

Hardrock Project

Erosion and Sediment Control Plan

HP-MG007-EV-130-0007_0

September 11, 2020

| Date | Rev | Status | | Prepared By | Checked By | Approved By |
|------------|-----|--------|------------|----------------|----------------------|----------------------|
| 11-Sept-20 | 0 | IFU | Signature: | N/A | <original signé par> | <original signé par> |
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| Document Revision History | | | |
|---------------------------|------------|----------------|----------------|
| Rev. | Date | Description | Originator |
| 0 | 11-Sept-20 | Issued for Use | SLR Consulting |
| | | | |
| | | | |

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1 Introduction

Greenstone Gold Mines GP Inc. (GGM) is committed to minimizing environmental effects through the implementation of mitigation measures, monitoring, and adaptive management for the Hardrock Project (the Project) within Environmental Management and Monitoring Plans (EMMPs) for construction and operation. The Erosion and Sediment Control Plan (ESCP) includes the mitigation measures required to meet best practice in accordance with all federal and provincial requirements during early works and the construction phase of the Project. Through the EMMPs, the Project's environmental risks and opportunities are addressed in a comprehensive, systematic, planned and documented manner to meet the following objectives:

- The Project is carried out in compliance with existing legislation, consistent with federal and provincial guidelines, GGM corporate policies, and commitments made to Indigenous groups and communities during project review
- Predictions of environmental effects identified in the environmental assessment are confirmed
- Measures to mitigate environmental effects are documented, their effectiveness assessed, and needs for further mitigation identified as needed
- Benefits from the Project are enhanced
- Reporting is structured to inform adaptive management and continual improvement.

The EMMPs guide environmental management for the Project. They are being progressively refined as the Project moves through permitting and construction. They will be updated based on continual improvement during operations, using an adaptive management approach.

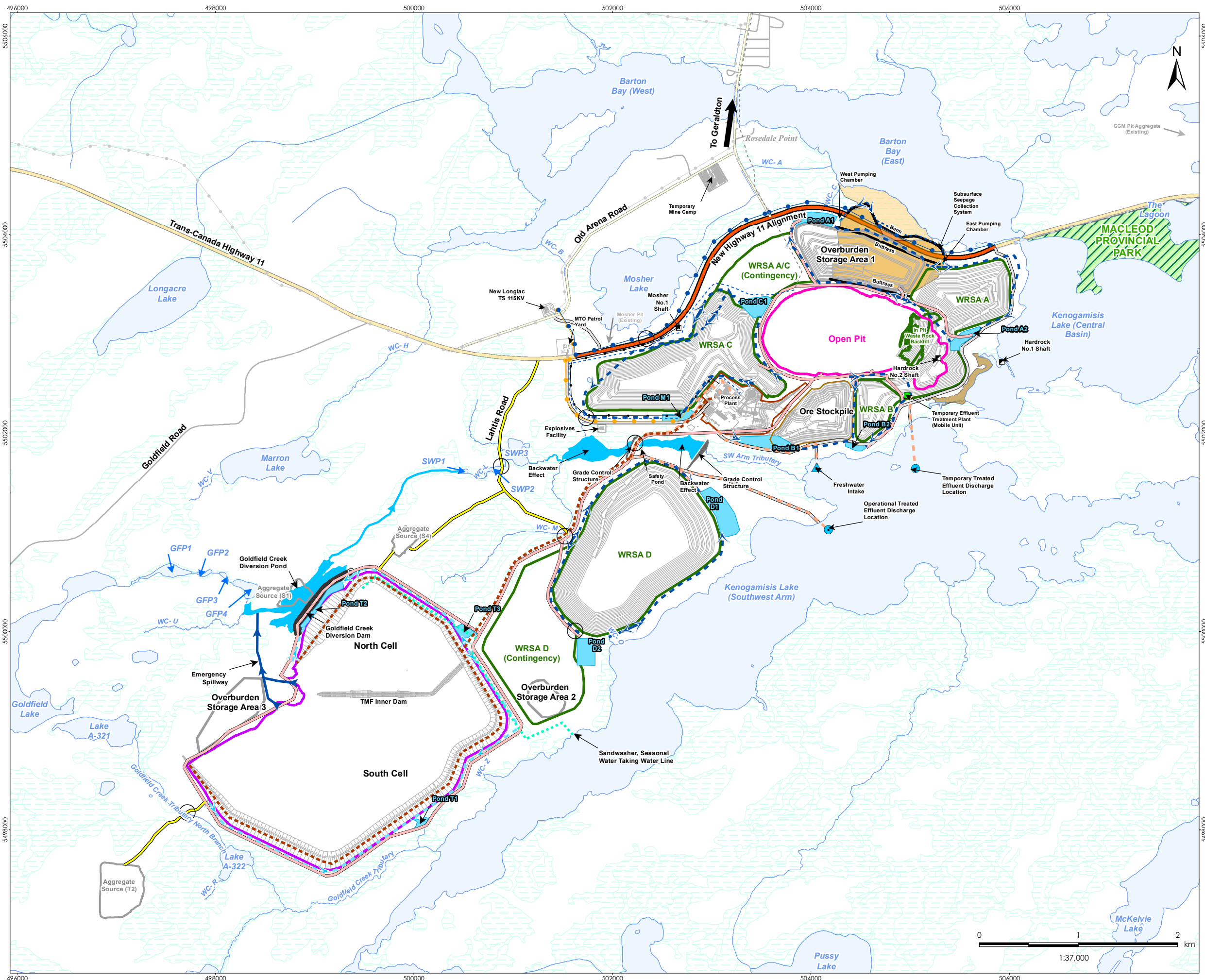
It should be noted that detailed requirements for erosion and sediment control will be outlined in Construction Specifications which this plan will support. This plan is not meant as a stand-alone plan for each of the individual elements of the Project.

2 Mine Overview

The Hardrock deposit will be mined as an open pit. The process plant will operate 365 days per year with a Life of Mine (LOM) of approximately 15 years. Mill throughput will range from 24,000 tonnes per day (tpd) increasing to 30,000 tpd as conditions warrant. The overall Project schedule will consist of the following phases:

- Construction: Years -3 to -1, with early ore stockpiling commencing after the first year of construction.
- Operation: Years 1 to 15, with Year 1 representing a transition from construction to operation.
- Closure: Years 16 to 20 for Active Closure and Years 21 to 36 for Post-Closure.

Key mine components of the Project Development Area (PDA) are an open pit, waste rock storage areas (WRSAs), overburden storage areas, ore stockpile, ore crushing and mill feed ore storage activities, process plant, water management facilities, tailings management facility (TMF), power plant and associated infrastructure, and explosives facility. Ancillary Project components are buildings, service water supply and associated infrastructure, sewage and effluent treatment plants, site roads, watercourse crossings, realignments, and habitat compensation/offsets, onsite pipelines and piping, fuel and hazardous materials storage, aggregate sources, and temporary camp. Existing infrastructure currently located within the PDA will be relocated, including a portion of Highway 11, a Ministry of Transportation (MTO) Patrol Yard, and Hydro One Networks Inc. (Hydro One) facilities. Refer to Figure 2-1 for the current mine site plan.



Legend

| | |
|---|------------------------------------|
| Preliminary Site Plan | Highway Realignment |
| ● Discharge Location | — New Highway 11 Alignment |
| ■ Existing Mine Shaft | Existing Features* |
| ▲ Freshwater Intake | — Highway |
| ■ Temporary Effluent Treatment Plant | — Major Road |
| ○ Watercrossing | — Local Road |
| — Access Road | — Existing Power Line |
| — Construction Access Road | — Existing Potable Water Pipeline |
| → Diversion Channel | — Watercourse |
| → Emergency Spillways | ▨ Provincial Park |
| — Haul Road | ■ Waterbody |
| — Potable Water Pipeline | ▨ Wetland (Eco-Site Based) |
| — Pipeline (Intake and Discharge) | Historical Tailings Areas |
| ● 44 kV Distribution Line | ■ Historical Hardrock Tailings |
| ● 12.5 kV Distribution Line | ■ Historical MacLeod High Tailings |
| ● 115 kV Transmission Line | ■ Historical MacLeod Low Tailings |
| → Seepage Collection Ditch | |
| → Subsurface Seepage Collection System | |
| → Contact Water Collection Ditch | |
| → Tailings Pipeline and 13.8 kV Distribution Line | |
| — Water Line | |
| ○ Aggregate Source | |
| ○ Collection Ponds | |
| ○ Open Pit - Full Extent | |
| ○ Ore Stockpile | |
| ○ Process Plant Area | |
| ○ Tailings Management Facility | |
| ○ Waste Rock Storage Area | |

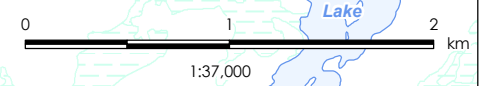
Notes

- Coordinate System: NAD 1983 UTM Zone 16N
- Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2013.
- * Existing Features have been removed in the PDA and do not reflect current conditions.

May 2019
160961223

Client/Project
Greenstone Gold Mines GP Inc. (GGM)
Hardrock Project

Figure No.
2-1
Title
Optimized Site Plan



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 Revised: 2019-05-17 By: pwcresell

3 Purpose and Objectives

The purpose of the ESCP is to outline means, methods and measures to minimize the potential for site erosion and to protect the natural environment from sediment migration. Exposed slopes, areas of ground disturbance and loose or exposed unconsolidated soils are of primary concern as they present the greatest potential for severe wind and water induced erosion. Where possible, the preferred method of sediment control will be source erosion management, to minimize the mobilization of sediment.

In support of GGM's overarching environmental objective (to prevent or mitigate any environmental impacts, meet or exceed regulatory requirements and strive to continually improve environmental practices and performance), GGM has established the following performance objectives for the ESCP:

- Prevent the uncontrolled release of sediment to natural waterbodies;
- Compliance with applicable legislation and regulations; and,
- Compliance with environmental monitoring criteria established during the Environmental Assessment approval process.

4 Scope and Scale

The ESCP applies to Project infrastructure and management under the care and maintenance of GGM. The ESCP covers the following:

- Geographic scope area of the Project that will undergo changes through the Construction and/ or Operation phases to accommodate the advancement of Project, and associated monitoring
- Temporal scope - Construction and Operation phases
- Regulatory scope – applicable laws and regulations, described in Table 4-2. The ESCP applies to individuals working for or on behalf of GGM, including employees and contractors. They all have a role and/or accountability for the development, implementation and maintenance of this ESCP.

4.1 Acts and Regulations

Several Federal and Provincial articles of environmental legislation govern construction work activities on the Project that directly prohibit the direct or indirect release of sediment. Refer to Table 4-1 for a list of relevant federal and provincial legislation governing the adherence of erosion and sediment control management practices to prevent any potential releases to the natural environment and refer to Table 4-2 for specific sections.

Table 4-1: Summary of Regulatory Requirements that Apply to the Erosion and Sediment Control Plan

| Type of Requirement | Relevant Act or Document | Details |
|---|--|---|
| Environmental Assessment Process Requirements | Federal Decision Statement Conditions | A decision statement was issued by the Canadian Environmental Assessment Agency under Section 54 of the <i>Canadian Environmental Assessment Act</i> on December 10, 2018 that outlined a series of conditions in which GGM must comply. This ESCP addresses the following conditions: Condition 3.14 |
| | Provincial Environmental Assessment Certificate Conditions | Notice of Approval - Order in Council 404/2019 was issued by the Ministry of the Environment, Conservation and Parks (MECP) on March 12, 2019. This ESCP addresses requirements of the following conditions: Condition 24.2 e): Construction Environmental Management and Monitoring Plan including Erosion Prevention and Sediment Control Management |
| Regulatory Requirements | Federal | <i>Fisheries Act, 1985</i> (last amended 2016-04-05) <i>Canadian Navigable Waters Protection Act</i> (formerly Navigation Protection Act), 1985 (last amended 2019-06-21) <i>Species at Risk Act, 2002</i> (last amended 2017-06-20) |
| | Provincial | <i>Environmental Protection Act, 1990</i> (last amended 2017-03-20) <i>Ontario Water Resources Act, 1990</i> (last amended 2017-07-01) <i>Endangered Species Act, 2007</i> (last amended 2008-06-30) |
| | Permit Approval Requirements | Several environmental permits and approvals from provincial and federal agencies are required for the construction and operation of the Project. Mine development is subject to various conditions within these permits and approvals governing such activities as earthworks, in-water work, construction erosion and sediment management practices, and many other works to prevent potential sediment releases. Permits and approvals that are relevant to construction and ESCP management on the Project include: <ul style="list-style-type: none"> • Fisheries Act Authorization; • Environmental Compliance Approval(s); • Permit to Take Water Approval(s); and, • Lakes and Rivers Improvement Act Approval(s). |
| | Municipal Regulatory Requirements | None identified. |

Table 4-2: Applicable Federal and Provincial Legislation

| Jurisdiction | Acts / Regulations | Description of Relevance |
|--------------|---|---|
| Federal | <i>Fisheries Act</i> , 1985 (last amended 2016-04-05) | Paragraph 35 prohibits undertaking activities that result in serious harm to fish unless authorized under the Act; Paragraph 36 prohibits the deposition of deleterious substances (includes sediment) into any type of water frequented by fish. |
| | <i>Canadian Navigable Waters Protection Act</i> (formerly Navigation Protection Act), 1985 (last amended 2019-06-21) | Encompassed in the Act is the infilling of navigable waters or the removal of materials from the bed of navigable waters. |
| | <i>Species at Risk Act</i> , 2002 (last amended 2017-06-20) | Paragraph 32 prohibits killing, harming or harassing any individual of a wildlife species listed as extirpated, endangered or threatened. |
| Provincial | <i>Environmental Protection Act</i> , 1990 (last amended 2017-03-20) | Section 6 (2) defines the regulatory prohibition of the release of sediments; Section 92 (1) sets forth the duty to notify when a spill has occurred. |
| | <i>Ontario Water Resources Act</i> , 1990 (last amended 2017-07-01) | Section 14 (1) defines the regulatory prohibition of the release of sediments; Section 33 defines offenses. |
| | <i>Endangered Species Act</i> , 2007 (last amended 2008-06-30) | Section 9 (1) prohibits killing, harming, harassing or capturing a species that is listed on the Species at Risk in Ontario List as extirpated, endangered or threatened. |

4.2 Permits and Approvals

Several environmental permits and approvals from provincial and federal agencies are required for the construction and operation of the Project. Mine development is subject to various conditions within these permits and approvals governing such activities as earthworks, in-water work and construction erosion and sediment management practices, and many other works to prevent potential sediment releases. Permits and approvals that are relevant to construction and ESC management on the Project include:

- Fisheries Act Authorization;
- Environmental Compliance Approval(s);
- Permit to Take Water Approval(s); and,
- Lakes and Rivers Improvement Act Approval(s).

5 Roles and Responsibilities

All persons working for or on behalf of GGM, including employees and contractors, have a role in the successful implementation and maintenance of the ESCP. Roles and responsibilities for activities under this plan are provided in Table 5-1.

Table 5-1: Roles and Responsibilities

| Role | Responsibility |
|---|---|
| Construction Manager (during Construction phase), Mine Manager (during Operations phase) | <ul style="list-style-type: none"> • Oversee clearing and grubbing activities during the construction phase of the Project • Collaborate with the Environmental Superintendent in planning and undertaking soils removal, placement and compaction. |
| Environmental Superintendent | <ul style="list-style-type: none"> • Collaborate with the Construction Manager to plan and direct soil removal, placement and compaction activities and erosion control measures. • Identify, document, track and maintain up-to-date compliance obligations related to the ESCP. • Collaborate with the Construction Manager and Mine Manager to communicate compliance obligations and provide training to employees and contractors. |
| Environmental Supervisor | <ul style="list-style-type: none"> • Collaborate with the Construction Manager in the delineation of potential areas of disturbance for construction activities including scheduling and phasing. • Supervise clearing and grubbing activities to minimum ground disturbance and installation of erosion and sediment control measures. • Supervise soil excavations, haul, placement and compaction activities and installation or erosion and sediment control measures. • Oversee implementation of monitoring activities by Environmental Monitors/Technicians. |
| Environmental Monitors/ Technicians | <ul style="list-style-type: none"> • Review and provide input into the ESCP. • Participate in implementation of mitigation measures and monitoring. • Provide input into any future revisions of the ESCP and adaptive management as required. • Communicate results of monitoring to their community |
| Environmental Advisory Committee | <ul style="list-style-type: none"> • Review and provide input into ESCP. • Provide input into any future revisions of the BMMP and adaptive management as required. • Meet regularly and report EAC activities to the Implementation Committee. |
| Contractors | <ul style="list-style-type: none"> • Provide construction staff, equipment and material for installation and maintenance of erosion and sediment control measures as requested by the Construction Manager and/or Environmental Superintendent/Supervisor. |
| Personnel/Equipment Operators | <ul style="list-style-type: none"> • Complete applicable training in clearing activities, soil salvage, soil handling, tailings handling, placement, compaction and erosion and sediment control. • Conduct clearing/grubbing, soil-tailing salvage/handling including placement and compaction activities according to defined procedures. |

6 Sources Overview and Risk Assessment

The control of source erosion is fundamental in preventing the migration of sediment. Risk assessments are fundamental in determining the need for erosion and sediment mitigation and management measures. Table 6-1 provides high level activities which should be considered by the Environmental Superintendent when determining the potential risk involved in activities which have the potential to require erosion and sediment mitigation and management. Prior to undertaking activities in the field, the potential risk of erosion or sediment migration will be considered in terms of likelihood and potential severity of the activity on a case-by-case basis using field conditions as a guide to a potential outcome.

Table 6-1: Activities and Triggers with Potential Risk for Erosion and Sedimentation

| Activity | Potential Trigger |
|---|---|
| Ground disturbance | Excavation, soil stripping, vegetation removal or grubbing and working in wet conditions or areas |
| Vegetation clearing and / or timber removal | Clearing of rooted vegetation which can cause soil destabilization including trees, shrubs, bushes, etc. |
| Water discharge or taking | Pumping water (for discharge or taking) which can lead to potential focused pressure resulting in erosion or sediment disturbance. |
| Water use for dust suppression or equipment | Uncontrolled release of water with the potential to cause erosion and sediment migration into water courses or sediment build up |
| Working in or around sensitive habitat | Ground disturbance with a potential to impact sensitive habitats, such as natural rocky or wetland areas |
| Working in or around water bodies (e.g., Goldfield Creek diversion, culvert installation) | Work conducted in ditches, drains, sumps, sediment ponds, etc. preventing the designed purpose of water infrastructure and result in sediment migration through water transport |

7 Mitigation and Management Measures

The ESCP includes design and operational requirements to minimize the potential for site erosion and to protect the natural environment from sediment migration. The technical solutions and measures adopted in the Plan are consistent with protection of the natural environment. The Project will have multiple activities which will have mitigation measures applied to them. This section of the ESCP describes the management strategies, required controls and operational requirements for the construction and operation phases of the Project.

7.1 Erosion Control

The following management practices for erosion control can be applied to various aspects of the work as defined by the Environmental Superintendent or designate. Actual practices chosen will vary according the site conditions, time of year, expected risk, substrate, weather related conditions, and construction timing (i.e. duration of expected exposure). Details on specific materials, placement and

maintenance requirements will be defined in construction specifications and illustrated on For Construction Drawings.

The two main activities during the construction phase of the Project which have the immediate need for erosion control are activities related to clearing and grubbing, and activities related to soil transport and management, which includes historical tailings transport and management.

7.1.1 Clearing and Grubbing

Clearing and grubbing of areas for the purpose of site development will be one of the initial construction activities. Clearing and grubbing activities will be staged to limit the amount of area exposed for extended periods of time. Standard accepted forestry practices will be implemented along with elements of sediment controls as outlined in Section 7.2 and defined on construction drawings and in specifications. Typically, sediment controls will be established in defined areas, including the potential placement of culverts, berms, temporary ponds, ditches etc., prior to clearing and grubbing activities.

7.1.2 Soil Transport and Management

The soil handling (excavation, placement and compaction), and transport process is highly susceptible to erosion due to disturbance and the potential for site alteration of natural surface water flow pathways. Soil handling, storage and sequencing will occur with the intention to reuse as much of the soils as possible during the restoration process. In order to achieve this, the handling of the soils (in particular topsoil) must be done with care to avoid or reduce the amount of disturbance or damage that is occurring to the critical soil structures required for vegetation growth.

Sediment and erosion controls related to soil transport and management include:

- Where potential exists, liners or additional preventative measures will be used in the transportation of solid or liquid materials to prevent fugitive releases outside of intended delivery locations;
- Stockpiles should be inspected regularly and maintained to ensure stability;
- Stockpiles will be benched, where appropriate, and protected from natural weathering through covers, vegetation or other suitable materials;
- Break slope length with check dams or velocity retarding and inert objects;
- Construction activities should be planned, and work areas identified, prior to stripping surficial vegetation;
- Soil stripping and excavation shall only be conducted when there is no precipitation occurring that is substantial enough to cause runoff and erosion;

- Water should be conveyed around work areas with ditching and appropriately sized culverts or sumps to reduce water velocity;
- Identify and stabilize potential sources of erosion prior to development, and implement sediment fencing or alternative methods of natural material support;
- Collect and settle water in sumps or sediment control ponds with gravity; and,
- Throttle the flow of water using check dams or semi-permeable materials and clean them often.

7.2 Sediment Control

Sediment controls shall be implemented in accordance with the construction specifications, drawings and as directed by the Environmental Superintendent, or designate. At minimum, sediment control measures shall conform to:

- Ontario Provincial Standard Specifications for Temporary Erosion and Sediment Control Measures (OPSS 805 – November 2006) as amended; and,
- Ontario Provincial Standard Specifications. Construction Specification for Seed and Cover Measures (OPSS 804 – April 2014) as amended.

Typical measures for sediment control are outlined in the following sub-sections.

7.2.1 *Siltation Control Fence*

Silt fencing is the most commonly used sediment control measure. By design, it filters sediment laden overland flow and allows water to pass through woven and non-woven fabric fences, while retaining entrained sediments. Siltation control fencing will be installed along appropriate slopes or shoreline contours adjacent to active working areas as defined on drawings prepared prior to ground disturbance. The fence is intended to act as temporary perimeter control to limit overland flows from exiting disturbed ground and entering undisturbed areas, water bodies, roadways etc. Silt fencing will be periodically inspected, specifically after rainfall events, and shall be maintained when retained sediments accumulate behind the structure as defined in the construction specifications. There is the expectation that silt fence will be repaired and replaced periodically throughout the lifecycle of construction activities. Silt fencing will be installed prior to ground disturbance and will remain in place and be maintained until such time as permanent stabilization measures have been implemented.

7.2.2 *Geotextile Mat*

Geotextile mat is a woven geosynthetic material that is placed as a temporary measure to protect exposed waste material in excavation areas when directed by the Environmental Superintendent or

designate. It is to be installed between waste materials or bare soils and rip rap in areas where the waste material or bare soils may erode from beneath the rip rap due to runoff.

7.2.3 *Drainage Ditches*

Drainage ditches are to be used to intercept and direct surface runoff to a designated collection point (rock flow check dam/sediment trap) or discharge point (established vegetation area for overall filtration), but not directly into a watercourse or waterbody. Drainage ditches are to be implemented when required to reduce or prevent soil erosion and to facilitate the establishment of vegetation. Drainage ditches will be required downgradient of roads associated with the Project within 30 meters of a watercourse or waterbody to capture and route potentially sediment laden waterflow. In some instances, due to excessive gradient, anticipated flow velocities and/or loose base materials, ditches may require lining with rip rap materials underlain with geotextile mat.

7.2.4 *Rock Check Dams*

Temporary rock check dams are to be used when the velocity of concentrated flow in a drainage ditch is such that bed erosion within the ditch is witnessed or when there is a need to detain and trap sediment. They are to be installed in drainage ditches where flow velocities cause erosion or when entrained sediments flows are present. Accumulated sediments shall be periodically removed when the depth of accumulation is one-third to one half the vertical height of the rock dam at the centre of the constructed features. Construction details (e.g., rock size, interval locations, core geotextile materials) will be outlined in construction specifications and may vary with site location.

7.2.5 *Berms*

Berms are water control structures used to direct or slow down water and protect water bodies from sediment laden run-off. Locations for installation of berms will typically be around material storage areas, or as otherwise directed or when on construction drawings. Placement of berms is only intended to impede the movement of sediment, and typically will not exceed 1.0 meters in height. Berms may be constructed of compacted granular materials, sectional concrete barriers, stacked sandbags etc. In some instances, depending on the size of the berm, location, and duration of installation, shop drawings signed and sealed by a licensed Professional Engineer in Ontario may be required prior to installation as per Provincial Labour regulations.

7.2.6 *Sediment Traps*

Sediment traps may be utilized throughout the Project where there is a sub-catchment drainage area of less than 2 hectares, and where there is potential for the sediment laden waters to enter a

waterbody. They are to be constructed as shown on drawings or as directed by the Environmental Superintendent in accordance with OPSS 805.

7.2.7 *Erosion Control Mat*

Erosion control mats are biodegradable mats or woven blankets, which are placed and stapled directly on exposed soil surfaces that have been disturbed and graded. Their primary purpose is to stabilize finished surfaces and allow seeding or other plantings to establish and limit surface erosion primarily due to rainfall and minor sheet flow events. Blankets are to be installed and maintained as per OPSS 804.

7.2.8 *Revegetation*

Revegetation of disturbed lands, and areas of fill placement and grading, will help stabilize soil surfaces with natural vegetation and re-introduce biodiversity into the project site either temporarily or permanently. All aspects of revegetation, progressive or final, will be outlined on construction drawings and specifications. Revegetation plans will be reviewed by EACs.

7.3 Water Management

Water management during the Construction phase will be managed based on the most suitable for each aspect or potential concern. Due to the size of the site and associated excavation, there is a need to develop, operate and maintain a network of semi-permanent ditches and ponds to direct and detain water from stockpile areas, diversions and seepage collection systems for treatment and discharge and for mill water reuse into operations. Specific details for water management can be considered outside the scope of this ESCP and are described in the Water Management and Monitoring Plan. Details related to monitoring, operations and maintenance of these features will be described in the associated Operations, Maintenance and Surveillance (OMS) Manual for the specific features.

During construction of these features, all elements of this ESCP shall be applicable to address ongoing soil disturbance and the potential for offsite soil migration to receiving water bodies that are outside the construction footprint. Careful planning and flow mitigation measures will be applied to minimize the disturbance of exposed soil surface areas without temporary stabilization.

A variety of management measures, such as, temporary diversion of surface flows, temporary stabilization of exposed slopes and ditch inverts and well as the use of rock check dam and other flow management measures will be applied. Banks and ditches which convey water will be inspected regularly to ensure soil stability and for the prevention of sediment transport. All sediment laden water will be captured through sediment control and water management infrastructure and will otherwise be prevented from leaving the Project footprint.

7.4 Significant Storm Events

A Significant Storm Event is defined as a minimum of 15 mm of rainfall forecast for a 24-hour period. During a significant storm event, construction activities shall cease, and the excavations will store the groundwater and the surface water runoff.

During significant storm events, monitoring will focus on areas of highest risk and includes visual inspections of active construction and freshly disturbed or cleared areas. The purpose of these inspections will be to determine if the likelihood of source erosion will result in sediment migration. Areas of concern will receive additional control measures to prevent the mobilization of sediment through precipitation or saturation by covering the surface or directing surficial flows in to water management structures. In cases of extreme flood events, ditches and berms will be utilized / constructed to prevent sediment from reaching receiving waters to the extent practical. Additional monitoring and mitigative measures may be required depending on the severity, scope and timeframe of the forecast by Environment Canada.

8 Monitoring & Inspections

Erosion and sediment controls will be continually inspected and monitored throughout the duration of construction and operations phases to verify the effectiveness of mitigative measures and management practices implemented to protect the environment, and to determine whether new management strategies are required.

Depending on the structure or work area, inspections will be conducted on a daily basis to weekly basis. Inspection forms will be completed by qualified staff to record observations of various parameters such as slope stability indicators, development of rills, seeps, depth of sediment accumulation.

The Environmental Supervisor, with assistance from the Environmental Monitors, will be responsible for the implementation of water quality monitoring in accordance the Water Management and Monitoring Plan and permit conditions.

Erosion and sediment control monitoring activities (overarching) are outlined in Table 8-1.

Table 8-1: Summary of ESCP Monitoring Activities

| Monitoring Activity | Project Phase | Frequency | Season |
|--|--------------------------|--|---|
| Inspection of work areas | Construction | Ongoing-daily | Year-round |
| Inspection of dams, stockpiles and other earthworks | Construction, Operations | Daily to weekly depending on structure (*) | Year-round |
| Water Quality monitoring for TSS | Construction, Operations | As per permit (e.g., ECA, PTTW) conditions | As per the Water Management and Monitoring Plan and respective ECA(s) |
| (*) : refer to OMS Manuals for dams, tailings and other structures for actual requirements | | | |

The following activities will be undertaken as part of the surveillance inspections and monitoring:

- Inspect and monitor the work sites on an on-going basis for compliance with this protocol;
- Inspect earthworks daily to detect evidence of erosion and sedimentation; promptly apply appropriate corrective measures;
- As required, direct the implementation of incremental aspects of erosion and sediment control to improve control efficiency;
- If required, direct the cessation of work activities where control measures are not effectively controlling sediment transport and erosion;
- All silt fence barriers will be inspected daily and immediately following all rainfall events;
- If gaps, tears, slumping, weathering or other visual failure of the materials are found, the silt fence will be immediately repaired, or the fabric replaced;
- In preparation for possible repairs, stand-by material of prefabricated silt fence barrier will be maintained on the construction site, and be made available for rapid deployment if necessary;
- Sediment traps will be monitored, including monitoring for standing water, prior to forecasted rain, daily during extended rain events, and weekly during other periods;
- Sediment will be removed from sediment traps after each rainfall event or whenever sediment reaches one-third of the trap capacity;
- Sediment clean out may be required for collection ponds to maintain adequate storage capacity. This material will be removed, dewatered-stabilized and taken to the TMF;
- Erosion control structures will be reinforced when significant rainfall events are forecasted as per direction of the Environmental Superintendent, or designate; and
- A continual log of conditions and response actions will be maintained.

9 Continual Improvement

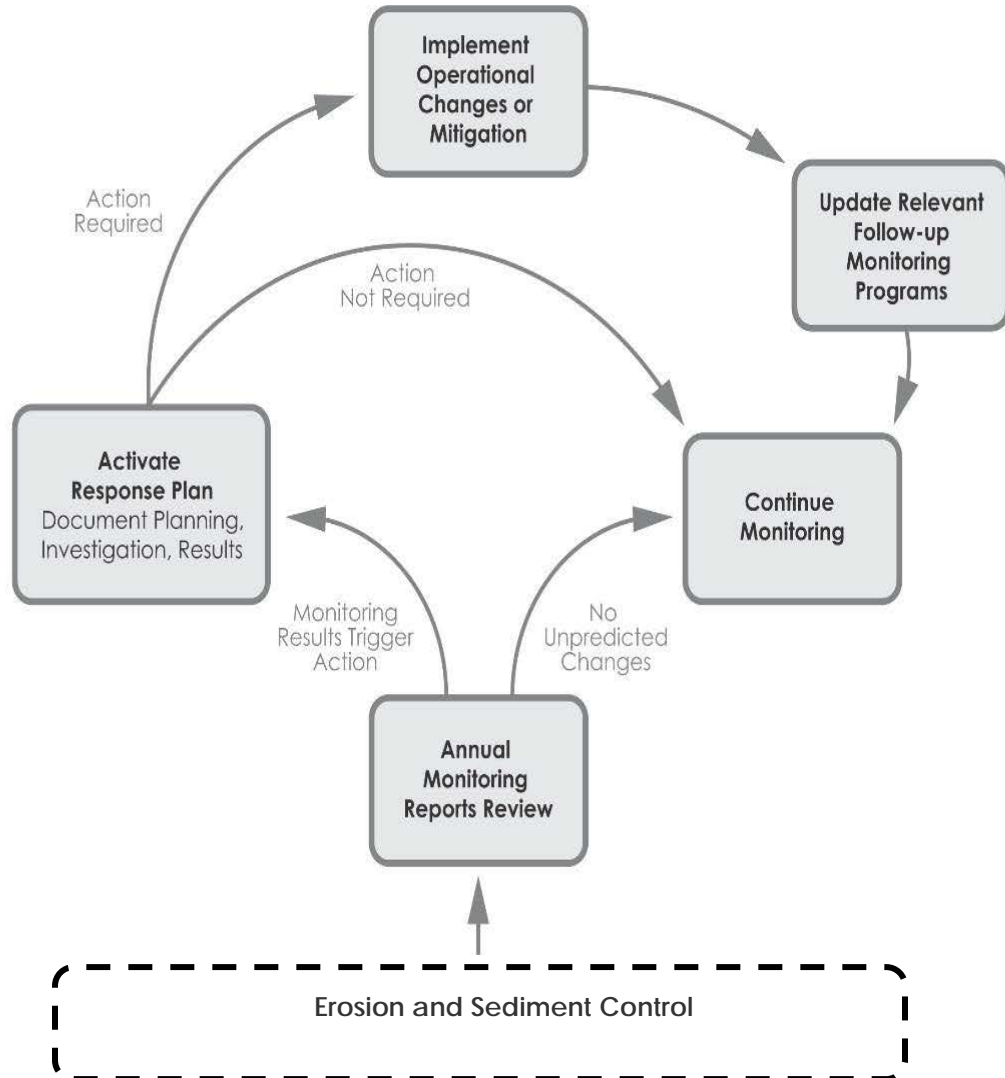
Adaptative Management is a planned and systematic process for continually improving environmental management practices by learning from outcomes. Adaptive management provides flexibility to

address/accommodate new circumstances, to adjust monitoring, to implement new mitigation measures or to modify existing measures.

GGM will identify and correct incidents with appropriate measures aimed to prevent reoccurrence and/or similar occurrences. The Adaptive Management Framework (see Figure 9-1) provides a formalized approach to:

- Formally track and monitor activities;
- Report and as needed investigate incidents, including non-conformance and non-compliant events;
- Develop and implement corrective and preventative actions; and,
- Continue monitoring and update relevant EMMPs.

Figure 9-1: Hardrock Project Adaptive Management Framework



GGM understands that corrective actions with regards to Erosion and Sediment Control may need to be made quickly, especially during the Construction phase of the work. These correction actions will be implemented as required in the field with direction from the Environmental Monitors. Corrective actions will be assigned as appropriate, including actions to prevent their reoccurrence. Corrective actions will vary according to the result of an incident investigation and in consideration of other incidents related to the ESCP.

GGM is committed to the continual improvement of its environmental management and performance. As part of the GGM Adaptive Management Framework, the ESCP will be assessed annually to verify implementation and the continued suitability, adequacy and effectiveness of the Plan. The review will identify elements of the ESCP in need of revision and evaluate performance against established objectives.

10 Training

GGM 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 will be established to provide worker competency, training and awareness:

- All site workers will complete awareness training on erosion and sediment control through Site General Orientations.
- As part of site orientation, applicable field personnel will be 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 will be provided.
- Personnel involved with construction and earthworks will be instructed on appropriate erosion and sediment control measures and requirements for the component being constructed. Lessons learned will be communicated through tailgate discussions and internal memoranda or directives, as necessary.

11 Reporting Requirements and Record Keeping

It is anticipated that those elements relevant to erosion and sediment control will be assembled into a formal summary report and issued annually during the Construction and Operations phases of the work. The report will form the basis of the Adaptive Management strategy and be utilized in the review process.

12 References and Related Documents

MECP 2019 .Rules For Soil Management and Excess Soil Quality Standards..

Ontario Provincial Standard Specification. 2006. Construction Specification for temporary Erosion and Sediment Control Measures (OPSS 805). November 2006.

Ontario Provincial Standard Specification. 2014. Construction Specification for temporary Erosion and Sediment Control Measures (OPSS 804). April 2014.