SD 02

Erosion and Sediment Control Plan - Update

Stantec

EROSION AND SEDIMENT CONTROL PLAN - UPDATE

TOUQUOY GOLD PROJECT, MOOSE RIVER GOLD MINES, NOVA SCOTIA

June 30, 2020

Prepared for:

Atlantic Mining NS Corp
409 Billybell Way
Mooseland NS B0N 1X0

Prepared by:

Stantec Consulting Ltd.
40 Highfield Park Dr #102
Dartmouth NS B3A 0A3
Tel. (902) 468-7777

Project Number: 121619250

This document entitled Erosion and Sediment Control Plan - Update was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Atlantic Mining NS Corp (the "Client") to support the permitting requirements for Client's submission under the Environment Act 122A(1) Approval number 2012-084244-05 (the "Application") for the Touquoy Gold Project (the "Project"). In connection thereto, this document may be reviewed and used by the provincial and municipal government agencies participating in the permitting process in the normal course of their duties. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____
(signature)
Heather Amirault, P. Eng. (ON), CAN-CISEC

Prepared by _____
(signature)
Pamela Kuipers, P. Eng. (AB)

Reviewed by _____
(signature)
Dan McQuinn, P.Eng. (NS)

Approved by _____
(signature)

Mark Flinn, P. Eng. (NS)

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Executive Summary

The Touquoy Gold Project involves the construction and operation of an open pit gold mine that includes a process plant and waste management facilities. The project is located at Moose River Gold Mines in Halifax County, approximately 115 km from Halifax. Approximately 262 ha of the site has been disturbed as a result of the development of the mine site, as of January 2020.

This document is the Erosion and Sediment Control Plan (ESCP) for the development and operation of the site. The site has been operational since October 2017. The ESCP has purposely been broken down into phases to better define the existing conditions and proposed work activities at the site and the environmental controls that will be installed and/or maintained for those activities and ongoing operations.

The ESCP has been developed based on the following four principles:

1. Keep clean water clean;
2. Minimize the amount of exposed soil;
3. Minimize the time of exposure of bare soil; and
4. Keep sediment onsite.

The ESCP consists of two parts: drawings that show existing conditions and known near future conditions (Appendix A and B); and the corresponding text that details the erosion and sediment controls that are in place or will be implemented to minimize offsite impacts). The environmental controls and their implementation have been presented on Drawing 1 in Appendix A, while near future conditions are presented on Drawing 2 in Appendix B.

Typical practices for ESC are presented along with a process for developing a project specific ESC Plan for any future works. Where future works are known and current plans in place to construct, this report provides guidance for implementation for those specific works.

The ESCP should be considered a “living document” that may have to be changed or adapted during the life of the Project to be continually effective.

Changes or adaptations to the ESCP may occur if:

1. Environmental controls and/or practices for a specific area of the site are not effective;
2. Project scheduling prevents certain activities from being completed; and
3. Contractor presents an alternative procedure for environmental control in a specific area of the site that meets the intent of the original ESCP and complies with Site Approvals and Permits.

1.0 INTRODUCTION

This report is prepared as an update to the Erosion and Sediment Control Plan (ESCP) (Stantec, 2010) for the Touquoy Gold Project (the Project). It is presented as a response to a Nova Scotia Environment (NSE) Environment Act Directive with Process RSN number 12677396, updated November 25, 2019, which states that, pursuant to Environment Act 122A(1):

> **Atlantic Mining NS Corp. shall submit an updated version of the 2010 Erosion and Sediment Control Plan for the Touquoy Gold Mine to the Department by January 31, 2020. This updated plan shall be prepared, signed and stamped by a Qualified Independent Professional Engineer licensed to practice in Nova Scotia.**

The Project is carried out in compliance with existing legislation, consistent with Federal and Provincial guidelines, best practices and Atlantic Mining NS Corp (AMNS) Corporate Policies;

- Measures to mitigate environmental effects are documented;
- Benefits from the Project are enhanced; and
- Reporting is structured to inform adaptive management and continual improvement.

As a subsidiary of St. Barbara, key aspects of AMNS environmental management program include:

- Ongoing, progressive rehabilitation of previously mined areas;
- Focus on water and energy efficiencies and sustainability;
- Proactive reporting and managing of environmental hazards and incidents;
- Environmental training and awareness;
- Ensuring compliance with statutory guidelines; and

Community and stakeholder consultation (St. Barbara, 2019).

1.1 PROJECT SUMMARY

The Touquoy Gold Project involves the construction and operation of an open pit gold mine that includes a process plant and waste management facilities. The project is located at Moose River Gold Mines in Halifax County, approximately 115 km from Halifax. Approximately 262 ha of the site is occupied or has been disturbed as a result of the development of the mine site as of January 2020. The mine has been operational since October 2017.

The mine site is centered in an area characterized by substantial historical gold mining disturbance. Moose River Gold Mines owes its origin to these activities with the initial discovery dating back to the 19th Century. Refer to Figure 1 for the location of the site.

The project site is located within relatively flat topography with maximum relief of 25 m. Elevations within the catchments vary from approximately from 160 masl (metres above sea level) in the headwater areas to 110 masl at the outlet. The site is characterized by low relief, hummocky type terrain, with frequent drumlins and numerous lakes, ponds, streams, and wetland areas. Presently, as calculated from Drawing 1 the property is covered with 54.5% undisturbed area (standing regrowth forest, wetlands, and waterbodies) 43% mine related disturbed area, and 2.5% clear-cut land or cleared residential or built-up lots.

As of 2020, the mine is estimated to be in production until 2023, followed by five years of active reclamation (Stantec, 2019b).

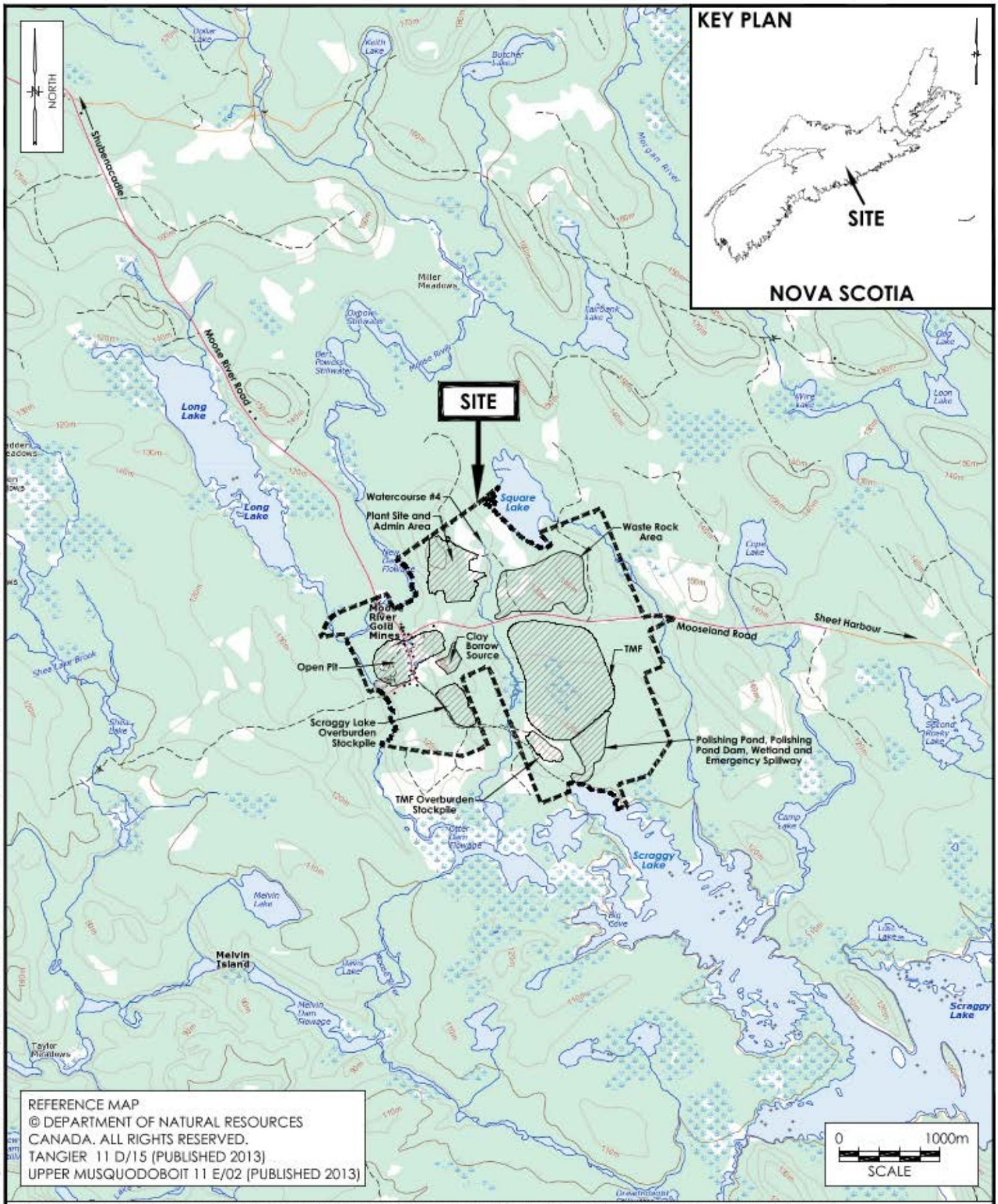
Refer to Drawing No. 1 in **Appendix A**, which shows the existing operational and water features at the Touquoy Gold Project site

1.1.1 Key Project Components

An open pit mine site requires many components to run. The key components of this Project are as follows:

- Open pit
- Waste rock storage area (WRSA)
- Plant site, buildings and supporting infrastructure, run of mine pile
- Tailings management facility (TMF) with polishing pond and engineered wetland
- Topsoil and overburden storage areas designated as TMF stockpile, and scraggy lake stockpile
- Clay borrow area
- Site roads, parking areas, and haul roads
- Water management facilities for contact water including collection ditches, ponds, and pumping infrastructure
- Effluent treatment plant
- Watercourse crossings
- Onsite pipelines
- Fuel and hazardous materials

A public roadway, Mooseland Road / Moose River Road, runs through the project site.



THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

SITE LOCATION PLAN

EROSION AND SEDIMENT CONTROL PLAN
TOUQUOY GOLD PROJECT
HALIFAX COUNTY, NOVA SCOTIA

Client: ATLANTIC GOLD CORPORATION

Job No.:	121619250
Scale:	1 : 50,000
Date:	2019 11 21
Dwn. By:	JL
App'd By:	HA

Fig. No.: 1

Stantec

V:\1216\active\121619250\1_geotechnical\3_drawings_logs\2500_TOUQUOY\4_Sheet_Files\4_TASK-985\121619250.2500.985_ESP_F01_REV0.dwg

2.0 EROSION AND SEDIMENT CONTROL PLAN (ESCP)

As part of the ongoing works at the Touquoy Gold Project site AMNS is committed to:

- Work with an independent professional engineer who will be retained to inspect, design, report and/or advise on the status of soil erosion and sedimentation controls during construction to ensure issues are addressed in a timely manner.
- Oversee site erosion and sediment control efforts to ensure compliance with NSE approvals.

2.1 PURPOSE AND OBJECTIVES

The purpose of the Project ESCP is to provide measures and Best Management Practices to minimize site erosion and protect nearby waterbodies from sedimentation for the protection of the environment.

Objectives and targets are established to drive continuous improvement in environmental performance and are consistent with the overall strategic goals of the Project. Objectives are measurable (where possible), monitored, communicated, and updated as appropriate.

In support of AMNS environmental objectives, the following performance objectives for the ESCP consider key Project interactions and compliance obligations:

- Prevent the uncontrolled release of sediment to natural watercourses;
- Compliance with applicable legislation and regulations including the Industrial Approval (2012-084244-06) and other approvals issued by NSE (Wetland Alteration Permit 2016-095967-03 and Water Withdrawal Permit 2017-103502-01); and
- Compliance with environmental monitoring criteria established as part of the environmental approvals process.

The ESCP should provide an effective tool for minimizing environmental impacts involving earthwork and operations activities during the operations of the project by:

- Identifying erosion and sediment control requirements before new site work commences;
- Managing surface water runoff where required;
- Providing measures to control erosion and sediment;
- Identifying potential impacts of erosion and sedimentation; and
- Identifying mitigation measures and their sequencing.

2.2 LIVING DOCUMENT

The ESCP identifies the location, design, and construction sequencing for appropriate erosion and sediment control. The ESCP should be considered a "living document" that may have to be changed or adapted during the life of the Project to be effective.

Changes or adaptations to the ESCP may occur if:

1. Environmental controls and/or practices for a specific area of the site are not effective;
2. Project scheduling prevents certain activities from being completed (e.g., hydroseeding being delayed until the following year due to lateness of season); and
3. Either the contractor or project personnel presents an alternative procedure for environmental control in a specific area of the site that meets the intent of the original ESCP and complies with site approvals and permits.

2.3 PLANNING

2.3.1 Organizational Roles and Responsibilities

All persons working for or on behalf of AMNS, including employees and contractors, have a role in the successful implementation and maintenance of the Erosion and Sediment Control Plan. Table 1 outlines roles and responsibilities for erosion and sediment control activities:

Table 1: Organizational Roles and Responsibilities

Role	Responsibility
Construction Manager (could be Project Manager for construction phase or relevant Departmental Manager during operation phase)	Oversee clearing and grubbing activities during the Construction and Operation phases of the Project. Collaborate with the Environment Manager/Superintendent to plan soil handling activities.
Environmental Manager/Superintendent	Collaborate with the Construction Manager to plan and direct soil handling activities. Identify, document, track, and maintain up-to-date compliance obligations. Communicate compliance obligations and provide training to employees and contractors. Report non-compliances to NSE, ECCC and/or DFO as required
Environmental Specialist/Environmental Technician	Collaborate with Construction Management to delineate areas of disturbance for construction activities.

	Supervise clearing and grubbing activities to minimize ground disturbance and supervise installation of erosion and sediment control measures. Complete environmental monitoring as per AMNS's Rainfall Event Monitoring Protocol (AGC-PRO-ENV 006)
Contractors	Provide competent and trained staff. Provide equipment and material for installation and maintenance of erosion and sediment control measures as requested by Construction Manager.
Operations Personnel/Equipment Operators	Complete applicable training in clearing activities, soil salvage, soil handling, and erosion and sediment control. Conduct clearing/grubbing and soil salvage/handling activities according to defined procedures. Responsible for monitoring and maintenance of ESC measures within regular work areas (for example, the Mine Department is responsible for ESC measures along haul roads, the Mill Department is responsible for ESC measures within the plant complex, Construction Managers are responsible for ESC measures within project areas including the TMF)
Independent professional	Inspect, design, report and/or advise on the status of soil erosion and sedimentation controls during construction as per 10.c) of the Industrial Approval.

It is essential throughout the implementation of this ESCP that communication between all parties be maintained. The following are key issues that must be addressed:

- Prior to installation of the environmental structures, the assigned Environmental Department team member must properly communicate the intention and details of the ESCP to the Contractor, and the Contractor must provide feedback if measures appear ineffective when constructed.
- During monitoring, the Environment Department must inform the Contractor of the surface water monitoring results as soon as possible when maintenance and repair to erosion and sediment controls is necessary.
- In the event that erosion and sediment controls fail, AMNS Operations personnel or the Environmental team member must immediately notify the Environmental Manager/Superintendent who will notify regulatory agencies as required and instruct the Contractor to make repairs within 12 hours.
- Field records will be kept by AMNS Environment Department and Operations personnel of all activities that could affect erosion and sediment control on this project to demonstrate due diligence to the regulatory agencies.

2.3.2 Competence, Training and Awareness

AMNS requires that persons working under its management, including employees and contractors, have the knowledge, understanding, skills and abilities to complete work in a manner that protects the environment. The following actions are established to provide worker competency, training and awareness:

Competency: As per Condition 10(c) of the Industrial Approval, AMNS will retain an independent professional engineer with specific ESC training and/or relevant experience to provide input and advice on sediment and erosion controls measures during construction activities and as needed during operations.

Training: Contractors shall provide a manager or site foreperson with specific ESC training or a minimum of 10 years of experience in installation and maintenance of ESC measures. Personnel involved with construction and earthworks are instructed by the environmental superintendent or senior operations staff on appropriate erosion and sediment control measures and requirements for the particular ESC component being constructed. Works-specific information is available through tender packages, tailgate discussions, and regular communication with site Environmental personnel. Lessons learned are communicated through tailgate discussions and internal memoranda as necessary.

AMNS workforce training is completed through instruction from the environmental superintendent and/or senior operations staff. The site Environmental Protection Plan is a training tool available to all employees and provides further information on erosion and sediment control procedures.

Awareness: As part of site orientation, applicable field personnel are made aware of erosion and sediment control concerns and obligations for the Project. General instructions for reporting potential erosion and sediment control concerns to site Environmental personnel are provided during this orientation. Lessons learned are communicated through tailgate discussions and internal memoranda as necessary.

2.4 BASIC PRINCIPLES OF EROSION AND SEDIMENT CONTROL

The approach taken on this project will emphasize erosion control techniques in an effort to eliminate or minimize the amount of sediment that is mobilized due to earthwork activities.

Nevertheless, Sediment Control Best Management Practices (Sediment Control BMPs) will be required. In some cases, additional sediment control (i.e., sediment ponds) may be required as a back-up or contingency in the event of large or frequent precipitation events.

The four basic principles of erosion and sediment control that have been included in the ESCP for the Touquoy Mine Project are described below.

2.4.1 Keep Clean Water Clean

Mixing clean water with sediment-laden water produces a larger volume of sediment-laden water to manage. Therefore, runoff will be directed away from active work areas prior to work commencing. If active work intercepts defined watercourses or wetlands, regulatory approval will be sought to divert the watercourse or alter the wetland prior to work commencing. Also, water from disturbed areas within the construction site will be intercepted and kept separate from surface runoff from undisturbed areas of the site.

2.4.2 Minimize the Amount of Exposed Soil

The most important consideration on this project and the one that has the potential to result in the largest adverse impact is the amount of exposed soil left open at any one time. The more soil that is exposed at any one time, the greater the erosion risk. The severity of this impact is based on soil erodibility, runoff erosivity (more frequent or intense runoff), slope length, and steepness.

Therefore, cover management and erosion control practices are emphasized in this ESCP as they are the most practical and cost-effective measures that can be utilized to control erosion.

2.4.3 Minimize the Time of Exposure

Another important consideration on this project is the amount of time that soils are left exposed. The longer the duration of exposure, the greater the risk.

Again, cover management and erosion control practices are emphasized in this ESCP as they are the most practical and cost-effective measures that can be utilized to control erosion.

2.4.4 Keep Sediment Onsite

Sediment leaving the site will be minimized. This will be achieved through the installation of sediment control measures along the perimeter of the site. These measures will be installed prior to the disturbance of any soils, with the exception of what is necessary to install these controls.

2.5 REQUIREMENTS OF THE ESCP

he following provisions have been included in the ESCP:

- Control measures will be in place prior to disturbance of the ground surface;
- Control measures will be constructed in accordance with applicable specifications;
- Periodic inspection of erosion and sediment controls will be carried out. Please refer to AMNS Rain Protocol (AGC-PRO-ENV-006 Rain Protocol) for procedures to follow prior to and during rainfall or freshet events;
- Erosion and sediment controls will be installed where they can easily be maintained;

- Buffer strips will be maintained around the construction site and wetlands; and
- Sections of the site will be stabilized as soon as they are brought to final grade.

2.6 RECEPTORS

There are a number of sensitive receptors on and adjacent to the site that will require protection from sediment-laden runoff generated during site development. The most sensitive receptors, based on their proximity to active work areas where land disturbance will be encountered, include:

- Moose River;
- Watercourse #4
- Unnamed tributaries to Moose River and associated wetlands;
- Scraggy Lake;
- Unnamed tributaries to Scraggy Lake; and
- Square Lake.

Figure 1 Illustrates the locations of these receptors.

In addition to the above receptors, third party properties are to be protected from sediment impacts. Property boundaries are indicated on Figure 1.

2.7 SOILS

Stockpiles onsite contain organic-rich soil and were constructed from the initial removal of topsoil and overburden materials from areas of the mine. The overburden materials include organic materials, silty-sand sediments, glacial tills, and rock (Stantec, 2019a). Runoff from topsoil / overburden areas can be identified by its brownish colour. Based on experience onsite, the site soils (topsoil and overburden) generate sediment laden runoff that will settle in a smaller sized settling basin.

Site roads are constructed from waste rock, which degrades into very fine particulates as traffic compacts and breaks the rock down. Runoff from waste rock areas can be identified by its grey colour. Based on experience onsite, sediment laden runoff from these roadways does not settle well in the smaller basins onsite. The best method that has been found to prevent these fine sediments from leaving the site has been to collect the runoff in collection ponds and pump it to the TMF pond where it can settle.

2.7.1 Surficial and Bed Rock Geology

Based on findings of an intrusive investigation conducted by GHD (2016a,b), the subsurface conditions in areas consistent with the Site generally consisted of a surficial layer of root mat, topsoil or peat overlying a sand and/or silt layer overlying glacial till and/or bedrock. Bedrock in the area predominantly consists of Meguma Group meta-sandstones and mudstones that have undergone alterations due to weathering, typically more permeable near the surface than the underlying bedrock (Stantec 2015). Mineralization

associated with quartz vein gold within the Meguma group also includes the presence of arsenopyrite that that is documented to elevate background arsenic geochemical conditions. Bedrock was previously encountered in subsurface investigations at between 0.6 m to 21.4 m below ground surface (GHD 2016a,b).

2.8 SELECTION OF BEST MANAGEMENT PRACTICES

2.8.1 Water Management BMPs

Water Management BMPs (i.e., offsite and onsite water control procedures) have been included in the ESCP to manage surface runoff and reduce the erosion potential of the site.

2.8.2 Erosion Control BMPs

Erosion Control BMPs have been included in the ESCP to manage exposed soil where there is the potential for erosion due to wind, rain splash, or flowing water.

Preventing erosion at the source reduces the amount of sediment that needs to be managed by down-gradient or perimeter sediment control measures. Cover is the most effective erosion control practice.

2.8.3 Sediment Control BMPs

Sediment Control BMPs have been included where there is a need to prevent mobilized sediment from leaving the site or entering a water body. Sediment controls will be placed close to the source to reduce the quantity of water that has to be managed.

Sediment control will primarily be accomplished by either filtering (i.e., sediment control fence) or settling sediment-laden runoff water (i.e. flow checks). Settling of sediment from onsite runoff has proven to be difficult and /or unsuccessful within smaller individual settling basins. The preferred methodology for treating sediment laden site runoff from site roadways and high traffic areas as of the time of writing this report is to collect the runoff via ditches and collector ponds and to pump the collected water to the TMF. This approach has resulted in reduced numbers of reportable events related to sediment releases.

3.0 TYPICAL PRACTICE FOR ESC

The Erosion and Sediment Control Handbook for Construction sites by the Nova Scotia Department of the Environment (NS ESC Handbook, 1989) provides guidelines for the preparation of an ESC plan. Typical ESC plans for any project undertaken onsite consist of a written report explaining the methods for erosion control and drawings showing the location of the erosion control measures within the existing site topography. Several site-specific considerations should be made in preparation of an ESC plan. These include, but are not limited to, existing topography and slopes, type of soil, drainage characteristics, proximity to watercourses. Furthermore, while erosion may occur in different locations at similar magnitude, it may be caused by different phenomena. As such, each issue should be addressed independently.

Regardless of site-specific features or issues present onsite, a typical ESC plan for any new site activity or activity expansion should contain the following documentation:

1) General statement of the project (on the report)

2) Topographic features (on the drawings)

3) Soil information (on both report and drawings)

4) Stormwater Management (SWM) program (on both report and drawings)

5) Proposed site alteration (on the drawings)

6) Temporary ESC measures to be used during construction (on both report and drawings)

7) Long-term ESC measures (on both report and drawings)

8) Maintenance for ESC measures (on report)

The “Factsheets” section of the NS ESC Handbook outlines in detail some potential ESC measures that can be used for this project. Other useful references include:

- Division 7 of the Standard Specification Highway Construction and Maintenance.by the Nova Scotia Department of Transportation and Public Works (1997).

Individual plans can be developed using the typical approaches outlined below and the information contained in the documents referenced in this section.

Refer to Drawing No. 3 in Appendix C for typical details.

3.1 CLEARING

Clearing activities specific to Erosion and Sediment Control plans should consider:

- What is the area of site to be cleared?
- What is the nearest waterbody? How near is it? How sensitive is it?
- What is the direction of surface water flow across the disturbed area?
- Is grubbing required or is clearing enough?
- Other environmental or regulatory considerations for tree clearing – i.e. approvals, surveys, etc.

Initial step of any clearing activity is to clear only enough area to install ESC measures. ESC measures, such as silt barriers, should be installed such that they prevent sediment laden runoff from leaving the proposed disturbance area and impacting a natural area or waterbody.

Clearing for large areas should proceed in phases, with each phase protected and / or stabilized before proceeding to the next.

Keep clean water clean – divert clean water around site using lined ditches. Should diversion of watercourses or wetlands be necessary, approval from NSE is required.

Prevent erosion onsite. Minimizing rutting and the exposure of bare soil during the clearing operation will be the most effective erosion control for any clearing activity. All vehicles used in the clearing operation shall use floatation tires, properly fitted for the vehicle. Any areas where extensive rutting or bare soil occurs as a result of the clearing operation should be temporarily covered with straw/hay mulch.

Prevent sediment laden runoff from leaving the site through the use of silt barriers, settling, or collection and treatment of runoff.

Cross culverts through cleared areas may be required as localized drainage dictates. These cross culverts will be installed prior to the commencement of grubbing on the site. Initially, grubbing should be limited to that required for cross culvert installation(s). After the cross culverts have been installed and erosion control measures have been placed at the culvert inlet and outlet locations, grubbing required for the balance of the work may proceed.

Grubbing of cleared areas should take place only if required for the ultimate purpose of the cleared land.

3.2 SITE GRADING

Consider:

- What is the area contributing flow to the grading area? Can external flows be directed around the area?
- What is the nearest waterbody? How near is it? How sensitive is it?
- Where is the runoff from the graded area being collected / treated?
- How long will the site grading take? Should long-term and / or temporary ESC measures be put in place?
- What is the material that is being graded (e.g. Overburden / topsoil or waste rock)? How does this affect erosion potential?

3.2.1 Slopes

Slope grading can be designed to reduce erosion potential. Techniques that can be applied include:

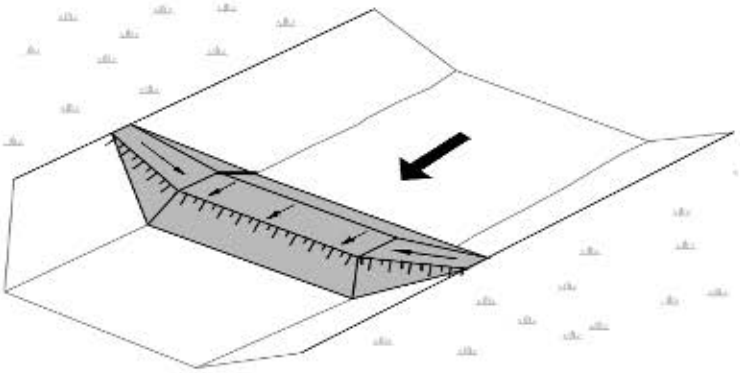
- Reduce the grade of the slope (i.e., create a 3:1 slope instead of a 2:1 slope)
- Reduce the height of the slope, either by keeping piles short, or by including benches / terraces into the slope to break up the overall slope length (See Figure 2) (NSE, 1989)
- If a slope will be in place for a long-term, stabilize the slope berms using an appropriate stabilization method (See Section 3.2.3).

Figure 2: Slope Benching

3.2.2 Berms

Berms can be created to keep runoff moving along a certain path (acting like the side of a ditch) or to slow or collect runoff (acting like a dam).

When constructing berms that are intended to act like a dam it is important to configure the ends of the berm so that water does not by-pass the retention area behind the berm. This configuration includes constructing both ends of the dam on an uphill slope (see Figure 3).



Berms should be constructed using material suited to their long-term use. Impermeable berms can be constructed with clay cores or highly compacted materials. Impermeable berms should be used in situations where water seeping through the berm would be unacceptable. Permeable berms can be constructed with rocks or gravels or using grubbing material. Permeable berms should be used in situations where the berm is intended to provide an opportunity for settling and water seeping through the berm would be clean.

Figure 3: Berm Configuration to Avoid Flow Around Ends

3.2.3 Stabilization

The best erosion protection is to not have exposed soils. This can be accomplished through vegetating the exposed soil area or covering the exposed area with a material that separates the soil from the cause of erosion (water or wind).

To establish vegetation a thin layer of topsoil is desirable over the area to be stabilized. Hydroseeding is an effective way to quickly establish vegetative cover and also works well on moderate slopes. Hydroseeding should be completed during the growing season. On shallow slopes straw mulch and hand broadcast seed may be sufficient to establish vegetation. On slopes with very low quality soils / substrate hydroseeding using biotic soils technology (also known as engineered soils) could be considered if vegetation growth is required. Outside the growing season areas may be stabilized using a rolled erosion control product (RECP) placed over hand broadcast seed or using a rock protection layer. Vegetated protection is usually best for a long-term application. For short term applications or on steep slopes a rock protection layer may be most appropriate.

3.3 DITCHES

Consider:

- What is the area contributing flow to the ditch? Is this area planned to change or remain the same over the life of the structure?
- What is the nearest waterbody? How near is it? How sensitive is it?
- Where is the water in the ditch being collected?
- How long will the ditch be in use? What flow / volume should it have capacity for?
- What is the slope and conveyance capacity of the ditch? What size of material should be used to line it?

Ditches may be constructed into native till without a clay liner if the material is competent. Clay liners may be employed to keep flows within the ditch and prevent seepage. Where seepage is desired as part of the function of the ditch the clay liner may be left off one or both sides of the ditch as appropriate to the desired function of the ditch (e.g. – if the ditch is conveying runoff along a haul road it may be appropriate to clay line the full ditch, if the ditch is conveying runoff / seepage from a pile onsite it may be appropriate to leave out the clay liner along the side of the ditch adjacent to the pile.)

Ditches should have a lining of erosion resistant material. This material should be sized to remain stable under the proposed design flow.

Some ditches onsite include or may be designed to include seepage ponds. These ponds should be pumped out and cleaned out regularly. See Section 3.4 for details on pond clean-out. Appropriate setbacks from property limits and environmental features should be considered when constructing new ditches.

3.4 PONDS

Consider:

- What is the area contributing flow to the pond? Is this area planned to change or remain the same over the life of the structure?
- What is the nearest waterbody? How near is it? How sensitive is it?
- How long will the pond be in use? What volume should it have capacity for?
- What is the cleanout procedure for the pond? What material should be used to line it?

Ponds may be constructed into native till without a clay liner if the material is competent. Clay liners may be employed to keep flows within the pond and prevent seepage. Where seepage is desired as part of the function of the pond the clay liner may be left out. To prevent erosion on the side slopes and at the

inlet, ponds should be lined with rock material. Rock material at the inlet should be sized to remain stable under design flow conditions.

If the pond is being used for settling, the pond should be designed based on the particles found in site runoff. Operational experience has indicated that settling ponds can be effective for runoff from overburden or topsoil areas but have proven ineffective for runoff from areas containing waste rock (i.e. WRSA, or haul roads). A laboratory analysis of settling characteristics should be conducted to support pond design if settling is desired for runoff from waste rock areas. Longer settling distances will increase the amount of sediment that settles in the pond (See Figure 4).

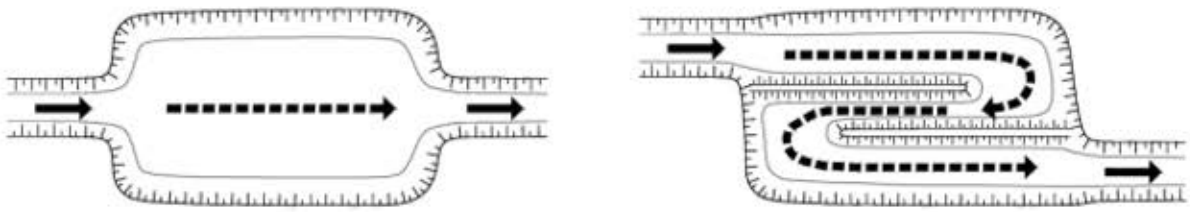


Figure 4: Flow Plath Lengths in Settling Basins

3.4.1 Pond Cleanout Procedures

If sediment build up occurs in a pond it should be cleaned out. Clean outs should be scheduled based on the rate of accumulation and the size of the pond facility. Ponds that accumulate sediment quickly should be cleaned more regularly. Ponds that are small and have limited storage capacity should also be cleaned more regularly. Pond clean out can be completed using a hydro-vac to extract accumulated sediment or using an excavator where space and safety permits. If excavator cleanouts result in some of the pond liner rock being removed this rock should be replaced.

New pond design or pond modifications should consider access for clean out as well as clean out equipment size and availability. Appropriate setbacks from property limits and environmental features should be considered when constructing new ponds.

Sediment that is cleaned out from a collector pond should be disposed of in the WRSA or TMF.

Many of the ponds onsite do not have outlets into the environment but are rather controlled by pumping out the collected water. Pumping should be conducted on a regularly scheduled basis and / or as needed based on accumulated runoff volumes. Pumped pond water should ultimately be discharged to the TMF or other purpose built pond with controlled discharge meeting Metal and Diamond Mining Effluent Regulation (MDMER) requirements. Fueling of pumps should take place over a spill protection container.

In preparation for a rain or snowmelt event, ponds should be pumped to their lowest level to provide maximum capacity for runoff collection. Ponds with lower capacities should have pumps available during runoff events to ensure that ponds do not overflow into the environment.

3.5 ROADWAYS

Consider:

- What is the direction of surface flow on the roadway?
- What is the nearest waterbody? How near is it? How sensitive is it?
- What is the roadway material? How does this affect erosion potential from rain or wind?
- Where is the water from the roadway being collected?
- How could road grading be used to affect flow on the roadway?

Most of the access and haul roads onsite have been constructed with berms on one or both sides of the road to control the flow of road runoff. While roads are regularly maintained and graded, the roads generate some of the most sediment laden runoff onsite. Road drainage is typically directed into ditches through irregularly spaced cuts into roadside berms or into collector ponds at low points in the road profile.

Berms are required along roadways in areas where the absence of a berm would allow road runoff to discharge into the environment. In areas where road runoff is directed into a collector pond or a ditch leading to a collector pond a berm may not be required.

Road grading configurations, such as super elevation or a reverse crown grading can help direct and control runoff (see Figure 5). In areas where it is desirable to keep runoff away from the edges of the road, such as where the waste rock haul road crosses the Watercourse 4 a reverse crowned road grading configuration is appropriate. In areas where it is desirable to have all road runoff flow towards a collection point such as a ditch or pond, for example the TMF access road between the pit haul road and the TMF perimeter road the super elevation of the roadway is appropriate to direct runoff towards the north side of the road.

Road berm maintenance will be required periodically to remove accumulated sediments that have been pushed to edge of road along the berms by grading operations. During this maintenance activity, ensure berms remain intact and reinforce as required.

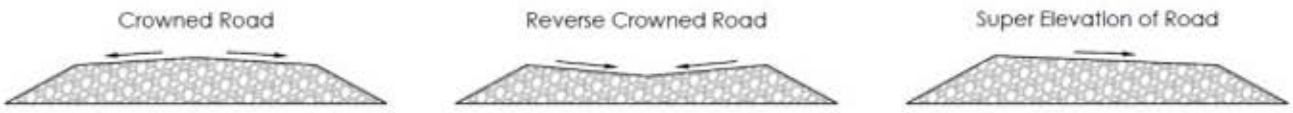


Figure 5: Road Grading Configurations

In the non-freezing months water from the polishing pond is used for on-site road dust suppression at areas of controlled drainage including the tailings dam crest, haul roads and access roads. Dust

suppressant is applied evenly and in quantities that do not cause direct surface runoff to the environment. Water is not taken from the engineered wetland as this water has already been metered for MDMER purposes. Water from the Open Pit is used for dust suppression within the open pit area. Raw water from Scraggy Lake is used for dust suppressant at the Mill crushing circuit.

In the winter months a Magnesium Chloride solution is used for onsite road dust suppression at the time of writing. This suppressant is in flake form and is applied using a salt spreader. At the Mill crushing circuit an Antifreeze dust suppressant named IPAC 1299F is also used.

3.6 STOCKPILES

Consider:

- What is the direction of surface flow on and around the stockpile?
- What is the nearest waterbody? How near is it? How sensitive is it?
- What is the stockpile material (e.g. Overburden / topsoil or waste rock)? How does this affect erosion potential?
- Where is the water from the stockpile being collected?

Appropriate setbacks from property limits and environmental features should be considered when constructing new stockpiles.

Runoff from exposed stockpile slopes should not be discharged directly into the environment. Containment features such as ditches or sediment barriers should be included around stockpiles to prevent sediment eroded from stockpile slopes from entering the environment. A perimeter drain may be used to control both sediment and flow direction. Section 3.2.1 ‘Slopes’ and Section 3.2.3 ‘Stabilization’, can be referenced when developing strategies to reduce erosion potential on stockpile slopes. Where stockpile slopes are at a grade that is either final, or not going to change for several years, stabilization using vegetation should be implemented.

3.7 RAIN EVENT PREPARATION

In preparation for a rain or snowmelt event there are many things that mine environmental and operation staff can do to allow ESC measures to perform well.

- Ponds should be pumped to their lowest level to provide maximum capacity for runoff collection. Ponds with lower capacities should have pumps available during runoff events to ensure that ponds do not overflow into the environment. Verify that pond inlets are stable, and that rock lining is in place to resist erosion.
- Preparation for pumping should include fueling pumps, verifying that pumps and any required backup systems are in the right locations and accessible.

Typical Practice for ESC

- Check that road grading is in place in areas where road grading (super elevation or reverse crown) is used specifically to control runoff. Verify condition of road berms and make repairs as required.
- Install extra berm cuts in roadway berms where required to allow flows more direct route into perimeter ditches or collector ponds.
- Where silt barriers are providing runoff / sediment control verify condition of barrier and make repairs as required.
- Consider adding temporary rock or RECP protection to sites that are in active transition or where final ESC measures have not yet been placed. Grade areas under construction to direct runoff towards collection or treatment areas.

Consider the need to reinforce and stabilize areas that have had erosion issues previously.

4.0 CURRENT CONDITIONS

The current conditions of ESC controls and measures are presented on Drawing No. 1 in Appendix A. Operations staff are responsible for maintaining the current ESC measures. These measures are described in further detail in the following subsections.

4.1 PLANT SITE AND ADMINISTRATION AREA

This site is vulnerable to erosion through traffic movement and runoff from precipitation. ESC measures in place include:

- Ditches to convey runoff to collector pond(s)
- A large collector pond to the south of the plant site
- A smaller settling pond near the security area
- A small settling pond near the access road crossing of watercourse #4
- Road berms
- Stabilization of disturbed areas with hydroseeding

Table 2 presents a summary of issues and solutions for ESC at the plant site and administration area.

Table 2: Plant Site and Admin Area Issues and Solutions

Issues	Solutions
Dust	Wetting of roads in summer using water from the polishing pond Dust suppressant in winter months.
Undersized collector pond at road crossing #4	Regular inspection during rain events, ongoing pumping during rain events, including a back-up pump system. Prepare design for larger collector pond.
Sediment from haul road south of plant site accumulates in areas near the haul road crossing of Mooseland Road	Design for improved drainage conveyance on roads and in ditches and new / upsized collector ponds is under development.
Impacts to roadways from traffic and runoff	Road grading and maintenance to maintain road drainage patterns and road berms. Grade roads to slope water towards ditches using super elevated or crowned road method as appropriate.

4.2 OPEN PIT AND CLAY BORROW AREA

This site is vulnerable to erosion through traffic movement, runoff from precipitation, and erosion and sedimentation due to clearing, grubbing and grading in the clay borrow area. ESC measures in place include:

- Ditches to convey runoff
- Grading of pit and surrounding roads, and clay borrow pit to direct runoff towards pit sump
- Diversion ditches
- Road berms
- Grubbings berm at perimeter of clay borrow area.

Table 3 presents a summary of issues and solutions for ESC at the open pit and clay borrow area.

Table 3: Open Pit and Clay Borrow Area Issues and Solutions

Issues	Solutions
Dust	Wetting of roads in summer using water from the polishing pond Dust suppressant in winter months.
Sediment from haul road towards WRSA and plant site accumulates in areas near the haul road crossing of Mooseland Road	Design for improved drainage conveyance on roads and in ditches and new / upsized collector ponds is under development.
Impacts to roadways from traffic and runoff	Road grading and maintenance to maintain road drainage patterns and road berms. Grade roads to slope water towards open pit using super elevated road method as appropriate.
Pit and clay borrow area expansion requires new clearing, grubbing, and grading	Follow ESC practices outlined in this document. Keep site graded towards pit. Erect sediment barrier to protect natural areas around clay borrow site.

4.3 WASTE ROCK STORAGE AREA AND ACCESS ROAD

This site is vulnerable to erosion through traffic movement, runoff from precipitation, and maintenance activities on haul road at watercourse #4 crossing. ESC measures in place include:

- Perimeter ditches to convey runoff
- Road berms with berm cuts

- Super elevated and reverse crown road grading on haul roads
- Collector ponds

Table 4 presents a summary of issues and solutions for ESC at the WRSA and access road.

Table 4: WRSA and Access Road Issues and Solutions

Issues	Solutions
Dust	Wetting of roads in summer using water from the polishing pond Dust suppressant in winter months.
Sediment from haul road between large collector ponds collects in low spot next to roadway	Keep super elevated road grading in place, verify before large rain / melt events. Consider construction of collector pond at low spot. Consider need for this section of haul road and remove / restore if not necessary for operations.
Impacts to roadways from traffic and runoff	Road grading and maintenance to maintain road drainage patterns and road berms.
Crossing of Watercourse #4	Follow ESC practices outlined in this document. Keep reverse crown grading in place on haul road, verify before large rain / melt events. Extra care in grading / maintenance of roadway at watercourse crossing to ensure road berm remains effective barrier to water crossing through berm / retaining wall. Preparation for large runoff events should include preparing berm cut in access road to convey runoff into perimeter ditch so that flows don't overwhelm small collector pond at access road crossing of watercourse #4.

4.4 TAILINGS MANAGEMENT FACILITY

This site is vulnerable to erosion through traffic movement, runoff from precipitation, and construction activities on the TMF dam and perimeter roads. ESC measures in place include:

- Perimeter ditches to convey runoff
- Road berms with berm cuts to control runoff to collector ponds and seepage ponds.
- Super elevated road grading on access roads
- Turbidity curtains
- Stabilization of disturbed areas with hydroseeding and rock fill cover

Table 5 presents a summary of issues and solutions for ESC at the TMF.

Table 5: Tailings Management Facility Issues and Solutions

Issues	Solutions
Dust	Wetting of roads in summer using water from the polishing pond Dust suppressant in winter months.
Impacts to roadways from traffic and runoff	Road grading and maintenance to maintain road drainage patterns and road berms. Grade roads to slope water towards ditches using super elevated or crowned road method as appropriate.
Runoff from site towards Scraggy Lake	Ensure runoff is captured before entering Scraggy Lake Ensure roads are compacted and have appropriate berms, berm cuts, and grading. Ensure turbidity curtains are in place in Scraggy Lake prior to large rain / melt events. Stabilize slopes and disturbed areas with hydroseeding or granular cover.
Crossing of Watercourse #4	Follow ESC practices outlined in this document. Keep reverse crown grading in place on haul road, verify grading before large rain / melt events. Extra care in grading / maintenance of roadway at watercourse crossing to ensure road berm remains effective barrier to water crossing through berm / retaining wall.

4.5 TMF OVERBURDEN STOCKPILE

This site is vulnerable to erosion through traffic movement, runoff from precipitation, and slope erosion. ESC measures in place include:

- Road berms
- Settling pond
- Stabilization of disturbed areas with hydroseeding or rock fill covering.
- Coir logs

Table 6 presents a summary of issues and solutions for ESC at the TMF Overburden Stockpile.

Table 6: TMF Overburden Stockpile Issues and Solutions

Issues	Solutions
Dust	Wetting of roads in summer using water from the polishing pond Dust suppressant in winter months.
Impacts to roadways from traffic and runoff	Road grading and maintenance to maintain road drainage patterns and road berms.
Slope runoff / erosion	Stabilize slopes with hydroseeding. Benching or terracing in slopes to shorten slope lengths.
Runoff from site towards Scraggy Lake	Ensure runoff is captured in settling pond before leaving site. Verify flow path from stockpile to historic road/ drainage draw and place sediment barriers to collect sediment and disperse flows. Monitor and maintain coir logs, placing additional measures if required. Ensure turbidity curtains are in place in Scraggy Lake prior to large rain / melt events.

4.6 SCRAGGY LAKE OVERBURDEN STOCKPILE

This site is vulnerable to erosion through traffic movement, runoff from precipitation, and slope erosion. ESC measures in place include:

- Road berms
- Partial perimeter ditch
- Silt fencing
- Grubbing berm
- Stabilization of disturbed areas with hydroseeding

Table 7 presents a summary of issues and solutions for ESC at the Scraggy Lake Overburden Stockpile.

Table 7: Scraggy Lake Overburden Stockpile Issues and Solutions

Issues	Solutions
Dust	Wetting of roads in summer using water from the polishing pond Dust suppressant in winter months.
Impacts to roadways from traffic and runoff	Road grading and maintenance to maintain road drainage patterns and road berms. Grade roads to slope water towards ditches using super elevated or crowned road method as appropriate.
Slope runoff / erosion	Stabilize slopes with hydroseeding. Consider benching or terracing in slopes to shorten slope lengths. Design for extension of perimeter ditch is under development. Further ESC measures for consideration: • Construction of a settling wetland to the north of the stockpile, • Construction of a ditch to convey water from the top of the stockpile to the pit.

4.7 MAINTENACE OF EXISTING WORKS

Ongoing maintenance of current ESC measures is the responsibility of the AMNS Operations personnel. Monitoring of existing conditions is required to determine when maintenance is required. Additional details on ESC monitoring are included in Section 6. Changes or upgrades to existing controls involving a change in the type of control or a significant relocation of the control shall incorporate guidance from an independent professional engineer.

The mine is nearing its full extent of operations. No major expansions to the footprint of existing infrastructure described above in Section 4 are planned in the near future, except for minor expansions to the pit, waste rock storage area, access roads, and clay borrow areas. ESC measures required for existing infrastructure are in line with those identified for the current conditions, with ongoing maintenance or replacement required as identified in Table 8.

Table 8: ESC Measures, Maintenance Triggers, and Actions

ESC Measure	Maintenance Trigger	Action Required
Silt Fence or Other Silt Barrier	Sediment build up to 1/3 of height,	Removal of accumulated sediment, re-establish silt barrier. Or establish new silt barrier downstream of barrier that is full of sediment.
Vegetation	Presence of rills Bare patches	Regrade and reseed.
Road Grading	Rutting,	Road regrading.

Table 8: ESC Measures, Maintenance Triggers, and Actions

ESC Measure	Maintenance Trigger	Action Required
	specific grading, such as reverse crown, not in place	
Berms	Breaks in berm Erosion on berm slopes Flow through berms meant to be impermeable Berm overtopped	Repair berms.
Ditches	Rock liner out of place Sediment accumulation affecting conveyance capacity	Reinstall rock liner – evaluate possibility that larger rocks are required to withstand flows. Mechanical / or hydrovac removal of sediments.
Perimeter Ditches	Rock liner out of place Sediment accumulation affecting conveyance capacity	Reinstall rock liner – evaluate possibility that larger rocks are required to withstand flows. Mechanical / or hydrovac removal of sediments.
Collector Ponds	Water levels nearing 1/2 pond capacity OR Capacity less than required for a 1 in 25-year storm event.	Pump pond to empty it. Ensure pumping capacity is available.
Settling Ponds	Sediments more than 0.3 m deep on average	Mechanical / or hydrovac removal of sediments. Re-establish pond lining if required.

5.0 NEAR FUTURE PHASE

The near future phase consists of all works anticipated in the next 2-3 years that are required to bring the mine into its full extent of operation for the life of the mine. While rerouting of roads and ditches and expansions to the open pit, waste rock storage area and borrow areas are anticipated, most infrastructure is in place and primary efforts are focused on maintenance of existing works. Refer to Drawing No. 2 in Appendix B for the mine layout and infrastructure anticipated in the near future. Installation and maintenance of new ESC measures related to near future specific site improvements is the responsibility of the Contractor.

5.1 PLANNED WORKS

The following subsections describe projects and expansions that are planned for the near future to support ongoing mine operations and improve site water management. Refer to Drawing No. 2 in Appendix B for the location of these features.

5.1.1 Scraggy Lake Overburden Stockpile Ditch and Pond

Under existing conditions, the water from the southwest ditch around the stockpile discharges to the wetland east of the stockpile, while the ditch to the northwest is directed to a vegetated area adjacent to the unnamed Moose River tributary to the west. The surface of the pile is graded to direct the majority of the water to the north in the direction of the open pit, with minor amounts directed to the east, west, or south.

The overburden ditch project consists of approximately 460 m of rock lined ditching to be constructed of waste rock material along the east side of the stockpile and a storm water storage pond to the south. Additional ditching work is also planned for the northwest side of the stockpile to redirect drainage along the west side of the pile and the top of the pile to the proposed storm water pond to the south. The project serves to mitigate issues identified in Section 4.6. There is a small wetland area (Wetland 28) +/-30m adjacent to the working area. Therefore, the project is considered to be of high environmental sensitivity. Authorization will be required from NSE prior to implementing any works outside the current approved project footprint at this site.

As the project is itself an ESC measure, ESC concerns for the project are primarily related to the construction phase. Construction activities consist of Clearing and Grubbing of work area, the excavation of ditches, lining Ditches with clay and rock, and seeding outer ditch slopes. Typical ESC Measures identified in section 3.1 (Clearing), Section 3.2 (Grading), Section 3.3 (Ditches) and Section 3.7 (Rain Event Preparation) shall be referenced throughout the project, as summarized below.

Erosion Control:

- Prevent erosion onsite. Minimizing rutting and the exposure of bare soil during the clearing operation will be the most effective erosion control for any clearing activity.
- Any areas where extensive rutting or bare soil occurs as a result of the clearing operation should be temporarily covered with straw/hay mulch.
- Construct temporary berms or barriers to reduce volume of upgradient runoff entering the working area.
- Work from downstream to upstream such that the first component constructed is a temporary pond which can receive runoff for pumping to a treatment area.
- Grade and vegetate slopes adjacent to natural areas

Sediment Control:

- Inspect, repair or reinstall sediment control fence along the perimeter of the Construction Areas prior to the commencement of any clearing (only clear and grub wide enough to allow the installation of fence);
    - Replace with coir logs and establish vegetated buffer at outer slope toes adjacent to natural areas for long-term erosion control at close of construction

Maintain sumps as needed during construction, pumping water to the existing perimeter diches. Pump intake or discharge filters may be required to ensure ditches are not overwhelmed with sediment.

5.1.2 Haul Road Crossing Ponds

A number of improvements and upgrades are planned for the intersection area at the center of the plant site, including new settling ponds and ditch upgrades. The work to the west of the main haul road (two ditch upgrades and a 0.3 ha footprint settling pond) is considered to be of low environmental sensitivity due to the +/-335 m buffer between Watercourse #4 and the works. The work to the east, (ditch upgrades and a 0.2 ha footprint settling pond, surrounded by roads), is considered to be of moderate environmental sensitivity due to the adjacent Watercourse #4 within +/- 70 m.

ESC concerns for the project are primarily related to the construction phase. Best Management Practices (BMPs) will be implemented to reduce risk of sediment-laden runoff leaving the site and entering into any of the above noted watercourses. Typical ESC Measures identified in Section 3.1 (Clearing), Section 3.2 (Grading), Section 3.3 (Ditches) and Section 3.7 (Rain Event Preparation) shall be referenced throughout the project, as summarized below.

Erosion Control:

- Prevent erosion onsite. Minimizing rutting and the exposure of bare soil during the site preparation and excavation operations
- Any areas where extensive rutting or bare soil occurs as a result of the clearing operation should be temporarily covered with straw/hay mulch.
- Hydroseed bare soils or cover with rock for long-term stabilization at close of construction works

Sediment Control:

- Where downgradient runoff is not captured by the collector pond system, install sediment control fence along the perimeter of the work footprint prior to the commencement of any site preparation or grading works (only clear and grub wide enough to allow the installation of fence initially, as applicable);

Maintain temporary sumps, ditches, and berms as needed within the perimeter of the working area, pumping sediment-laden water to the collector pond system for management and discharge to the environment via the TMF

5.1.3 Access Road Collector Pond Improvements

A small sediment collection pond exists near the Plant Access Road water crossing for Watercourse #4, between the Plant Site and WRSA. Runoff from the roadway is intercepted by the collector sump and pumped to the TMF via a series of ditches and ponds. The sump is undersized for purpose and is scheduled for upgrading to a collector pond. The construction footprint of the pond is in draft format and portions of the upgraded ditching are within 30 m of Watercourse #4 and its associated wetland areas. The Collector Pond construction project is therefore considered to be of high environmental sensitivity. Authorization will be required from NSE prior to implementing any works outside the current approved project footprint at this site.

ESC concerns for the project are primarily related to the construction phase, as pond improvements are an ESC measure. Best Management Practices (BMPs) will be implemented to ensure that no sediment-laden runoff leaves the site and enters into any of the above noted watercourses. Typical ESC Measures identified in Section 3.1 (Clearing), Section 3.2 (Grading), Section 3.3 (Ditches) and Section 3.7 (Rain Event Preparation) shall be referenced throughout the project, as summarized below.

Erosion Control:

- Prevent erosion onsite. Minimizing rutting and the exposure of bare soil during the site preparation and excavation operations.
- All vehicles used in clearing operations shall use floatation tires, properly fitted for the vehicle.

- Any areas where extensive rutting or bare soil occurs as a result of the clearing operation should be temporarily covered with straw/hay mulch.
- Hydroseed bare soils or cover with rock for long-term stabilization as indicated on design drawings.

Sediment Control:

- Where downgradient runoff is not captured by the collector pond system, install sediment control barriers along the perimeter of the work footprint prior to the commencement of any site preparation or grading works (only clear and grub wide enough to allow the installation of fence initially, as applicable).
- Maintain temporary sumps, ditches, and berms as needed within the perimeter of the working area, pumping sediment-laden water to a collector pond for management and discharge to the environment via the TMF.

5.1.4 Open Pit Expansion, Waste Rock Storage Area Expansion, and Clay Borrow Expansion

The disturbance footprint of the open pit is expected to increase by 0.5 ha in the near future (pending NSE approval). This area has been harvested for merchantable timber previously, but will be cleared of remaining brush, grubbed and then excavated. The Open Pit Expansion area is considered to be of moderate environmental sensitivity due to the proximity of Moose River to the west, which has ESC measures in place to act as a buffer (diversion ditches, hydroseeded slopes), and the presence of an unnamed stream which originates in the wetland area at the south east. Authorization will be required from NSE prior to implementing any works outside the current approved project footprint at this site.

The footprint of the WRSA is expected to increase by 5.7 ha under future conditions (pending NSE approval). The WRSA expansion is considered to be of high environmental sensitivity due to its proximity to the Square Lake and Watercourse #4.

Similarly, the footprint of the clay borrow expansion, adjacent to the Open Pit is expected to increase by 2.2 ha in the near future. The clay borrow expansion area is considered to be of moderate environmental sensitivity because of the close proximity to the stream originating in the Open Pit area and associated wetlands.

Best Management Practices (BMPs) will be implemented to ensure that no sediment-laden runoff leaves the expansion site(s) and enters into any of the above noted watercourses. Typical ESC Measures identified in Section 3.1 (Clearing), Section 3.2 (Grading), Section 3.3 (Ditches) and Section 3.7 (Rain Event Preparation) shall be referenced throughout the project, as summarized below.

Near Future Phase

Erosion Control:

- Prevent erosion onsite. Minimizing rutting and the exposure of bare soil during the clearing operation will be the most effective erosion control for any clearing activity.
- Any areas where extensive rutting or bare soil occurs as a result of the clearing operation should be temporarily covered with straw/hay mulch.
- Hydroseed bare soils for long-term stabilization.
- Reinstate diversion ditches and/or berms as applicable.

Sediment Control:

- Where possible grade sites to Drain water towards open pit(s).
- Where downgradient runoff is not captured by an open pit install or inspect and repair sediment control barriers along the perimeter of the Expansion Areas prior to the commencement of any clearing (only clear and grub wide enough to allow the installation of fence initially, as applicable).
- Maintain temporary sumps and ditches as needed within the perimeter of the sediment control fence, pumping sediment-laden water to the open pit or collector pond system for management and discharge to the environment via the TMF.

6.0 MONITORING AND MAINTENANCE

It is essential throughout the implementation of this ESCP that communication between all parties be maintained. The following are key issues that must be addressed:

- Prior to installation of the environmental structures, the assigned Environmental Inspector must properly communicate the intention and details of the ESCP to the Contractor, and the Contractor must provide feedback if measures appear ineffective when constructed.
- During monitoring, the Environmental Inspector must inform the Contractor of the surface water monitoring results as soon as possible when maintenance and repair to erosion and sediment controls is necessary.
- In the event that erosion and sediment controls fail, AMNS and the regulatory agencies must be notified immediately of failure and potential impacts and the Contractor instructed to make repairs within 12 hours.

Field records will be kept of all activities that could affect erosion and sediment control on this project to demonstrate due diligence to the regulatory agencies.

6.1 REVIEW OF EROSION AND SEDIMENT CONTROL MEASURES

All erosion and sediment control measures must be installed in compliance with specifications and manufacturer's instructions. Improper installations may not be effective or may fail allowing the mobilization and transport of sediment offsite.

Environmental control measures will be reviewed by the trained Environment Department team member or independent professional engineer during construction and any deficiencies will be corrected by the Contractor or Operations personnel as soon as possible. If the environmental controls included in the ESCP have to be replaced or adapted, then this process should be recorded in a written addendum to the ESCP.

Weather forecasts should be consulted during site preparation on a daily basis. In the event of a forecasted precipitation event in excess of 15 mm in 24 hours, or 5-10 mm within three hours, environmental controls will be inspected in the field by the trained Environment Department team member and preventative maintenance carried out by the Contractor or operations personnel in advance of a storm.

If deficiencies arise that that cannot be rectified through regular maintenance procedures, an independent professional engineer should be retained to provide advice on resolving the deficiency.

6.2 DURING CONSTRUCTION MONITORING AND MAINTENANCE

Effective monitoring, including frequent inspections of environmental control measures, is critical to demonstrating due diligence and for managing the consequences of the project. Through early detection of problems, long-term consequences can be minimized.

Monitoring will be undertaken for active construction areas to ensure the effectiveness of the ESCP and compliance with regulatory requirements. Monitoring of environmental controls will be carried out at the construction area each day construction is active. A more detailed examination of controls will be carried out prior to and immediately after a rainfall event; a snowmelt event; or a combination of the two (where the combined total is $\geq$ 15 mm). Areas that will be routinely monitored include:

- Areas of exposed soil;
- Areas adjacent to watercourses;
- Site access points and roadways; and
- All environmental control measures.

Maintenance and monitoring of the erosion and sediment controls is the responsibility of AMNS and the site Contractor as outlined inTable 1. Maintenance activities should be according to the conditions outlined in this ESCP.

Flow checks and sediment ponds require sediment removal when the sediment reaches a height of 0.3 m or one-third the effective height of the control.

Inspection observations and maintenance requirements completed by the Environmental Technician/Specialist should be recorded on a standard form.

Inspection and monitoring for TSS may suggest that some environmental controls need to be replaced or modified because they are ineffective. Advice from an independent professional engineer will be sought to develop remedial ESC solutions.

6.3 POST-CONSTRUCTION MONITORING

Effective long-term monitoring of ESC measures will be essential to minimizing erosion and sedimentation on the site. If problem areas are identified, the cause will be identified and a remediation plan prepared to correct deficiencies. Monitoring onsite is the responsibility of the Environmental Technician/Specialist. Advice from an independent professional engineer will be sought to develop remedial ESC solutions.

In situations where considerable ongoing erosion has occurred, regrading work (earthwork) may have to be undertaken to redesign slopes and/or drainage channels. The regulatory agencies should be kept apprised of all proceedings by the Environmental Department manager.

6.4 CONTINGENCY PLANNING MEASURES

In case the ESC measures in place onsite are ineffective or are overwhelmed by significant flows it is important to have a contingency plan and backup supplies available. Contingency planning should include consideration of the following information:

- Quantity and location of stored erosion and sediment control mitigation materials onsite;
- Instructions on how construction equipment can be made available on short notice (including owner/operator details);
- Plan for preventing the offsite discharge of sediment-laden runoff from the site; and
- A plan for emergency sequence of activities, including shutdown of the activity.

AMSN has systems and protocols in place to address these items, as follows:

AMNS maintains a list of Emergency Preparedness supplies and locations onsite, including supplies that could be required to remediate or maintain ESC measures, such as pumps, silt fencing, coir logs, and strawbales. Mine equipment (E.g. excavator, bobcat) can also be mobilized in case of need. Additionally, the mine's Environmental Protection Plan "Section 2.8 Erosion and Sediment Control" and Standard Operating Protocol (SOP) "PRO ENV 006 Rain Event Monitoring Protocol" includes details on what to watch for and an action plan if a silt release event is suspected. Steps include:

- The person who discovers the ESC issue should notify their supervisor of the visual sedimentation.
- The supervisor should contact the Environmental Department about the sediment issue. If the runoff is in a watercourse or has the potential to enter a watercourse, notification to the Emergency Spill Line may be required.
- Environmental Department staff will:
  - Work with the relevant department to determine the point source of sedimentation.
  - Provide Notification to the Emergency Spill Line if runoff is in a watercourse or has potential to enter a watercourse.
  - Work with an independent professional engineer to ensure issues are addressed in a timely manner.
  - Oversee site erosion and sediment control efforts to ensure compliance with NSE approvals.
- Operations staff, with direction/support from the Environment Department, will:
  - Correct any issues that need attention or maintenance using proper tools / equipment.
  - Halt all construction activities if necessary.
  - Work with the independent professional engineer to ensure issues are addressed in a timely manner

- Install additional ESC controls if needed to prevent further release of sediment (e.g. installation of silt fencing or the placement of straw bales).

- Environmental Department will confirm and compile documentation, including:
  - The location of the silt release and cause of ESC failure (if known).
  - A description of the issues and corrective actions.
  - Communication, decision making discussions, and outcomes, including any regulatory notification.
  - Photos, water levels, water flow (if possible), water quality (deleterious substances and acute toxicity) estimated duration of release (for reporting under MDMER), weather and amount of precipitation received.

Recorded GPS coordinates for sample locations and any breakout locations.

6.5 INCIDENT REPORTING

In the event that the release of TSS in runoff from the site exceeds provincial guidelines (see below) regulatory agencies should be alerted. Even failures that do not result in the release of sediment from the site should be recorded by the Environmental Department staff. Such incidents will be discussed with the Contractor / operations manager to prevent future occurrences.

- For Clear Flows (Normal background Conditions):

  i) Maximum increase of 25 mg/L from background levels (24 hours or less); and

  ii) Maximum average increase of 5 mg/L from background levels (inputs lasting between 24 hours and 30 days).

- For High Flow (Spring freshets and Storm Events):

  i) Maximum increase of 25 mg/L from background levels when background levels are between 25 mg/L and 250 mg/L; and

ii) Shall not increase more than 10% over background levels when background is > 250 mg/L.

6.6 DECOMMISSIONING OF ENVIRONMENTAL CONTROLS

It is important that temporary sediment controls are removed at the appropriate time. These measures will only be removed after site inspection by the Environmental Department has concluded that areas are sufficiently stabilized and that downstream controls are no longer required. These controls will be removed once:

- The disturbed area is sufficiently stabilized;
- No areas of active erosion are observed;
- Monitoring indicates stable conditions; and

Compliance with provincial guideline for TSS in runoff can be consistently met.

6.7 DOCUMENTATION

To establish due diligence during normal operations and in the event of the release of sediment-laden runoff during extreme events, it is important to demonstrate that all reasonable actions have been undertaken to prevent such an occurrence.

All ESCP activities will be recorded in order to demonstrate that process was followed. Copies of these documents will be kept onsite for reference by construction personnel, the Company, Contractors and the Environment Department. This documentation should include:

- Original project / activity specific ESCP;
- Revisions to the ESCP;
- Regular inspection and maintenance reports;
- Reports on effectiveness of environmental controls;
- Maintenance control records;
- ESCP related incident reports, if applicable; and
- ESCP decommissioning report.

The preparation of documentation is a joint effort between the Environment Department and responsible Operational Department or Construction Manager. The ESCP preparation and update is ultimately the Environment Department's responsibility. The Environment Department documents routine monitoring of control measures as outlined in the Rain Event Monitoring Protocol. All other monitoring, maintenance and incident documentation is completed by the responsible Department or Construction Manager with the support of the Environment Department.

7.0 CLOSURE

This ESCP is based on an assessment of the Touquoy Gold Project property and its environmental sensitivities at a level of detail necessary to provide confidence that the plan will minimize offsite impacts during earthwork activities on this site. This ESCP is meant to be a living document and it is anticipated that changes in the plan may be warranted to ensure that the most effective BMPs are incorporated on this project in a timely fashion.

8.0 REFERENCES

Centre for Water Resources Studies Faculty of Engineering, Dalhousie University, May 28, 2008. *Course Material on Erosion and Sediment Control for Construction Sites*.

Conestoga-Rovers & Associates, November 2007. *Focus Report Touquoy Gold Project, Moose River Gold Mines, Nova Scotia*. Prepared for DDV Gold Limited.

Conestoga-Rovers & Associates, March 2007. *Environmental Assessment Registration Document for the Touquoy Gold Project*. Prepared for DDV Gold Limited.

GHD Limited (GHD). 2016a. *Monitor Well Drilling, Installation and Associated Groundwater Monitoring Program (Phase I) Touquoy Gold Project, Moose River, Nova Scotia*. Prepared for Atlantic Gold Corporation. April 25, 2016.

GHD Limited (GHD). 2016b. *Monitor Well Drilling, Installation and Associated Groundwater Monitoring Program (Phase 2) Touquoy Gold Project, Moose River, Nova Scotia*. Prepared for Atlantic Gold Corporation. June 30, 2016.

Nova Scotia Department of the Environment (NSE), April 1989. *Erosion and Sedimentation Control Handbook for Construction Sites.*

Nova Scotia Department of Transportation and Public Works, February 1, 1997 (and updates). *Standard Specification Highway Construction and Maintenance*.

Stantec Consulting, 2010. *Erosion and Sediment Control Plan for the Development of the Touquoy Gold* Project, Moose River Gold Mines, Nova Scotia. March 2010.

Stantec Consulting Ltd. (Stantec). 2015. *Groundwater Modeling to Support Evaluation of Disposal of Beaver Dam Tailing in the Touquoy Pit*. Prepared for Atlantic Gold Corporation.

Stantec Consulting Ltd. (Stantec). 2019a. *Scraggy Lake Overburden Stockpile Assessment Touquoy Gold Project, Middle Musquodoboit, Nova Scotia.* Prepared for Atlantic Mining NS Corp Sept 11, 2019.

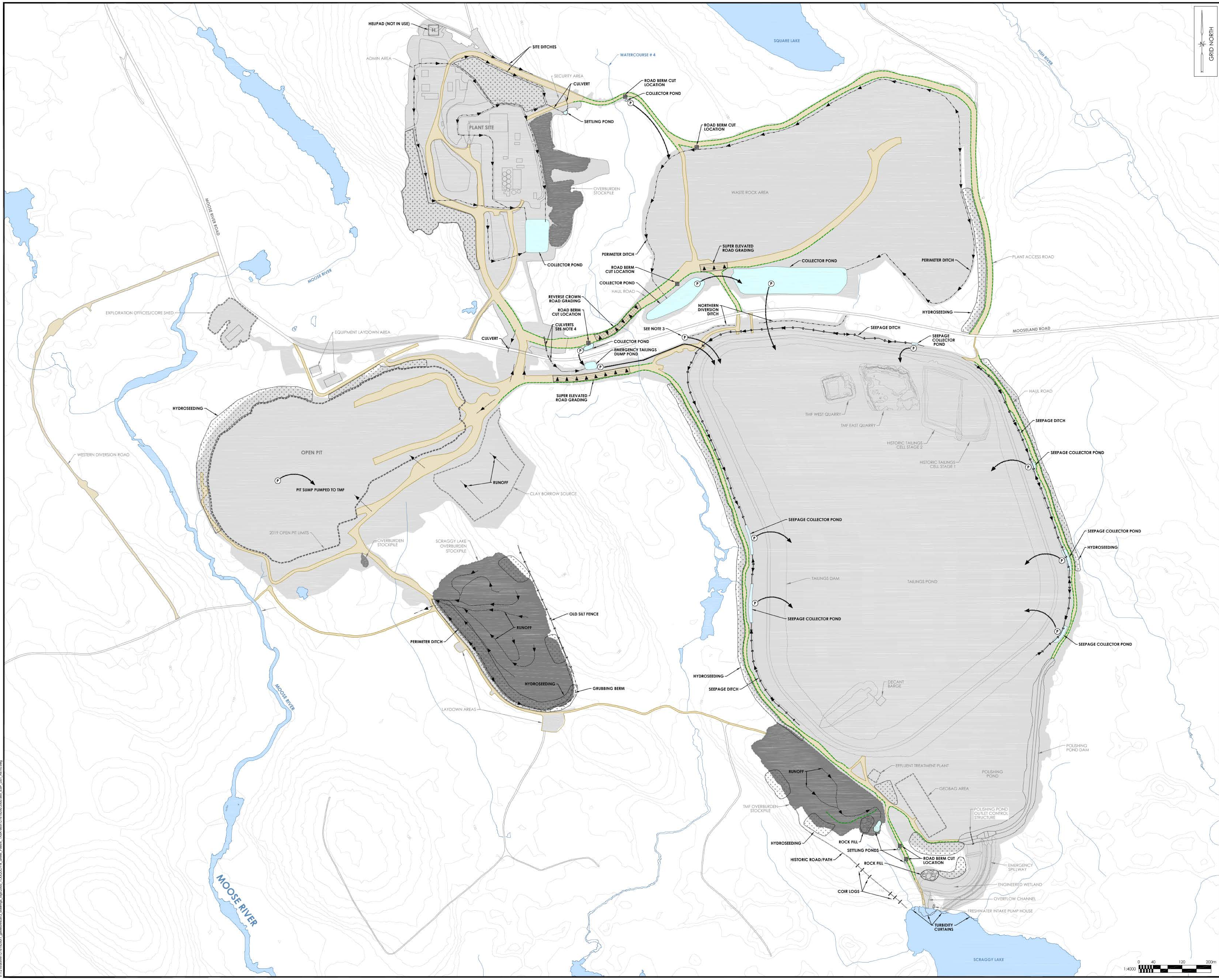
Stantec Consulting Ltd. (Stantec). 2019b. Reclamation Plan Touquoy Gold Project - Rev. 3. October 2, 2019.

St. Barbara, 2019. St. Barbara – Our Environment. Accessed on the world wide web at https://stbarbara.com.au/sustainability/our-environment/ on November, 2019.

Transportation Association of Canada, Second Draft 2004. *National Guide to Erosion and Sediment Control on Roadway Projects.*

APPENDIX A

EXISTING CONDITIONS AND SITE DEVELOPMENT PLAN



Stantec
845 Prospect Street
Fredericton, New Brunswick, Canada, E3B 2T7
Tel. 506.452.7000
www.stantec.com

Legend

- CONTOUR, 2m (LIDAR, 2010)
- EXISTING ROAD
- HISTORIC ROAD/PATH
- EXISTING WATERCOURSE
- WATERBODY
- DISTURBED AREAS (DEC. 31, 2019)
- OVERBURDEN STOCKPILE
- HAUL/ACCESS ROAD
- ROAD BERMS
- ROAD BERM CUT LOCATION
- REVERSE CROWN ROAD GRADING
- SUPER ELEVATED ROAD GRADING
- HYDROSEEDING
- ROCK FILL
- COLLECTOR / SETTLING POND
- PUMP
- PUMPED DISCHARGE
- PERIMETER/SITE DITCH AND FLOW DIRECTION
- SEEPAGE DITCH AND FLOW DIRECTION
- RUNOFF FLOW DIRECTION
- TURBIDITY CURTAIN
- HELIPAD (NOT IN USE)

Notes

1. BACKGROUND TOPOGRAPHY SHOWN IS BASED ON LIDAR DATA PROVIDED BY CONESTOGA-ROVERS & ASSOCIATES (2010). ACTUAL FIELD CONDITIONS MAY VARY.
2. SITE DATA PROVIDED BY ATLANTIC GOLD CORPORATION.
3. TO BE PUMPED ONLY IF CONSTRUCTION ACTIVITIES REQUIRE IT (ACTS AS ROADSIDE DITCH).
4. TAILINGS LINE CULVERTS CONVEY TURBID WATER TO EMERGENCY TAILINGS DUMP POND.

STAMP | STAMP

No.	DETAILS	BY	APPD.	DATE

REVISIONS

CLIENT: ATLANTIC GOLD CORPORATION

PROJECT: TOUQUOY GOLD PROJECT TAILINGS MANAGEMENT FACILITY

PROJECT LOCATION: HALIFAX COUNTY, NOVA SCOTIA

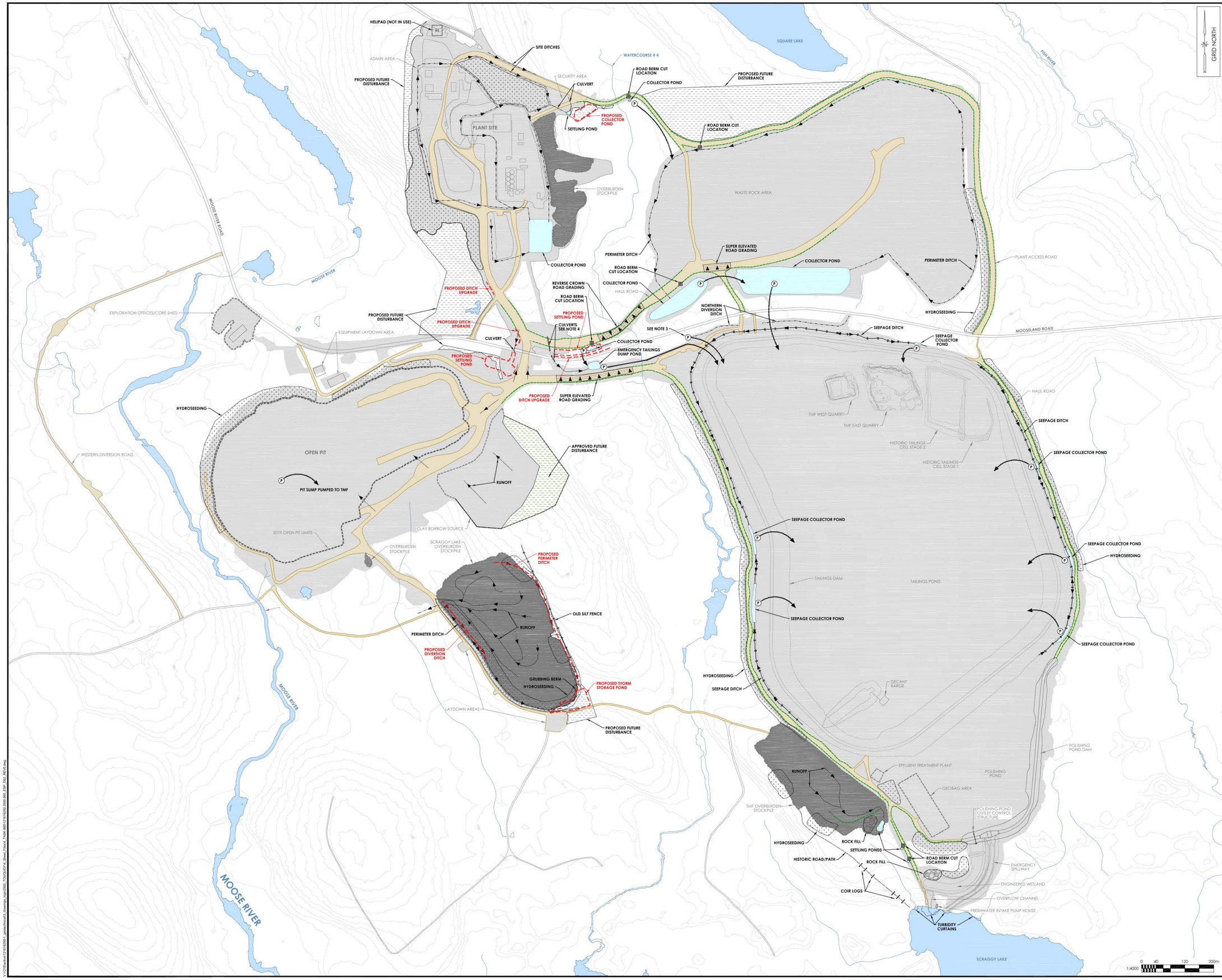
JOB No.:	SCALE:	DATE:
121619250	1 : 4000	2020-06-17
DRAWN BY: JL	DESIGNED BY: HA	APPROVED BY: MF

DRAWING TITLE: EROSION AND SEDIMENT CONTROL EXISTING CONDITIONS

DRAWING No.: 1 | REVISION No.: 0

APPENDIX B

CONSTRUCTION ACTIVITIES AND EROSION AND SEDIMENT CONTROLS



GRID NORTH

Stantec

Stantec
845 Prospect Street
Fredericton, New Brunswick, Canada, E3B 2T7
Tel. 506.452.7000
www.stantec.com

Legend

- CONTOUR, 2m (LIDAR, 2010)
- EXISTING ROAD
- HISTORIC ROAD/PATH
- EXISTING WATERCOURSE
- WATERBODY
- DISTURBED AREAS (DEC. 31, 2019)
- OVERBURDEN STOCKPILE
- HAUL/ACCESS ROAD
- ROAD BERMS
- ROAD BERM CUT LOCATION
- REVERSE CROWN ROAD GRADING
- SUPER ELEVATED ROAD GRADING
- HYDROSEEDING
- ROCK FILL
- COLLECTOR / SETTLING POND
- PUMP
- PUMPED DISCHARGE
- PERIMETER/SITE DITCH AND FLOW DIRECTION
- SEEPAGE DITCH AND FLOW DIRECTION
- RUNOFF FLOW DIRECTION
- TURBIDITY CURTAIN
- HELIPAD (NOT IN USE)
- PROPOSED ESC MEASURES
- APPROXIMATE AREA OF APPROVED FUTURE DISTURBANCE
- APPROXIMATE AREAS OF PROPOSED FUTURE DISTURBANCE (BASED ON CONCEPTUAL PLANS AND ARE SUBJECT TO APPROVAL)

Notes

1. BACKGROUND TOPOGRAPHY SHOWN IS BASED ON LIDAR DATA PROVIDED BY CONESTOGA-ROVERS & ASSOCIATES (2010). ACTUAL FIELD CONDITIONS MAY VARY.
2. SITE DATA PROVIDED BY ATLANTIC GOLD CORPORATION.
3. TO BE PUMPED ONLY IF CONSTRUCTION ACTIVITIES REQUIRE IT (ACTS AS ROADSIDE DITCH).
4. TAILINGS LINE CULVERTS CONVEY TURBID WATER TO EMERGENCY TAILINGS DUMP POND.

STAMP | STAMP

No.	DETAILS	BY	APPD.	DATE

REVISIONS

CLIENT: **ATLANTIC GOLD CORPORATION**

PROJECT: **TOUQUOY GOLD PROJECT TAILINGS MANAGEMENT FACILITY**

PROJECT LOCATION: **HALIFAX COUNTY, NOVA SCOTIA**

JOB No.:	SCALE:	DATE:
121619250	1 : 4000	2020-06-17
DRAWN BY:	DESIGNED BY:	APPROVED BY:
JL	HA	MF

DRAWING TITLE: **EROSION AND SEDIMENT CONTROL NEAR FUTURE ESC PLAN**

DRAWING No.:	REVISION No.
2	0

V:\121619xx\final\121619250\1_plan\mxd\3_drawings_topo250_TOUQUOY14_Sheet_Fixed_TMF_ARR121619250-2500_ESP_002_REV0.dwg

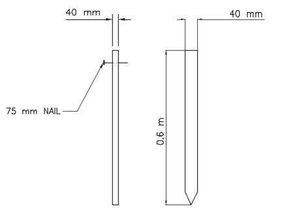
APPENDIX C

ENVIRONMENTAL CONTROL CONSTRUCTION DETAILS

* BEFORE INSTALLING ROLLED EROSION CONTROL BLANKET, TILL UPPER 150 mm OF SOIL TO HELP VEGETATION TO ESTABLISH. RAKE SOIL LEVEL AND ADD SEED AND MULCH BEFORE INSTALLING ROLLED EROSION CONTROL BLANKET.

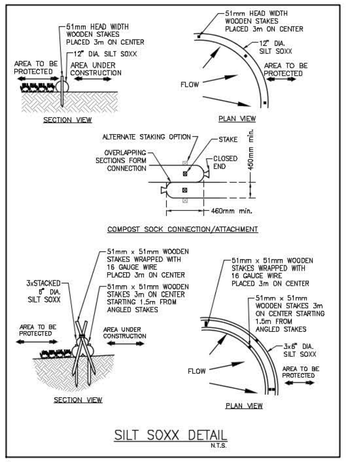
NOTE:
SECURE BLANKET BY STAKING AND OVERLAPPING AT THE SEAMS WITH A SHINGLE-TYPE METHOD. ADDITIONAL STAKING SHALL BE APPLIED IF THE BLANKET SEPARATES FROM THE SOIL MORE THAN 0.05m UNDER A REASONABLE PULL.

DETAIL – TYPICAL EROSION CONTROL BLANKET
N.T.S

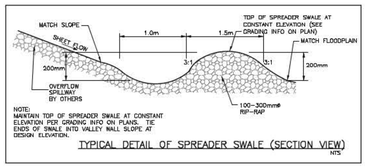


NOTES:
1. WOOD STAKES SHALL BE OF MINIMUM DIMENSIONS SHOWN AND SHALL BE GENERALLY FREE OF ANY KNOTS.
2. ALL WOOD STAKES SHALL BE RELATIVELY STRAIGHT AND WITHOUT ANY ROT OR WATER DAMAGE.
3. ONE 3-INCH NAIL SHALL BE DRIVEN THROUGH A PRE-DRILLED HOLE 1" TO 2" BELOW THE TOP OF THE WOOD STAKE.
4. THE PRE-DRILLED HOLE SHALL BE SMALL ENOUGH THAT THE NAIL MUST BE DRIVEN INTO THE STAKE, YET LARGE ENOUGH TO PREVENT SPLITTING OF THE STAKE WHILE DRIVING THE NAIL.
5. THE NAIL SHALL BE DRIVEN SUCH THAT AN EQUAL AMOUNT OF THE NAIL PROTRUDES THROUGH BOTH SIDES OF THE WOOD STAKE.
6. IN-LIEU OF PREDRILLING HOLES THROUGH THE WOOD STAKES, A PNUMATIC NAIL-GUN MAY BE USED; HOWEVER, THE AIR PRESSURE MUST BE ADJUSTED SUCH THAT NO SPLITTING OF THE WOOD STAKE OCCURS.
7. ALL VARIATIONS FROM THE STAKING DETAIL MUST BE APPROVED BY THE ENGINEER.

DETAIL – WOOD STAKE FOR MATTING
N.T.S

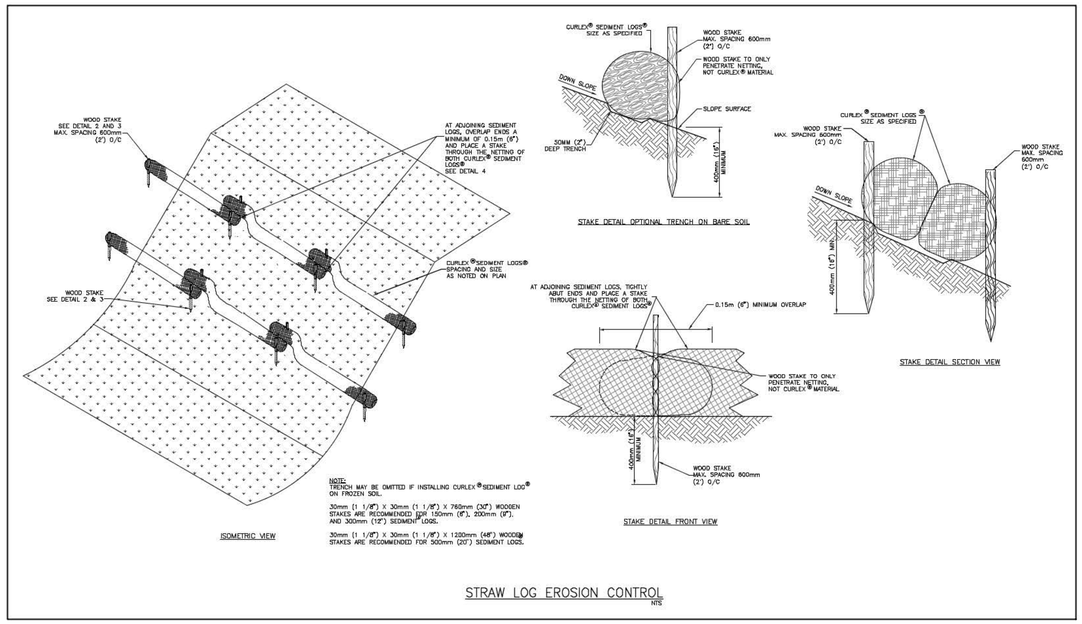


SILT SOXX DETAIL
N.T.S



NOTE:
MAINTAIN TOP OF SPREADER SWALE AT CONSTANT ELEVATION PER GRADING INFO ON PLANS. TIE ENDS OF SWALE INTO VALLEY WALL SLOPE AT DESIGN ELEVATION.

TYPICAL DETAIL OF SPREADER SWALE (SECTION VIEW)
N.T.S



NOTE:
TRENCH MAY BE OMITTED IF INSTALLING CURLEX® SEDIMENT LOG® ON FROZEN SOIL.

30mm (1 1/8") X 30mm (1 1/8") X 760mm (30") WOODEN STAKES ARE RECOMMENDED FOR 150mm (6"), 200mm (8"), AND 300mm (12") SEDIMENT LOGS.

30mm (1 1/8") X 30mm (1 1/8") X 1220mm (48") WOODEN STAKES ARE RECOMMENDED FOR 500mm (20") SEDIMENT LOGS.

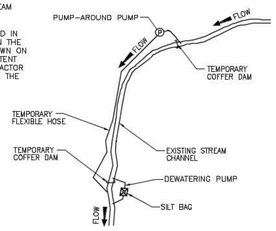
STRAW LOG EROSION CONTROL
NTS

SEQUENCE OF CONSTRUCTION FOR TYPICAL WORK AREA

1. INSTALL SILT BAGS AS REQUIRED.
2. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
3. PLACE UPSTREAM COFFER DAM AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION OR AS OUTLINED IN THE APPROVED WATER MANAGEMENT PLAN AND COMMENCE FISH SALVAGE AS REQUIRED
4. PLACE DOWNSTREAM COFFER DAM AND PUMPING APPARATUS. DEWATER ENTRAPPED AREA. AREA TO BE DEWATERED SHALL BE EQUAL TO ONE DAY'S WORK OR AS OUTLINED IN THE APPROVED WATER MANAGEMENT PLAN.
5. PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLANS.
6. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF COFFER DAMS. REMOVE COFFER DAMS, PUMPS, AND TEMPORARY FLEXIBLE HOSE. (DOWNSTREAM COFFER DAMS FIRST).
7. ALL GRADING AND STABILIZATION MUST BE COMPLETED IN ONE DAY WITHIN THE PUMP AROUND AREAS BETWEEN THE COFFER DAMS. THE COFFER DAM LOCATIONS AS SHOWN ON THIS SHEET ONLY SHOW THE UPPER AND LOWER EXTENT OF WORK FOR EACH STREAM SEGMENT. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE COFFER DAM(S) FOR EACH DAY'S WORK.
8. REMOVE COFFER AND PUMPING EQUIPMENT.
9. REMOVE SILT BAGS AND STABILIZE BASE AREA.
10. STABILIZE DISTURBED AREA WITH SEED, MULCH AND PLANTINGS AS PER LANDSCAPE PLAN.

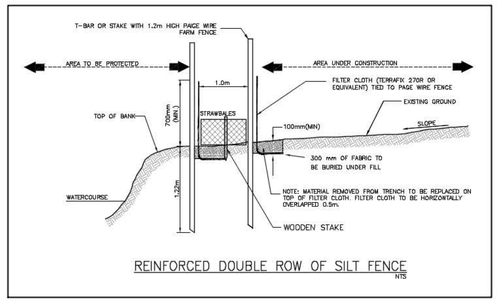
SILT BAG

NOTE:
PROVIDE STABILIZED OUTLET

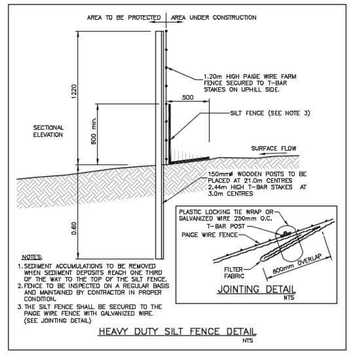


PUMP AROUND OPERATION
N.T.S

NOTES:
1. ALL EXCAVATION SHALL BE PERFORMED IN ONLY DRY OR ISOLATED SECTIONS OF CHANNEL.
2. COFFER DAMS ARE TO BE USED TO ISOLATE WORK FROM STREAM FLOW WHEN NECESSARY.
3. ALL GRADED AREAS SHALL BE STABILIZED WITHIN 24 HOURS.
4. MAINTENANCE OF STREAM FLOW OPERATIONS SHALL BE INCIDENTAL TO THE WORK. THIS INCLUDES POLYETHYLENE SHEETING, DIVERSION PIPES, PUMPS AND HOSES.
5. PUMPS AND HOSES SHALL BE OF SUFFICIENT SIZE TO DEWATER THE WORK AREA, IN ACCORDANCE WITH THE PERMIT TO TAKE WATER
6. SIDE SLOPES OF RESTORED CHANNEL SHALL BE MATTED PRIOR TO TURNING WATER INTO CHANNEL. SEE TYPICAL MATTING LOCATION DETAIL.
7. CONTRACTOR IS RESPONSIBLE FOR DETERMINING & ACQUIRING THE PROPER SIZED PUMP.
8. ALL MATERIALS ARE TO BE APPROVED BY ENGINEER OR ENGINEER'S ONSITE CONSTRUCTION MANAGER.
9. IF OVERNIGHT PUMPING IS REQUIRED NOISE BY-LAWS MUST BE OBSERVED.
10. FISH BARRIER NETS MUST BE ERECTED AND MAINTAINED TO PREVENT FISH FROM ENTERING THE WORKING AREA OF THE CHANNEL
11. ALL PUMPING TO CONFORM TO MOE PTTW

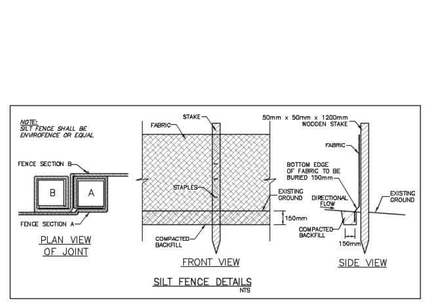


REINFORCED DOUBLE ROW OF SILT FENCE
NTS

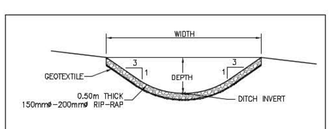


NOTES:
1. SEDIMENT ACCUMULATIONS TO BE REMOVED WHEN SEDIMENT DEPOSITS REACH ONE THIRD OF THE WAY TO THE TOP OF THE SILT FENCE.
2. FENCE TO BE INSPECTED ON A REGULAR BASIS AND MAINTAINED BY CONTRACTOR IN PROPER CONDITION.
3. THE SILT FENCE SHALL BE SECURED TO THE PAGE WIRE FENCE WITH GALVANIZED WIRE. (SEE JOINTING DETAIL)

HEAVY DUTY SILT FENCE DETAIL
NTS

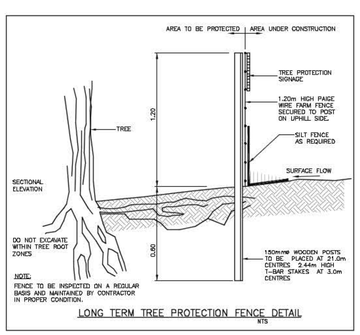


SILT FENCE DETAILS
NTS



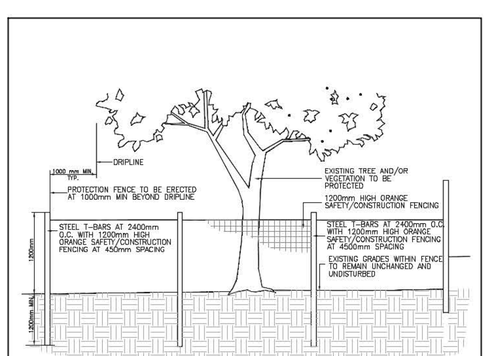
NOTES:
1. WIDTH AND DEPTH TO BE DETERMINED BY DESIGNER BASED ON PROPOSED CONVEYANCE RATES
2. RIP-RAP DIAMETER TO BE VERIFIED BY DESIGNER
3. DITCH SIDE SLOPES MAY BE REDUCED TO 2:1 AT DISCRETION OF DESIGNER

ROCK LINED DITCH DETAIL
N.T.S



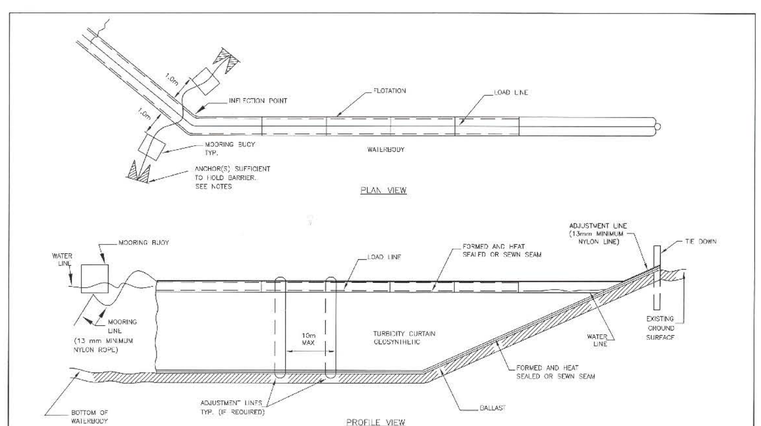
NOTE:
FENCE TO BE INSPECTED ON A REGULAR BASIS AND MAINTAINED BY CONTRACTOR IN PROPER CONDITION.

LONG TERM TREE PROTECTION FENCE DETAIL
NTS



NOTES:
1. ATTACHMENT OF FENCE TO TREES WILL NOT BE PERMITTED.
2. ANY EXPOSED ROOTS ARE TO BE HAND PRUNED USING PROPER ARBORICULTURAL PRACTICES.
3. UNDER NO CIRCUMSTANCES SHALL ANY CONSTRUCTION MATERIALS, EQUIPMENT OR VEHICLES BE PLACED WITHIN THE TREE PROTECTION ZONE.
4. ALL TREE PROTECTION TO BE ERECTED PRIOR TO ANY CONSTRUCTION ACTIVITY AND IS TO REMAIN IN PLACE UNTIL ALL CONSTRUCTION HAS BEEN COMPLETED. OBTAIN WRITTEN APPROVAL FROM CONTRACT ADMINISTRATOR PRIOR TO REMOVAL OF FENCING.

SHORT TERM TREE PROTECTION FENCING
N.T.S.



NOTES:
1. ANCHORING IS TO PROVIDE POSITIVE POSITIONING FOR TURBIDITY CURTAIN.
2. THE NUMBER AND SIZE OF ANCHORS AND THEIR LOCATION TO BE DETERMINED BY THE SIZE OF THE CURTAIN AND ITS LOCATION.

NOVA SCOTIA
Transportation and Infrastructure Renewal

No.	REVISION	
1	Note 2 added APR 2011	

Scale : N.T.S.
Drawn by : M.BARTEAUX
Checked by : B.PETT
Date of Plot : AUG2009
File No. : S-2009-140

Monaper Environmental Services
Director of Public Safety Services
Executive Director Highway Engineering and Construction

TURBIDITY CURTAIN HS710

Stantec
845 Prospect Street
Fredericton, New Brunswick, Canada, E3B 2T7
Tel. 506.452.7000
www.stantec.com

Legend

Notes

STAMP

STAMP

No.	DETAILS	BY	APPD.	DATE

REVISIONS

CLIENT: ATLANTIC GOLD CORPORATION

PROJECT: TOUQUOY GOLD PROJECT TAILINGS MANAGEMENT FACILITY

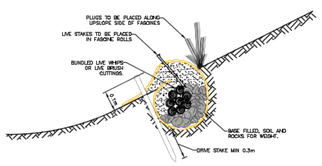
PROJECT LOCATION: HALIFAX COUNTY, NOVA SCOTIA

JOB No.:	SCALE:	DATE:
121619250	NTS	2019-11-27
DRAWN BY:	DESIGNED BY:	APPROVED BY:
JL	HA	MF

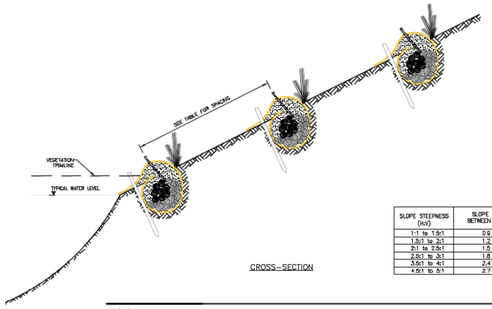
DRAWING TITLE: DETAILS AND NOTES

DRAWING No.:	REVISION No.
C-500	0

V:\01619\active\121619250\cadd\c121619250_C-500.dwg

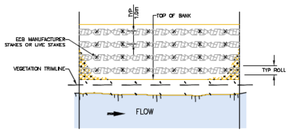


DEATIL



CROSS-SECTION

SLOPE STEEPNESS (x:y)	SLOPE DISTANCE BETWEEN TRENCHES
1:1 to 1.5:1	0.9 to 1.2
1.5:1 to 2:1	1.2 to 1.5
2:1 to 2.5:1	1.5 to 1.8
2.5:1 to 3:1	1.8 to 2.4
3.5:1 to 4:1	2.4 to 2.7
4.5:1 to 5:1	2.7 to 3.0



PLAN VIEW

Notes

1. BUNDLES OF LINE CUTTINGS, SOIL, ROCKS PLACED HORIZONTAL TO THE SLOPE.
2. BUNDLES TO BE KEYED INTO THE SLOPE AND SECURED WITH STAKES
3. BUNDLES TO BE 300–400mm IN DIAMETER AND PROTRUDE APPROX. 100mm ABOVE SLOPE
4. LINE CUTTING TO CONFORM WITH CONSERVATION AND RECLAMATION DOCUMENT SPECIES REQUIREMENTS
5. TO BE USED ON LONG SLOPES
7. USE ON SITE TRANSPLANT MATERIAL WHERE POSSIBLE. IF APPROPRIATE HARVESTING MATERIAL IS NOT AVAILABLE, NURSERY STOCK MAY BE USED.
8. TRIM OFF SPLIT, CRACKED AND DAMAGED (IN TOP 10% TO 20% OF STAKE) ENDS AFTER INSTALLATION. MAKE SURE TO LEAVE AT LEAST 3 BUDS TO ENSURE GROWTH. IF AFTER TRIMMING DAMAGED ENDS, NOT ENOUGH BUDS EXIST, REPLACE STAKE.
10. LIVE STAKES TO BE HARVESTED, STORED AND INSTALLED AS PER STANDARD PRACTICE AND BEST MANAGEMENT PRACTICE FOR LIVE WILLOW CUTTINGS.

IMPLEMENTATION

- LAYOUT THE LOCATION OF CONTOUR FASCINES ON SLOPE USING SPRAY PAINT AND LASER OR HAND LEVEL.
- TRENCH INSTALLATION IN LIVE FASCINES TO A DEPTH SLIGHTLY SHALLOWER THAN THE FASCINE BUNDLE DIAMETER.
- INSTALL CONTOUR FASCINES IN TRENCHES AT REQUIRED VERTICAL SPACING BASED ON SLOPE GRADIENT (SEE TABLE ABOVE).
- BUNDLES TO BE SECURED IN PLACE USING WOODEN STAKES.
- BACKFILLED ON EITHER SIDE LEAVING APPROXIMATELY 1/3 OF THE BUNDLE EXPOSED. ENSURING THAT FILL IS PLACED BETWEEN THE EXPOSED STEMS.

LIVE FASCINE ROLLS

N.T.S

Stantec
845 Prospect Street
Fredericton, New Brunswick, Canada, E3B 2T7
Tel. 506.452.7000
www.stantec.com

Legend

Notes

STAMP

STAMP

No.	DETAILS	BY	APPD.	DATE

REVISIONS

CLIENT: **ATLANTIC GOLD CORPORATION**

PROJECT: **TOUQUOY GOLD PROJECT TAILINGS MANAGEMENT FACILITY**

PROJECT LOCATION: **HALIFAX COUNTY, NOVA SCOTIA**

JOB No.:	SCALE:	DATE:
121619250	NTS	2019-11-27
DRAWN BY: JL	DESIGNED BY: HA	APPROVED BY: MF

DRAWING TITLE: **DETAILS AND NOTES**

DRAWING No.: **C-501**

REVISION No. **0**