

Developing a Reclamation and Closure Plan for Regional Mines

Mining and Exploration

November 2021



Ministry of
Energy, Mines and
Low Carbon Innovation



PROVINCE OF BRITISH COLUMBIA

B.C. Ministry of Energy, Mines and Low Carbon Innovation

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Reclamation and Closure Plan for Regional Mines Version 1.0

November 2021

This document provides information regarding Reclamation Guidance for Regional mines in British Columbia. Although references are made to legal requirements, the content of this document should not be interpreted as legal instructions or legal advice. Users of this document should refer directly to official copies of the legislation to determine legal requirements and seek qualified legal counsel when case-specific interpretations are needed.

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List of Abbreviations

the Act	<i>Mines Act</i>
ARD	Acid Rock Drainage
BEC	Biogeoclimatic Ecosystem Classification
CDC	Conservation Data Centre
Code	<i>Health, Safety, and Reclamation Code for Mines in British Columbia</i>
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EMA	<i>Environmental Management Act</i>
EMLI	BC Ministry of Energy, Mines and Low Carbon Innovation
MEND	Mine Environment Neutral Drainage
ML/ARD	Metal Leaching/Acid Rock Drainage
NOW	Notice of Work
QP	Qualified Professional
SARA	Species at Risk Act
TRC	Truth and Reconciliation Commission
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples

Purpose of this Document

The purpose of this document is to provide guidance on the development of a site-specific Reclamation and Closure Plan for Regional Mine projects in BC – placer, sand and gravel, industrial mineral quarries, and mineral and coal exploration. As part of the application to do work under a *Mines Act* authority a plan outlining the details for the protection and reclamation of the land and watercourses affected by the mine must be filed with the Ministry of Energy, Mines and Low Carbon Innovation (EMLI). For regional mines the application is called a Notice of Work.

This document is designed to provide:

- Mining proponents with an understanding of the information required to develop a site-specific Reclamation and Closure Plan for *Mines Act* permit applications;
- Regulators with a consistent provincial framework for information requirements and;
- An implementation strategy to ensure that Reclamation and Closure Plans are refined and improved for all phases of exploration and mine development.

While not mandatory, it is highly recommended that proponents submit a stand-alone Reclamation and Closure Plan to supplement the information in the application form – this is particularly important for complex projects. This will improve the application process and will demonstrate that the applicant has adequately considered reclamation activities as part of the overall mine plan. A thorough Reclamation and Closure Plan allows both the province and Indigenous Nations to have confidence that the intended end land use will be achieved. This will help to reduce application review times, facilitate more effective Indigenous consultation, and reduce delays due to information requests that may otherwise have been needed to determine the reclamation liability and bond requirements.

Having a well thought out and documented Reclamation and Closure Plan will assist companies in their own engagement with Indigenous Nations and can highlight opportunities for overall efficiencies when starting operations with the reclamation plan in mind.

This document is not intended to replace previous guidance. Best Management Practices (BMPs) for reclamation are not included in this document as the intent is to assist in preparation of a written Reclamation and Closure Plan. Other guidance documents such as the Handbook for Mineral and Coal Exploration and the BC Placer Mining Best Management Practices Technical Guide, provide BMPs for reclamation and should be used as companion documents.

Recommended content for each section of a Reclamation and Closure Plan is outlined and provides the general level of detail expected by EMLI. Please note that site-specific conditions of each property must be considered, and not all recommendations in this document will be applicable to every mine site. As each site is unique and mining activities may vary from a small-scale exploration to a large open pit mining, it is important to consider the availability of site-specific information and whether the information requirements outlined in each section of this document are relevant to the site. For example, metal leaching / acid rock drainage may not be an issue

at a given site. In this case, the sections in this guidance document relating to mitigation and management of metal leaching / acid rock drainage need not be included in the site-specific Reclamation and Closure Plan.

Similarly, for small operations where site-specific information collected through onsite investigations may be limited, it may be appropriate to use information about the region in which the mine is located to help characterize baseline conditions. Publicly available information may be obtained through the resources identified in Section 5.3 of this document, as well as through datasets available on the Province of BC's map portal, iMapBC.

When the scope, scale or complexity warrants it, mining proponents are encouraged to ensure that the Reclamation and Closure Plan to be implemented on their property is developed or reviewed by a Qualified Professional (QP), whose scope of practice includes expertise in mining reclamation, or a person who, in relation to duty or function, has suitable education, experience, accreditation and knowledge that is applicable and may reasonably be relied on to provide advice within their area of expertise.

Note: This document is to assist proponents in the development of a Reclamation and Closure Plan. Regional mining and exploration projects vary in terms of activity, complexity, scale, and level of disturbance. Please note that site-specific conditions of each property must be considered, and not all recommendations in this document will be applicable to every mine site. The level of detail of a given section may be modified based on the size and nature of the project.

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1 Introduction

For the purpose of developing a Reclamation and Closure Plan, reclamation includes a suite of activities conducted throughout the life of mine intended to minimize effects resulting from mining disturbances and to:

- Ensure long-term stability and erosion control of the post-mine landforms and watercourses;
- Restore habitat, ecosystems, and biodiversity;
- Restore land capability;
- Mitigate metal leaching and acid rock drainage (ML/ARD);
- Protect water quality;
- Remove buildings and equipment;
- Remediate contaminated areas; and
- Restore the areas used temporarily for mining purposes to an acceptable end land use.

Reclamation plans are required to be site-specific and informed by baseline characterization of current condition of the land, ecosystems, species and available habitats, land capability, and end land use objectives. For complex or large projects, development of a reclamation plan and associated reclamation prescriptions are considered to be in the realm of a QP.

Note: This document is to assist proponents in the development of a Reclamation and Closure Plan. Regional mining and exploration projects vary in terms of activity, complexity, scale, and level of disturbance. Please note that site-specific conditions of each property must be considered, and not all recommendations in this document will be applicable to every mine site. The level of detail of a given section may be modified based on the size and nature of the project.

2 Importance of Reclamation and Closure Plans

Exploration and mining in BC are considered a temporary use of the land. In some cases, the phases of mining can occupy the footprint for decades and for others the timeframe for mining uses is much shorter, even on the scale of months. Regardless of the amount of time the mining activities span, reclamation planning must be linked to both short- and long-term environmental protection programs. Actions taken at the outset of mining activities will impact the ability and ease of reclamation activities. For example, salvaging and stockpiling organic material and soils at the start of a project, will reduce the time, cost and effort necessary to re-establish vegetation at the end of a project. Reclamation is an activity that is expected to occur progressively throughout all phases of mining, either actively or through research and planning.

The reclamation strategy outlined in the Reclamation and Closure Plan for a site is required to be adaptive and depending on duration and complexity of the program, the plan may require regular updates throughout the

life of mine as site conditions change and as the results of past reclamation activities inform future reclamation activities. Under Section 10.4.1 of the *Health, Safety, and Reclamation Code for Mines in British Columbia* (Code), Reclamation programs are required to be updated a minimum of every 5 years with the Mine Plan and Reclamation Program Update report. Please note that proposed changes to approved mine plans should not be presented solely in the Mine Plan and Reclamation Program Update. If a change in the mine plan is being considered beyond what is permissible under Section 10.1.18 of the Code, an application to amend the permit will be required.

Note: Stand-alone Reclamation Plan – A recommended best practice identified in the March 2020 “*Mineral and Coal Exploration Notice of Work Application Companion*” is to have an overarching, stand-alone reclamation plan that covers all proposed activities and disturbance. Available at:

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/mineral-exploration-mining/documents/exploration/mineral_and_coal_exploration_now_application_companion.pdf

TIP: The Provincial Government has developed proponent resources for engaging Indigenous groups: <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations>

3 Reclamation Planning

The Reclamation and Closure Plan should be designed as a site-specific plan which addresses the requirements identified in Parts 9 and 10 of the Code. Specifically, the Reclamation and Closure Plan must clearly demonstrate how applicable reclamation standards outlined in the Code will be achieved for the mine disturbance footprint and the proposed post-closure landscape. The plan should include the general reclamation approach and prescriptions (including concepts for final landforms, soil placement, surface preparation and revegetation) for each site-specific component.

The plan should provide baseline information and data to substantiate how the proposed plan will meet the reclamation requirements under the Code. In the case of less complex operations, this could be scoped to present the current state of the land based on publicly available information.

The plan should be a living document and as a mine progresses through the various development phases, the plan will require updates at minimum every five years (Section 10.4.1 of the Code). For sites with a life of mine of five years or less, the Reclamation and Closure Plan is required to provide all details necessary to carry out reclamation requirements. While the principles of reclamation planning still apply for mining activities with short duration such as drilling, it is understood that reclamation activities may be undertaken within one season and updates to the Reclamation and Closure Plan may not be required.

4 Reclamation and Closure Plan Suggested Format

The goal of this section is to provide an outline of information requirements which proponents can use to design and implement a reclamation program for their site(s). The following is a suggested format intended as a general guide. Some sections within the suggested format may not be applicable to certain applications and in others, additional information may be required depending on the site-specific nature and extent of the mine disturbance and the mining activities proposed.

Note: It is intended that the format and information provided in a Reclamation and Closure Plan be scaled to the specifics of the project. Some sections within the suggested format may not be applicable, or the level of detail of a given section may be modified based on the size and nature of the project.

4.1 Purpose and Objectives

This section should summarize the goals of the Reclamation and Closure Plan and provide site-specific context. This section should explain linkages with other objectives or plans and identify the focus of the plan as well as what regulations, information requirements or corporate approaches it is designed to address. The scope of the plan should be defined both spatially and temporally and include contingency plans.

4.1.1 Existing Disturbance and Outstanding Reclamation Liabilities

Describe any existing disturbance and reclamation liabilities, including developments, and infrastructure currently in place within the mine area as a result of previous and ongoing activities. Identify any potential liabilities that may affect future reclamation efforts (e.g. contaminated material, accumulated debris, underground workings, known ML/ARD issues, or other existing environmental and/or health and safety information).

An itemized listing of existing disturbances and sizes of each should be provided; table format is acceptable and an annotated map is beneficial. In the case where the mine site overlaps with pre legislation (before 1969) mine disturbance that is not related to the current permitted project or application, these disturbances should also be clearly identified and described.

4.1.2 Proposed Activity

This section provides overview information on the proposed exploration program or mine plan which is consistent with the description in the Notice of Work application form. Ideally it should provide all information required for use of the [Regional Reclamation Bond Calculator](#) including:

- Description of the proposed activity;
- Anticipated life of mine;
- Itemized list of proposed disturbances and size (e.g. pits, trenches, stockpiles, access roads/trails, drill pads, camps, laydowns, etc.). This may be provided in table format;

- Infrastructure requirements (e.g. type of camp, number of buildings, equipment, machinery, number and size of storage containers, etc.);
- Inventory of fuel and other potential sources of contamination;
- Development sequence and schedule, which includes reclamation activities and monitoring.

This section should also briefly describe any potential environmental effects of the project that will require special consideration during reclamation planning and implementation. These may include site-specific impacts (within the footprint) as well as impacts for consideration on a wider scale (outside of the footprint). For example, impacts may include:

- Instream work, water withdrawal, culverts installation or removal;
- Location of the project footprint within identified ecosystems of management concern;
- ML/ARD issues requiring mitigation and treatment;
- Challenges for reclamation (e.g. high elevation environment);

Additional review is required for proposed works with impacts which may cause alteration or degradation of critical habitat for sensitive species of management concern (e.g. Caribou, bats) and/or loss or alteration of fish habitat, or negative effects on the aquatic environment.

4.1.3 Site Maps

A reclamation specific site map which shows location of proposed reclamation may be provided. Alternately the site map included in other sections of the application may be referenced when clarifying where each reclamation activity, or other activities such as erosion and sediment controls will be applied.

Note: If geospatial files will be submitted the following guidance may be useful:

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/mineral-exploration-mining/documents/exploration/mines_act_application_imapbc_reference_guide.pdf

4.2 Baseline Characterization

The Baseline Characterization section of the report is intended to describe existing, or pre-disturbance conditions. Understanding of existing land uses and baseline (i.e. pre-disturbance) biophysical conditions is a critical step in reclamation planning. The identification of current land use activities, provincial or regional land management objectives, and potentially affected Indigenous groups and stakeholders should inform the development of end land use goals and guide reclamation activities. Pre-disturbance biophysical conditions can be used to establish the existing land capability of the site and discern limiting factors that will need to be addressed through reclamation practices. This information will guide reclamation prescriptions, monitoring, and criteria for determining reclamation success as it relates to end land use goals. In cases where there has been prior mine or other industrial disturbance, or for older established mines, baseline conditions may be

characterized based on data from a neighbouring unaffected watershed or area. When baseline is characterized using another location, the site selected must be similar in nature and a rationale for selection provided.

4.2.1 Current Land Uses and Present Condition of the Land

In this section identify current land uses and users, including Indigenous groups whose asserted territory overlaps the project site. Other land users may include agriculture, range, commercial forest harvesting, trappers, guide outfitters, recreational users, industrial or residential development, etc. An intrinsic value such as wildlife habitat is also a valid land use and specific target species should be identified to guide reclamation planning.

Identify any jurisdictional or land management areas that overlap with the proposed project area that will influence reclamation objectives. These could include areas within the Agricultural Land Reserve, designated Wildlife Habitat Areas, Old Growth Management Areas, or other provincially protected areas. Reclamation considerations may also be required on private land, or for areas within Regional Districts/municipalities, community watersheds, or in areas with Land Use Plans or other established land management frameworks.

TIP: The Provincial Government geospatial mapping tool, iMapBC, is a useful tool for desktop land use analysis. It allows the user to view and analyze the thousands of geographic datasets stored in the B.C. Geographic Warehouse. Available at: <http://maps.gov.bc.ca/ess/sv/imapbc/>

TIP: Explore by Location is also a useful resource which enables a user to identify a specific area of interest and explore land uses and authorizations that overlap. Search results may be helpful in characterizing current land uses and land users.

Available at: <https://portal.nrs.gov.bc.ca/web/client/explore>

4.2.2 Biophysical Conditions

Land capability is dependent on ecosystem elements such as climate, vegetation, soil and topography. Pre-disturbance or baseline biophysical conditions should be characterized to inform reclamation prescriptions, objectives and expectations. Where the scope and scale of the project warrants, detailed information on pre-disturbance ecosystems, habitats and other land uses in the project area should be classified in a manner that allows for the information to be presented in maps and tabulated inventories (e.g., Biogeoclimatic site series, habitat mapping by wildlife species for the relevant life stage). The information provided should reflect both terrestrial and aquatic habitats.

4.2.2.1 Climate

Climate plays an important role in reclamation planning and implementation, from plant species selection, timing of revegetation works, and ecosystem development timeframes. Understanding climate conditions will also assist in identifying potentially limiting factors that may require additional mitigation measures. For example, heavy spring rain events will influence erosion and sediment control measures to prevent soil loss;

summer drought conditions may influence planting stock selection and timing of seeding/planting, and reclamation in cold climates with short growing seasons may require additional consideration to species selection, site preparation and strategic microsite planting.

When the scope and scale of the proposed activity warrants detailed information, this section should provide a summary of climatic parameters such as annual and seasonal temperature and precipitation. Climatic conditions should be considered and discussed as potential limitations for reclamation success.

TIP: Environment Canada publishes the climatic normal (averages over 30 years) for about 300 stations in British Columbia at https://climate.weather.gc.ca/climate_normals/index_e.html

4.2.2.2 Soil

Soil is the foundation of basic ecosystem function, an important resource, and a critical component of successful reclamation. Understanding soil characteristics provides valuable planning information for the operator in terms of soil stripping, stockpile management, and reclamation. Determination of soil depth across the site will guide stripping operations, and anticipated soil volumes should be used in the siting and design of stockpiles. Knowledge of pre-disturbance soil depths and stockpile volumes should be factored into soil replacement prescriptions for reclamation. Existing soil characteristics, including soil moisture and nutrient regimes, will assist in determining land capability and inform plant species selection for revegetation. Understanding of nutrient limitations can inform whether fertilizer application may be necessary to promote plant establishment. A lack of understanding of limiting soil factors, in addition to poor soil management can result in marginal revegetation performance, which ultimately results in additional liability, remedial action, monitoring, and costs. Where the scale and scope of the activity warrants, the collection of baseline soil data will inform the site-specific Reclamation and Closure plan.

Code Section 10.7.8 – Growth Medium

On all lands to be re-vegetated, the growth medium shall satisfy end land use, capability, and water quality objectives. All surficial soil materials removed for mining purposes shall be saved for use in reclamation programs unless these objectives can be otherwise achieved.

Even if it is proposed that all available soil will be salvaged in the mine footprint, valuable information can be acquired through a soil survey to evaluate topsoil and subsoil characteristics to help inform reclamation planning. Baseline soil parameters related to reclamation include: soil profile characterization such as horizon depths, soil texture, topsoil and subsoil quantity, as well as physical and chemical soil limitations (e.g. high coarse fragment content (stoniness), high water table, pH, salinity, etc.). Soils information should describe soil thickness and variability for each vegetation community; these data should inform location, salvage depths and volume of soil types. Baseline soils information should include the identification and mapping of soil units. Soil

descriptions and classification should follow The Canadian System of Soil Classification, Third Edition (Agriculture and Agri-Food Canada, 1998).

TIP: The BC Soil Information Finder Tool is an interactive mapping application that provides access to soil survey maps, soil attributes, and agriculture capability mapping in British Columbia. The BC Soil Information Finder Tool is available at: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/land/soil/soil-information-finder>

TIP: The Canadian System of Soil Classification is available digitally here: http://sis.agr.gc.ca/cansis/publications/manuals/1998-cssc-ed3/cssc3_manual.pdf

4.2.2.3 *Physiography and Surface Drainage Features*

Provide a description of the topography including terrain and surface drainage features for the project area. This primarily includes natural drainage features in relation to the larger landscape, but could include man made features such as ponds, ditches and road drainage features. The intent is to identify landscape features that may influence, or be affected by the proposed project (e.g. areas of slope instability, watercourses). Information related to slope length, gradient, and aspect are important to consider during the development of erosion control and revegetation prescriptions. Baseline topography information will help inform final landform design.

Code Section 10.7.9 - Landforms

Where practicable, land and watercourses shall be reclaimed in a manner that is consistent with the adjacent landforms.

Information on slope, aspect, land surface expression, and surface drainage features (e.g. watercourses, waterbodies, wetlands, dugouts, seepages, swales) is necessary to inform the reclamation plan. This information is useful to understand the site-specific successional processes for ecosystem development as well as geomorphic and erosional processes, which will assist reclamation planning for mining-related landforms that may remain after mining. Much of the information can be presented on a map.

In areas where the project may affect the aesthetics of the surrounding landscape, and may be a public concern, additional mitigation measures and landscape design may be required and should be incorporated into reclamation planning.

TIP: There are numerous digital geospatial data sources of topographical data. One of many government sources is Topographic Map Viewer. The B.C. Government provides georeferenced, 1:20,000 scale topographic maps of the entire Province of British Columbia to view and download for free. Available at: <https://www2.gov.bc.ca/gov/content/data/geographic-data-services/topographic-data/topographic-map-viewer>

4.2.2.4 Vegetation

Vegetation information provides an indication of site productivity and plant community assemblages; and therefore, provides important baseline information regarding reclamation expectations and targets. This section should identify vegetated landscape features/polygons and existing or historical disturbances (e.g. mature forest, riparian areas, wetlands, cutblocks, crop land, pasture, historical mining) in relation to the proposed project disturbance footprint. Describe the vegetation communities within the proposed project area, including within the project footprint if the scale and scope and duration of the activity warrants. This may include seral stage and a list of primary species by layer (i.e. tree shrub, herb) within each community. Plant community descriptions should be correlated with the Biogeoclimatic Ecosystem Classification (BEC) system site series level. Where the scope, scale and duration of the proposed activity warrant, involvement of a QP may be necessary. Vegetation assessments and ecosystem classification are within the realm of the QP.

Baseline vegetation assessment data is used in reclamation planning to:

- Identify target plant communities/ecosystems for the closure landscape; and
- List key species to establish in target plant communities/ecosystems.

TIP: For more information on the BEC system, ecosystem descriptions, and guides, visit the Biogeoclimatic Ecosystem Classification web portal at: <https://www.for.gov.bc.ca/hre/becweb/>

Baseline vegetation information will also include a description of invasive species on, or near, the site that could possibly affect the results of reclamation activities and ultimately reclamation objectives. Proponents may be required to prepare an Invasive Plant Management Plan for the project. The plan should identify known or potential invasive plants within the project area, as well as describe prevention, treatment, and monitoring measures. Where applicable, link measures within the Invasive Plant Management Plan to the activities and outcomes within the Reclamation and Closure Plan.

Code Section 10.7.7 - Re-vegetation

On all lands to be re-vegetated, land shall be re-vegetated to a self-sustaining state using appropriate plant species.

TIP: The Invasive Alien Plant Program (IAPP) database contains invasive plant surveys, treatments, and activity plans for the entire province of BC. The data in IAPP is entered by a wide variety of user groups (ministries, regional districts, weed committees, forest licensees, utilities, conservation groups, federal departments and others) on an on-going basis. The Invasive Alien Plant Program geospatial mapping tool allows the user to view and query documented invasive plant occurrences throughout the province. Available at: <http://maps.gov.bc.ca/ess/hm/iapp/>

4.2.2.5 *Wildlife*

Provide a description of wildlife and wildlife habitat within the project area. Note and describe areas with high wildlife values, such as areas with browse (food) availability, high vegetation diversity, wetland and riparian habitats. Include any significant habitat features (e.g. mineral licks, dens, stick nests, wildlife trees, hibernacula) that are known or mapped. Where reclamation objectives include wildlife habitat, consider target species and habitat requirements for a range of relevant life phases (e.g. breeding, rearing, foraging). Provide information on any known overlaps with legally designated lands such as Ungulate Winter Ranges and Wildlife Habitat Areas, and proposals for how reclamation will address requirements of the protected species and their habitats if applicable.

TIP: HabitatWizard is a map-based web tool that allows users to spatially access detailed fish, wildlife and ecosystem information online. It provides wildlife inventory data (incidental, survey & telemetry observations), endangered species information, Wildlife Management Units, and Caribou distribution. Available at: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/ecosystems/habitatwizard>

4.2.2.6 *Fish and Aquatic Resources*

Provide a description of surface water features (streams, lakes, wetlands) located on, or near, the project area. Indicate whether the water feature is fish bearing and what species are present. If the feature is not fish bearing, it may still be important to note the fish distribution within the watershed.

If a stream or waterbody will be impacted by the project and restoration activities will be required, additional baseline information must be collected. Provide a physical characterization of the habitat that will be impacted (e.g. morphology, gradient, channel width, bank height, bed material, etc.) and quality of rearing, spawning, and overwintering habitat for the fish species present within the system.

Proponents must be cognizant of provincial and federal regulations when it comes to working in and around water and potentially affecting fish or fish habitat. This includes timing restrictions for instream activities.

TIP: Regional timing window information is available at:
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water/regional-terms-conditions-timing-windows>

TIP: HabitatWizard is a map-based web tool that allows users to spatially access detailed fish, wildlife and ecosystem information online. It provides fisheries information such as species presence data, obstacles to fish passage, inventoried lakes & streams, invasive aquatic species, and well as links to over 2,500 bathymetric maps. Available at: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/ecosystems/habitatwizard>

4.2.2.7 *Species or Ecosystems at Risk*

Due to their conservation status, provincial red- and blue-listed species and federal *Species at Risk Act* (SARA)-listed species require special consideration during project development and reclamation planning.

Identify any species or ecosystems at risk within the project area where special considerations may be required. This includes:

- Provincial red- and blue-listed species and ecosystems:
 - **Red:** Any species or ecosystem that is at risk of being lost (extirpated, endangered or threatened)
 - **Blue:** Any species or ecosystem that is of special concern
- Species listed as endangered, threatened, special concern under SARA by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC)

TIP: The B.C. Conservation Data Centre (CDC) maps known element occurrences (an area of land and/or water where a species or ecosystem is known to occur) of red- and blue-listed species and ecosystems. The CDC database includes the best available information and is updated on a regular basis.

Available at: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/known-locations-of-species-and-ecosystems-at->

4.2.2.8 *Water quality*

Mining activities have potential to impact water quality, and sound planning and effective operational management must be in place to ensure that impacts to water quality do not occur. Surface water management such as diversions, sediment ponds and erosion and sediment controls or water treatment may minimize impacts during operations, as well as throughout the closure phase.

Where a project has the potential to negatively affect surface water quality, or the aquatic environment, an assessment of potential impacts may be required and will likely include watercourses or receiving environments outside of the *Mines Act* permit area. The collection of and monitoring of water quality data for the project may be required in order to identify and measure potential impacts, as well as demonstrate regulatory compliance. Standard Operating Procedures for water quality monitoring and water management may be required. Reclamation planning should consider how water management at each phase of the project will be implemented to avoid water quality impacts and meet regulatory requirements.

Code Section 10.7.20 - Water Quality

If water quality from any component of the mine results in exceedances of applicable provincial water quality standards in the receiving environment, when required by the Chief Inspector, remediation strategies shall be implemented for as long as is necessary to mitigate the problem.

The Ministry of Environment and Climate Change Strategy (ENV), regulates water quality when there is a discharge from a mine or mining activity to the receiving environment. To assess impacts of water quality on other water users and uses, such as aquatic life or drinking water, ENV has established standard water quality guidelines and water quality objectives. Implementing a routine sampling regime is required for sites where water quality could be impacted by mining activities.

Note: If contact water will be discharged from the mine site, an effluent discharge permit issued by ENV is required under the *Environmental Management Act*.

TIP: Approved Water Quality Guidelines in BC: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>

Reclamation planning must consider how water quality will be impacted by mining activities in order to design plans to mitigate the impacts. Specific protection measures may also be required to reclaim water management structures in a manner that will not impact water quality. Reclamation plans must also propose strategies for how long-term water quality can be maintained once mining activities are complete and into the closure and post-closure phases.

4.2.2.9 Groundwater

The Reclamation and Closure Plan will provide details explaining how groundwater resources may be impacted by mining activities and what mitigations and monitoring are planned throughout all phases or activities. Groundwater monitoring may be required under certain conditions throughout the life of mine. Baseline groundwater quality is to be established early in the project life if a sampling program is required.

TIP: The *Water Sustainability Act* Groundwater Protection Regulation are available at:
http://www.bclaws.ca/civix/document/id/complete/statreg/39_2016

Reclamation planning must include decommissioning of groundwater wells unless they are required for long-term monitoring. Where appropriate, a *Mines Act* permit may include conditions to avoid interaction with groundwater, such as setting maximum excavation depths for quarries above the water table, or require monitoring programs or specific mitigation measures based on mine designs proposed.

4.2.2.10 Metal Leaching/Acid Rock Drainage

Both metal leaching and acid generation are geochemical processes that can occur naturally. In areas where minerals containing sulphide and elemental sulphur are exposed to oxygen and water, acid generation may occur and can be mobilized to the receiving environment (waterbodies) causing negative impacts on water quality, and aquatic ecosystems in general.

The Code defines acid rock drainage (ARD) as “low pH surface or ground water that results from the oxidation of sulphide minerals or, elemental sulphur, or the dissolution of acid generating minerals found in rocks and coal.”

Under certain acidic conditions, some metals become soluble which may lead to toxicity in the water, in addition to acidity. Some metals are soluble in neutral pH water and must be identified and managed accordingly. Different rock types will have different “time to onset” characteristics, that is, how much time it will take for metal leaching and/or acid rock drainage to develop upon exposure. It can range from days to decades and should be quantified as part of initial mine planning and exploration.

Any level of disturbance may result in metal leaching and / or acid rock drainage conditions. Road cuts through rock with drainage flows over exposed rock material should be assessed prior to construction.

Metal leaching and / or acid rock drainage is complex and mitigation, monitoring or active treatment is often required long term; therefore, avoidance is best practice.

Code Section 10.1.16 - Metal Leaching and Acid Rock Drainage

Plans for the prediction, and if necessary, the prevention, mitigation and management of metal leaching and acid rock drainage shall be prepared in consideration of the *Guidelines for Metal Leaching and Acid Rock Drainage at Mine sites in British Columbia*.

At sites where geology or mining activities may result in metal leaching and / or acid rock drainage, the Reclamation and Closure Plan must address mitigation and monitoring through life of mine. Site characterization

for metal leaching and / or acid rock drainage prediction and mitigation is considered to be within the realm of a QP.

TIP: Guidelines For Metal Leaching and Acid Rock Drainage at Mine sites in British Columbia (Price and Errington): <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/permitting/ml-ard>

Global Acid Rock Drainage Guide: http://www.gardguide.com/index.php?title=Main_Page

Mine Environment Neutral Drainage (MEND): <http://mend-nedem.org/default/>

iMap BC Geology and Soils Layer: <https://arcmapping.gov.bc.ca/ess/hm/imap4m/>

4.2.2.11 Baseline Mapping

Where complexity of the development activities warrants, comprehensive site-specific baseline data is important to inform the Reclamation and Closure Plan and the development of site-specific reclamation prescriptions. The description and presentation of baseline biophysical data may be best presented with maps. For example, this may include the location and distribution of ecosystem units, watercourses, and wildlife features, (as discussed in Sections 5.3.2.1 through 5.3.2.7) as well as illustration of topographical features using contours.

For small sites where the availability of site-specific information may be more limited, some information about the region in which the mine is located may be obtained through the resources identified in the previous sections, as well as through datasets available on the Province of BC's map portal, iMapBC. Basic site maps can also be created using this site.

TIP: The B.C. Government has a free online map portal which is available for public use. Provincial datasets which may provide helpful information about the region in which your mine is located are available on this site. iMapBC can be accessed at: <https://www2.gov.bc.ca/gov/content/data/geographic-data-services/web-based-mapping/imapbc>

TIP: A tutorial for use of this application is available at: <http://www.frontcounterbc.gov.bc.ca/pdf/applications/parks/iMapTutorial.pdf>

TIP: If you prefer to download the data and make maps in a program such as ArcMap, datasets can be downloaded through DataBC: <https://data.gov.bc.ca/>

4.3 Reclamation Plan

This section is intended to detail how the site will be reclaimed to establish post-disturbance ecosystem function and meet land capability and end land use goals. The reclamation plan should provide a description of the following:

- Planned disturbance;
- Planned end land use(s);
- Predicted post-project land capability;
- Reclamation objectives (both short term and long term);
- Progressive reclamation planning;
- Reclamation activities; and
- Reclamation monitoring.

Spatially defined end land use goals, post-project land capability predictions, and reclamation objectives will act as a blueprint to guide reclamation planning, research, and monitoring throughout the life of the project. Reclamation prescriptions provided in the Reclamation and Closure Plan should be clearly tied to defined targets. Contingencies should be presented to address predicted challenges to achieving reclamation objectives.

TIP: The following industry specific guidebooks provide useful reclamation information and best practices:

- BC Placer Mining Best Management Practices Technical Guide: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/mineral-exploration-mining/documents/reports/bmps_technical_guide_2019.pdf
- Handbook For Mineral and Coal Exploration in British Columbia: <https://www2.gov.bc.ca/assets/gov/business/natural-resource-industries/mineral-exploration-and-mining/handbookformineralexploration0809.pdf>
- AME Reclamation Guide for Exploration <https://amebc.ca/tools/reclamation-guide-for-mineral-exploration/>
- Reclamation and Environmental Protection for Sand, Gravel and Quarry Operations in British Columbia: <https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/contracting-with-the-province/documents/archive-unofficial-tender-documents-90-days/12626->

4.3.1 End Land Use

Target end land use(s) are outlined in *Mines Act* permits. The end land uses proposed must consider both previous and potential land uses. Typically, the end land use goal is to return the land back to comparable conditions that allows for pre-disturbance land use opportunities. Where post-project land uses are proposed that differ from pre-mining conditions, supporting rationale must be provided, especially where the development is to occur on Crown Land. When a development is planned for private lands, the private landowner must be consulted and agree with the proposed end land use plan. It is important to consider input from local Indigenous groups and include future aboriginal uses of the site in the end land use plan.

Where regional Land Use Plans specific to the area in which the mine is located exist, they should be considered in the end land use plan. For example, if the Land Use Plan and associated tenures designate areas of the mine footprint for forestry, it may be reasonable to target an end land use of forestry and reclamation prescriptions would be expected to include the appropriate tree species, as well as the target tree density (for example, stems/hectare).

End land uses for the permit area must be measurable and therefore include objectives designed with the ability to quantify targets in the future. For example, if an end land use goal is wildlife habitat, it is useful to include target species and habitat types so these targets can be quantified in the future. For example, if the creation of moose winter habitat is identified as a target reclamation objective then vegetation prescriptions would be expected to include browse species preferred by moose.

TIP: Land Use Plans and Resource Management Plan completed in BC are available at the following link: <https://www2.gov.bc.ca/gov/content/industry/crown-land-water/land-use-planning>

Code Section 10.7.4 - Land Use: The land surface shall be reclaimed to an end land use approved by the chief permitting officer that considers previous and potential uses.

4.3.2 Land Capability

Land Capability is the ability of an area to currently or eventually support a given land use based on physical and biological characteristics and limitations (climate, topography and soils). It is a Code requirement (Section 10.7.5) that the average land capability of post-closure lands be similar to the average land capability that existed prior to mining. The exception to this would be if the land capability is not consistent with the approved end land use or compromises long-term physical and/or geochemical stability.

In this section, clearly identify land capability for the project disturbance. Describe the post-closure landscape in terms of target ecosystems, biodiversity elements, and where applicable habitats for relevant wildlife species occur. Consider ecological succession of the site and identify limiting factors that must be overcome to facilitate the desired recovery trajectory. This section should include a discussion of the changes to land capability that

could result due to project activities. Projected post-closure land capability should be compared to pre-development land capability, to evaluate the required achievement of similar capability after mining. Information may be presented in map and tabulated formats.

Code Section 10.7.5 - Capability: Excluding lands that are not to be reclaimed, the average land capability to be achieved on the remaining lands shall not be less than the average that existed prior to mining, unless the land capability is not consistent with the approved end land use or compromises long-term physical and/or geochemical stability.

There are various systems, measures, or indicators used to determine land capability. Within natural systems in BC, the BEC system is the standardized method to classify sites on an ecosystem-specific basis. Although the BEC system does not directly provide information on capability for specific end land uses, estimates of capability can be generated from BEC units for uses such as wildlife habitat, forestry, and aspects of Indigenous traditional uses.

For projects occurring within the Agricultural Land Reserve, agricultural capability ratings and limitations are assessed through a classification system described in Land Capability Classification for Agriculture in British Columbia (Ministry of Environment 1983).

TIP: The document entitled *Land Capability Classification for Agriculture in British Columbia* (Ministry of Environment 1983) can be found at the following link:

<https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/agricultural-land-and-environment/soil-nutrients/moem1.pdf>

This system should be used for projects on agricultural land.

4.3.3 Reclamation Objectives

The overarching goal of a Reclamation and Closure Plan is to guide activities that will lead to project-related disturbances being reclaimed to a desired end land use(s) where the average land capability is similar to the average that existed pre disturbance. Reclamation objectives are individual steps that are developed and that direct activities to achieve defined reclamation goals.

Reclamation objectives should be realistic, achievable and measurable and help guide all prescriptions proposed within the Reclamation and Closure Plan, including the re-establishment of pre-disturbance conditions, targets for post-closure ecosystems, landform design, vegetation prescriptions, erosion sediment control planning, time scales, sequencing, reclamation research and reclamation monitoring.

4.3.4 Progressive Reclamation Planning

Progressive reclamation is defined as a reclamation activity that is undertaken concurrent with mining activities, prior to the end of mine life and which contributes to the final reclamation and closure goals, targets and end

land use objectives of the site. Progressive reclamation is often confused with erosion and sediment control measures, primarily seeding. The test for progressive reclamation is that the activity must be aligned with end land use objectives (appropriate site preparation and vegetation) and not simply an interim measure for the management of erosion or sedimentation during operations.

Progressive reclamation could include a phased approach to mine development. For example, when the resource from one area is depleted the site could be reclaimed before, or in conjunction with mining the next area. Figure 1 provides a simplified example of progressive reclamation of a pit/quarry, where reclamation is occurring on a phased approach over the life of the project. For exploration projects, progressive reclamation could include the efficient sequencing of activities. For example, a crew could be establishing a new drill site, while one is actively drilling, and a third crew is reclaiming the last active site, with this process being repeated over the duration of the program.

In the Reclamation and Closure Plan, progressive reclamation can either be discussed within a separate section or incorporated into the schedule of reclamation activities presented in Section 4.3.5. Where relevant, consider using figures, tables or maps to present the planned progression of reclamation over time or phases of development.

Progressive reclamation planning should be detailed and consider all sequencing and scheduling (dates) of the project and reclamation activities over the life of the project. It should provide information on the storage and handling of materials, location of roads and infrastructure, and limiting site constraints.

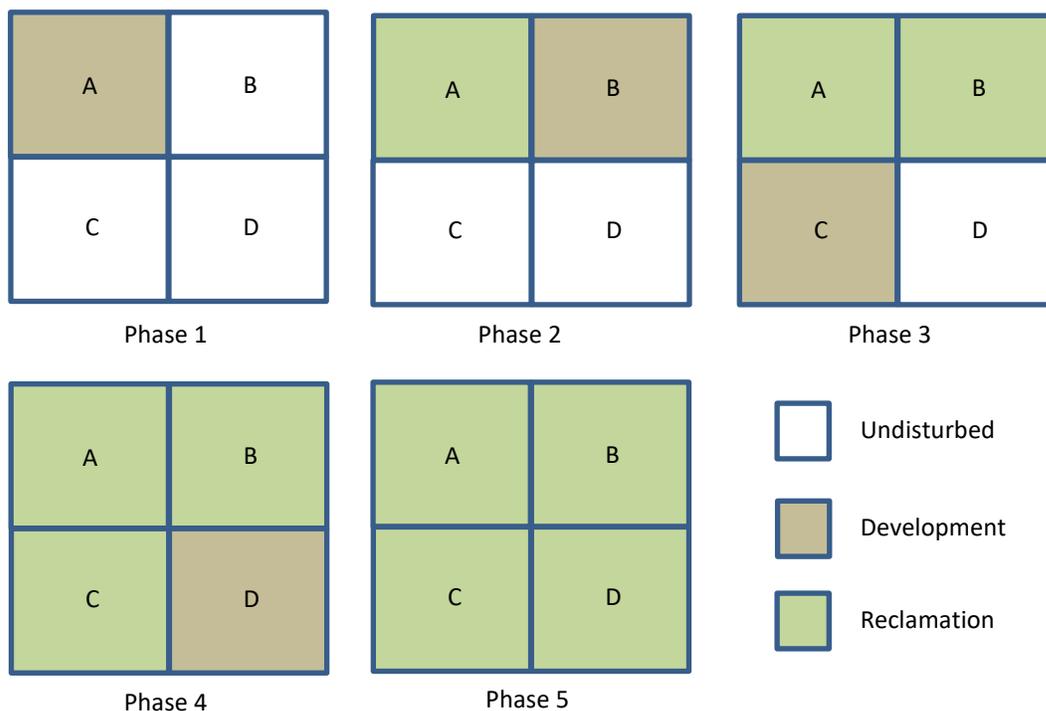


Figure 1 Simplified example of progressive reclamation of a pit/quarry, where reclamation is occurring on a phase approach throughout project development.

4.3.5 Reclamation Prescriptions

In this section, describe in detail all reclamation and closure activities to be undertaken on site. Reclamation prescriptions must be site-specific and should be broken down into logical project components, areas, or footprint disturbance. For each project component/area, include a discussion of how activities link with the end land use goals and site-specific objectives, sequence of development and reclamation activities, and how progressive reclamation will be implemented throughout the life of the project. Provide details with respect to what is involved in each activity and how it will be completed. Include details such as equipment to be used, planned site preparation techniques, how soil or overburden will be applied to the surface and at what depth, details of planting and seeding prescriptions and a schedule for each activity.

The specific reclamation prescriptions proposed will be used to assess the amount of reclamation security required for the project. Proponents are encouraged to use the Regional Bond Calculator (a link is provided in the Reclamation Security section of this document) as a tool to help fine-tune their mine plan to reduce liabilities.

TIP: The following website contains further information on reclamation security and liability estimates including EMLI policies:

<https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/permitting/reclamation-closure>

EXAMPLE HEADINGS

The following are example headings and key points that should be considered when discussing reclamation activities for the different mine components/areas.

Mine Component or Area

For each component (e.g. pit, camp, borrow) or area (e.g. “East Pit” or “North Ramp Road”), include a discussion of site-specific objectives and a description of site-specific reclamation prescriptions for soil management, removal of structures and equipment, land forming, site preparation, soil placement and revegetation. Describe potential limitations associated with reclaiming this site, and contingency measures that will be considered or implemented if required. Use Section 4.3.5 as many times as needed to capture all site disturbance areas.

Soil Salvage and Management

Describe how topsoil, subsoil and overburden will be salvaged, handled, and stored. Indicate stockpile locations, anticipated volumes, and management to limit erosion, invasive species and handling. This information may be best presented in map format.

Code Section 10.7.8 - Growth Medium: On all lands to be revegetated, the growth medium shall satisfy land use, capability and water quality objectives. All surficial soil materials removed for mining purposes shall be saved for use in Reclamation programs unless these objectives can be otherwise achieved.

Landforming, Soil Replacement & Site Preparation

Describe how the site will be graded and contoured during reclamation, including maximum slope angles, and how it will compare to the previous and adjacent landforms. Provide information on the sequencing of material placement and material source, for example, placement of poor-quality overburden (saline, very stoney), followed by reject material, better quality overburden, subsoil, and finally topsoil. If applicable, discuss whether fines from sediment ponds can or will be used to augment soil resources available for reclamation purposes in cases where fine textured material and topsoil are limited. Include information on soil placement depths, this may vary by location, land use, and linked to BEC site series.

Code Section 10.7.6 - Long Term Stability: Land, watercourses and access roads shall be left in a manner that ensures long-term physical and geochemical stability.

Code Section 10.7.9 – Landforms: Where practicable, land and watercourses shall be reclaimed in a manner that is consistent with adjacent landforms.

Identify what considerations or effort will be completed to reduce compaction and ensure adequate infiltration and rooting conditions in the substrate. This could include placement of overburden in thick lifts (1 m), or mechanically decompacting overburden prior to topsoil placement.

Describe site preparation activities and final soil surface condition. When the end land use objective is the establishment of natural ecosystems and/ or wildlife habitat it is recommended that the surface be left rough and loose allowing for a range of microsites and greater infiltration of precipitation. Where possible, scattering stumps, roots, and other woody debris on top of soil may encourage the development of plant communities, while increasing soil organic matter and organisms, and assisting with erosion and sediment control.

Revegetation

Describe how the site will be revegetated, what species will be included in reclamation prescriptions (seeding, plugs, seedlings, cuttings, natural ingress) and how these relate to land capability and end land use goals. If activities include seeding or planting, indicate the species mix, how the species were chosen, and target seeding rate or planting density. If the revegetation prescriptions vary across the site, provide locations and a description of each prescription. If using native seed or rooted stock, indicate the source of the material, if known. When reclaiming to a forested land use, consider the development of herbaceous, shrub, and tree layers to restore natural structure and function. On small disturbances (typically less than 1 ha but may vary depending on adjacent ecosystem conditions), or along narrow linear disturbances such as exploration trials; natural ingress from adjacent undisturbed areas may be considered as a means of revegetation, and is likely to be more successful when decompaction and/or ripping of compacted running surfaces has been undertaken.

Note: Except for an agricultural setting, the use of aggressive and/or perennial agronomic species in reclamation is generally not considered acceptable practice. In some cases, even the use of native grass seed should be considered carefully depending on circumstances and end land use goals. For example, if the disturbance area

is small and natural ingress of herbaceous species is likely, or if plugs and seedlings are included in initial prescriptions, grasses, particularly agronomics, are known to impede the ingress and growth of native species and may outcompete planted stock. This may result in changes to the desired ecosystem being targeted for reclamation and / or mortality of planted stock. Planting non-persistent agronomics such as Fall Rye is acceptable as an interim erosion and sediment control measure.

FAST FACT: The term “agronomic species” refers to domesticated grasses and legume species developed for the agriculture industry. Common problem agronomic species found on sites and roadways across the province are fast growing and persistent forage and turf species. These introduced species are incompatible with most native alpine, forest and grassland vegetation and disrupt the functioning and structure of native plant communities.

Code Section 9.10.1 (7) (f) - Reclamation of exploration access shall result in the establishment of self sustaining vegetation appropriate for the site which may include reforestation if so directed by an inspector.

Code Section 10.7.7 - Re-vegetation: On all lands to be re-vegetated, land shall be re-vegetated to a self-sustaining state using appropriate plant species.

4.3.5.1 Structures and Equipment

In this section, describe how all structures and equipment will be removed or disposed of following the completion of operations. This includes the removal of camp structures, shipping containers, crushing/wash plant equipment, and other project related debris or scrap material.

Legacy debris can be common where the property has changed owners (possibly numerous times). If this is the case, the Reclamation and Closure Plan should identify previous disturbances and associated infrastructure in the baseline/current conditions sections. Best practice would be to salvage, remove, and/or dispose of any debris, if possible.

Note that old structures or vehicles, especially at sites that have been inactive for long periods of time, may host various (and potentially threatened or SARA-listed) wildlife species such as bats or barn swallows, so demolition or removal work may require assessments for wildlife impacts. In these cases, works should be scheduled for time periods when species using the structures will not be present.

Code Section 10.7.10 - Structures and Equipment: Prior to abandonment, unless exempted by the Chief Inspector

- (a) All machinery, equipment and building superstructure shall be removed,
- (b) Concrete foundations shall be covered and revegetated
- (c) All scrap material shall be disposed of in a manner acceptable to an inspector

4.3.5.2 Road/Trail Reclamation

Reclamation of access roads and trails is required in order to minimize environmental impacts, and to meet regulatory requirements. The specific reclamation requirements for roads will depend on circumstances (e.g. site characteristics, future land use, and access management considerations), as well as the approved end land use.

Reclamation planning should consider the potential for linear disturbances to create preferential pathways for predators. Reclamation prescriptions necessary to mitigate this, such as steps to limit line of sight, removing smooth running surface of roads, use of slash piles and/or woody debris to inhibit movement and planting densities, should be incorporated into the Reclamation and Closure Plan.

The planned level of road closure and rehabilitation is required to be included in the Reclamation and Closure Plan, as the details require review from Indigenous groups and relevant agencies in order for the benefits and risks, as well as mitigation measures to be fully assessed. In some cases, road access may be required for post closure monitoring and maintenance associated with the reclamation program for the mine site; however, a rationale and schedule for future reclamation of all road surfaces that aligns with the approved end land use must also be provided if roads are planned to remain post closure.

A determination of the appropriate reclamation prescriptions for roads and other access structures should be guided by the end land use goals and long-term stability requirements. For example, it may be acceptable for a road to be exempt from decommissioning or reclamation if the reclamation liabilities can be transferred to another party and it may be acceptable to prescribe deactivation procedures rather than reclamation for a main access route that connects to other resource values and is expected to be used by the proponent in the near future. Historical or non-status roads that are used by other non-industrial users, should be left “as is” as much as possible, while managing any specific water management or stability concerns.

To meet Code requirements, road reclamation may include activities such as: decompaction, pullback of side-cast material and contouring such that the slope conforms to adjacent topography, removal of drainage structures, reestablishment of natural drainage and water courses, soil replacement, and revegetation. Prescriptions that do not include full reclamation must include adequate supporting rationale.

Code Section 9.10.1 (6) - Exploration Access: Deactivation of exploration sites and access shall result in

- (a) Stabilization of the exploration site and access road prism and clearing widths,
- (b) Restoration or maintenance of drainage patterns, and
- (c) Minimization of soil erosion to the extent practicable

Code Section 9.10.1 (7) - Exploration Access: Reclamation of exploration sites and access shall result in

- (a) Restoration of drainage patterns,
- (b) Removal of bridge superstructures,
- (c) Removal of bridge substructures if failure would affect downstream values,
- (d) Removal of all culverts,
- (e) A stable surface that minimizes future erosion, and
- (f) The establishment of self-sustaining vegetation appropriate for the site which may include reforestation if so directed by an inspector.

Code Section 9.13.1(1) -Reclamation: Reclamation of mechanically disturbed sites, campsites and exploration access shall occur within one year of cessation of exploration unless authorized in writing by an inspector.

Road/Trail construction and Soil Salvage Management

In this section, describe how project roads and trails will be constructed using methods to limit disturbance wherever possible. This section should include details such as road length and width, equipment to be used, extent of road use throughout permit duration (e.g. main access road vs one-time use), resurfacing and a general substrate description (e.g. gravel at 30 cm or clay at 15 cm). Identify how organic material, topsoil and overburden will be salvage and stored. Indicate stockpile locations, anticipated volumes, and management to limit erosion and invasive species.

Reclamation/Deactivation Activities

Describe the method and sequence of planned road and trail reclamation/deactivation activities; provide site-specific prescriptions. Note, activities must include the restoration of natural drainage patterns, removal of bridge and culverts, measures to ensure long term stability, measures to limit or prevent erosion (both short-term and long-term), and the establishment of self-sustaining vegetation appropriate for the site.

Revegetation

Both Sections 9.10.1 and 10.7.7 of the Code require that revegetation efforts include the establishment of self-sustaining vegetation appropriate to the site. The “appropriateness” of the vegetation for a site, requires that the reclamation prescriptions and plant species are purposely selected with the end land use in mind.

In this section of the Reclamation and Closure Plan, describe how the roads and/or trails will be revegetated, what species will be used to revegetate, and how those species relate to land capability and end land use goals. For example, if the end land use is wildlife habitat and the pre-disturbance habitat was browse, prescriptions may include red osier dogwood or other known browse species.

In some cases, it is acceptable to allow narrow linear corridors, such as exploration trails, to revegetate through natural ingress. If natural ingress is chosen as a primary reclamation prescription include rationale as to why it is expected that this method will be successful; how short-term erosion and sediment control will be accomplished prior to, and during, initial colonization; and identify the risk of invasive plant infestation and relevant mitigation measures. Depending on site conditions, reliance on natural ingress may require additional time to demonstrate reclamation success, and this should be factored into the monitoring program.

If activities include seeding or planting, indicate the species mix, how the species were chosen, and target seeding rate or planting density. If the revegetation prescription varies with road/trail segments, provide locations and a description of each prescription. If using native seed or rooted stock, indicate the commercial source of the material if known.

4.3.5.3 Stream Restoration/Watercourse Crossings

Aquatic habitats and riparian areas disturbed by proposed project activities are to be restored. Identify and describe any stream restoration activities associated with the project, this includes activities related to instream works, channel reconstruction, bank stabilization, and riparian vegetation establishment. Provide information on relevant instream timing windows, mitigation measures to control sediment release during proposed works, and the construction of any aquatic habitat features.

Depending on the nature of the activity and level of risk, QPs (e.g. engineer, fisheries biologist) may be required to ensure that channel designs meet engineering, environmental and safety standards.

TIP: Before considering any work within a stream, consult British Columbia's Standards and Best Practices for Instream Works. Available at: <https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/iswstdsbpsmarch2004.pdf>

Code Section 9.10.1 (8) - Exploration Access: Stream crossings shall be constructed, maintained, deactivated and reclaimed in a manner that allows safe fish passage and protects fish habitat at, above and below the stream crossing.

Code Section 9.10.1 (9) - Exploration Access: Stream crossings on streams that do not contain fish shall be constructed, maintained, deactivated and reclaimed in a manner that does not adversely affect downstream fish values.

4.3.5.4 Water Management

Water management and drainage control is important during all project phases to minimize erosion and soil loss resulting from overland and channelized flow through the site. The Reclamation and Closure Plan will document methods to re-establish and control drainage at key phases of the project. In cases where pits and trenches are proposed, or in areas with a shallow water table or where seepages are expected to be present, water management includes management of groundwater.

In this section describe water management activities as they relate to the reclamation of the site. This could include the decommissioning and reclamation of sediment ponds and drainage features. In some cases, it will include the construction of drainage features to remove or divert surface water from the site.

If potentially ML/ARD generating material will be present, a thorough discussion of how this material will be managed, treated, and monitored will be required. Additional ML/ARD specific plans will be required.

Code Section 10.7.12 – Watercourses: Watercourses shall be reclaimed to a condition that ensures

- (a) Drainage is restored either to original watercourses or to new watercourses that will sustain themselves without maintenance, and
- (b) The level of productive capacity shall not be less than existed prior to mining, unless the owner, agent or manager can provide evidence which demonstrates, to the satisfaction of the chief inspector, the impracticality of doing so.

4.3.5.5 Well Decommissioning

If applicable, include groundwater well information and how they will be decommissioned.

TIP: The Groundwater Protection Regulation, under the *Water Sustainability Act*, outlines the requirements for construction, maintenance and decommissioning of wells in the province. Summary information available at: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/laws-rules/groundwater-protection-regulation>

A copy of the Groundwater Protection Regulation is available at: https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/39_2016

4.3.6 Reclamation and Closure Drawings

The Reclamation and Closure Plan should include Reclamation and Closure Drawings. The drawings are intended to illustrate how the site will look following reclamation, in particular contour and shape of final landforms. The figures should demonstrate to the regulators that all aspects of reclamation have been considered, are achievable, and provides a clear expectation of what the site will look like after reclamation. In addition, the

drawings should provide an operational “blueprint” for mine staff to follow to guide reclamation activities. Where applicable the drawing should include both spatial and temporal detail.

The drawings should be at an appropriate scale and size to clearly show the required information. Reclamation Closure Drawings should include cross sections (site profiles) of the reclaimed feature (final slope), as well as a plan view drawing of the project area after reclamation showing landscape features and should include:

- Area of disturbance (i.e. mine footprint);
- Sequence of progressive reclamation;
- Location of cross-sectional lines for site profiles;
- Slope angles;
- Direction of drainage across the site;
- Location and dimensions of any created water features (e.g. ponds, wetland, stream channels, drainage ditches);
- Vegetation community, land capability, and land use;
- Undisturbed buffer areas;
- Water table level (where appropriate).

4.3.7 Research and Site Learnings

For mining projects that are of low impact and low complexity (e.g. minimal disturbance, short duration, without terrain instability or ML/ARD concerns), reclamation research is not typically required. However, for larger projects, or ones that are expected to occur beyond five years, (for example quarries and large-scale sand & gravel and placer operations) reclamation research in the form of trials and studies may be considered by the inspector.

Initial reclamation planning for a site is often based on a number of assumptions related to site conditions and presumed effectiveness of prescriptions. Site-specific variables are best understood by testing reclamation prescriptions on a small scale through reclamation trials, or monitoring of progressive reclamation results, and then applying the learnings to future reclamation activities. For example, if data from a planting trial, or monitoring/observational results from past progressive reclamation efforts indicated high mortality of a species, a plan to address this in future planting may include the selection of other successful species, targeted microsite preference, or planting in higher density with fertilizer amendments.

Research results and site learnings through observation and monitoring should be used to inform updated Reclamation and Closure Plans throughout life of mine.

Opportunities for collaboration with industry, government and academia should be considered as they may create operational efficiencies and will enhance the knowledgebase through information sharing and publication.

4.3.8 Monitoring

Monitoring is critical in determining reclamation progress, and ultimately evaluating the success of the approach. Monitoring must clearly establish measurable criteria used to evaluate reclamation success. Monitoring provides a summary of performance and ongoing actions pertaining to:

- Documentation of site conditions and reclamation requirements (e.g. vegetation, water quality, stability, capability, end land use) and;
- Identification of potential deficiencies and associated remedial action(s) applied to meet the necessary reclamation objectives.

Reclamation monitoring provides opportunities for adaptive management as a mechanism for revising or improving upon restorative action based on monitoring results.

In this section of the Reclamation and Closure Plan, include a description of monitoring rationale and how it links the targets and end land use goals to the data collected. The monitoring program should provide details of personnel responsible for monitoring and relevant scheduling of activities.

Vegetation monitoring is one of the most common reclamation monitoring activities; however, monitoring can include a host of other activities (e.g. wildlife monitoring, geotechnical monitoring, water quality/ARD monitoring, and foliar metals uptake monitoring) depending on site conditions and project specifics.

Monitoring frequency will vary depending on factors such as what is being monitored and the anticipated speed of recovery. For vegetation monitoring, a minimum of three site visits are recommended (for example Year 1, Year 3, Year 5). However, additional assessments may be required to demonstrate that vegetation trajectories are on target to reach end land use goals.

Code Section 10.7.21 - Monitoring: The owner, agent, or manager shall undertake monitoring programs, as required by the Chief Inspector, to demonstrate that reclamation and environmental protection objectives including land use, productivity, water quality and stability of structure are being achieved.

Reclamation monitoring may be required for extended periods beyond the operational phase. For example, long-term monitoring may be required for water quality, erosion and sediment controls, water management structures, or reclamation prescriptions (vegetation). The Reclamation and Closure Plan must provide details, supporting rationale, and a corresponding schedule of these activities following closure.

A schedule is required to include long-term monitoring requirements and goals as well as resources required to undertake all monitoring work post closure. The schedule and activities are linked to security and the eventual security review prior to release of reclamation obligations. Closure and Post-Closure monitoring and activities are part of the reclamation security assessment.

4.3.9 Evaluating Reclamation Success

In this section of the Reclamation and Closure Plan, describe how reclamation success will be determined. Include a rationale for how success will be measured against site-specific management objectives and

benchmark targets. The establishment of measurable criteria used to evaluate reclamation success in this section will guide monitoring efforts. Targets or indicators of success should be linked to site-specific attributes such as species diversity, vegetation cover, plant survival, soil depth, water quality objectives, etc. For larger or more complex sites, input from a QP should be used to assist in defining reclamation success criteria.

Examples of reclamation success criteria could include:

- Topsoil placement is >80% of pre-disturbance topsoil depths;
- Survival of planted species is >70% after 3 years;
- Established target tree density (e.g. >1,000 stems/ha);
- Ground cover of native species >50% after 3 years;
- Repeated documented use of reclaimed area by targeted wildlife species.

This section should also include a detailed contingency plan for what will be done if monitoring results indicate that reclamation works undertaken are not meeting targets.

4.3.10 Reclamation Reporting

In this section, include a clear process for recording and reporting reclamation activities, as well as monitoring results. The purpose of reclamation research and monitoring is to trial reclamation approaches and evaluate whether reclamation prescriptions are resulting in the end land use objectives laid out in the Reclamation and Closure Plan. Therefore, it is important that the reclamation reporting section include an explanation of how the information collected will be used to improve or inform the reclamation program in the future.

It is important to outline the structure and timing of reporting, taking in to account the annual reporting requirements of regulatory agencies. Considerations for both internal and external reporting should be included. Reporting requirements may be dictated by multiple regulatory agencies; each of these should be clarified in this section.

All mine sites in BC are required to submit an Annual Reclamation Report and/or an Annual Summary of Exploration/Placer Activities to the Chief Inspector each year prior to March 31st. The intent of annual reporting is to provide a summary of all activities conducted on the mine property over the previous year. Specifically, the report must outline the following:

- Mine development, including surface disturbance, stripping, stockpiling, number of drill holes, extent of trenches, disposal and storage of all materials.

For larger mines and quarries, the Chief Inspector may require the submission of an Annual Reclamation Report which, in addition to the above summarises:

- Activities, research and monitoring results associated with the development and implementation of the environmental protection program;
- Activities, research and monitoring results associated with the development and implementation of the reclamation program.

The report must also provide a projection of mining and reclamation activities planned for the following 5 years. The format of the report required may depend on the type of mining activity or location.

TIP: Annual Reclamation Report information is required to be in a specific format. Please review the Annual Reclamation Report Requirements prior to submitting your report. Guidelines for the report are found here: <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/permitting/reclamation-closure/annual-reclamation-reports>

Annual reporting summaries for exploration activities, placer activities and a multi-year area-based work programs follow a less descriptive reporting process.

TIP: Activity specific summary forms for exploration, placer and multi-year area-based programs can be accessed below:

- [Annual Summary for Exploration Activities \(PDF, 148KB\)](#)
- [Annual Summary for Placer Activities \(PDF, 311KB\)](#)
- [Multi-Year Area-Based Work Program Annual Update \(PDF, 184KB\)](#)

4.4 Adaptive Management

Adaptive management allows for flexibility to address uncertainty when unexpected results or site conditions occur; the approach is also intended to be precautionary in nature. Adaptive management involves thinking about how the results of monitoring will change reclamation actions, and allows for the inclusion of new information and improved science into mitigation measures and/or reclamation activities as more information becomes available over time.

A routine review of the Reclamation and Closure Plan should be conducted to identify improvements based on monitoring information. The outcome of this assessment is to identify whether implementation of the plan is meeting site-specific objectives and/or regulatory requirements.

In this section, identify how adaptive management will be incorporated into the reclamation program. The frequency of and personnel responsible for periodic reviews of the plan should be included, as well as considerations for updating the plan if the site enters a care and maintenance phase. Information should be tailored to the nature of the disturbance; site conditions and potential environmental risk, and be reflective of the duration of the project.

Adaptive management is expected to occur for the full duration of the monitoring period. For example, if monitoring of reclamation works is planned to continue for 5 years after exploration, considerations for adaptive management to occur in response to monitoring results is also expected throughout that period, and possibly beyond if required to meet reclamation requirements.

4.5 Reclamation Security

EMLI requires proponents of all mine activities to post a reclamation security bond intended to cover the cost of site reclamation, maintenance and closure. The value of the reclamation security bond is set during the project approval process and may be modified during the life of the project depending on the nature of mining activities, specific features and/or other project circumstances, as well as at the time of permit amendments or when the scope of work changes.

The bond is held by the Province until reclamation requirements have been achieved, at which point the bond is released and returned to the proponent. In cases where the proponent abandons the site or otherwise fails to fulfill reclamation obligations, the reclamation security bond is used by the Province to cover the cost and obligations of reclamation and closure by a third-party.

EMLI developed a [Regional Reclamation Bond Calculator](#) to establish a fair and consistent means of assessing reclamation liability for mines administered through the regional offices. Information from the application is used to populate the applicable fields within the bond calculator. Applications that are well planned with reclamation and closure in mind, and which limit disturbance and environmental liability while actively practicing progressive reclamation, will result in lower security bonding.

Proponents are encouraged to review and use the Bond Calculator when planning a mine program and estimating reclamation costs. Keep in mind that to avoid financial risk and liability to the public/government, the assessed security represents the cost of reclamation to the Province if EMLI had to complete the works using third party contractors or consultants. The cost for reclamation, if completed by the proponent, may be considerably less given the benefits/efficiency of onsite equipment and control over project activities and schedule. This provides an incentive to complete the reclamation in order to receive the return of the reclamation security.

In this section of the Reclamation and Closure Plan, provide a detailed estimate of the reclamation cost associated with existing and proposed new disturbances. The total liability estimate should be based on activity and reclamation unit (e.g. hectares of disturbance, number of drill pads, kilometres of road, etc.). The estimate can be developed using the Regional Reclamation Bond Calculator tool which is based on blue book rates; however, the proponent may provide an independent cost estimate for the proposed activity using different rates, along with sound justification for alternate rates proposed. A contingency may be applied to the total amount of security. Ultimately, the amount of Reclamation Security is at the discretion of the Mines Inspector, and will be determined in a fair and transparent manner, in dialogue between EMLI and the proponent.

TIP: Information and a copy of the Regional Reclamation Bond Calculator and associated guidance document is available online at: <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/permitting/reclamation-closure>

5 Suggested Resources

Please note, the information below should not be considered a complete or comprehensive listing of all resources but rather suggestions for the type of resources the proponent or QP may consult when developing a Reclamation and Closure Plan.

AME (Association of Mineral Exploration) online resource. Reclamation Guide for Exploration. Available at: <https://amebc.ca/tools/reclamation-guide-for-mineral-exploration/>.

EMLI (Ministry of Energy, Mines and Low Carbon Innovation). 2021. Health, Safety and Reclamation Code for Mines in British Columbia: Revised June 2017. Victoria, BC. Pp 365. Available online at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/mineral-exploration-mining/documents/health-and-safety/code-review/health_safety_and_reclamation_code_apr2021.pdf

EMPR (Ministry of Energy, Mines and Petroleum Resources) & MOE (Ministry of Environment) 2009. Handbook for Mineral and Coal Exploration in British Columbia – A Working Field Guide, 2008-09 Edition. Available online at: <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/exploration-in-bc>

FLNRO (Ministry of Forests, Lands and Natural Resource Operations) and MEM (Ministry of Energy and Mines). 2014. Atlin Placer Mining Best Management Practices Guidebook. Available online at: https://www.env.gov.bc.ca/wld/documents/bmp/Skeena/Atlin%20Placer%20Mining%20BMP%20Guid%20ebook_FINAL%20June%2030%202014.pdf

MOF (Ministry of Forests) 1997. Soil Rehabilitation Guidebook. Victoria, BC. Available online at: <https://testwww.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/soilreha/rehab1.htm>

MOF (BC Ministry of Forests). 1999. Silviculture Manual. BC Ministry of Forests, Forest Practices Branch, Victoria BC. Available online at: <https://www.for.gov.bc.ca/hfp/publications/00099/index.htm>

Province of British Columbia. 1995. Reclamation and Environmental Protection Handbook for Sand, Gravel and Quarry Operations in British Columbia. BC Ministry of Energy, Mines and Petroleum Resources; Ministry of Transportation and Highways, and Natural Resources Canada. 150pp. Available online at: <https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/contracting-with-the-province/documents/archive-unofficial-tender-documents-90-days/12626-0002/t3-5-reclamation-and-environmental-protection-handbook-1995.pdf>

Polster, D. 2013. Making Sites Rough and Loose: A Soil Adjustment Technique. NAIT Boreal Research Institute. Technical Note, June 2013. <https://publicdocs.nait.ca/sites/pd/layouts/15/DocIdRedir.aspx?ID=4NUSZQ57DJN7-208515216-6043>

APPENDIX A:
Regulatory Setting

Regulatory Setting

Mines Act and Health, Safety, and Reclamation Code for Mines in British Columbia

EMLI regulates all mining activities on behalf of the Province. EMLI has regulatory authority for all mines and mining activities in BC, which includes geotechnical, environmental and health and safety considerations. The Ministry implements policies and programs that require responsible exploration, development, operation, and closure of mine sites and works to ensure that all mining activities meet requirements for the health and safety of workers and the environment. Under the *Mines Act* and Code, EMLI is responsible for the permitting and regulation of all phases of exploration, mine construction, operation, closure, and post-closure activities. Reclamation is an activity that is expected to occur progressively throughout all phases of mining, either actively or through research and planning.

The *Mines Act* and Code provide the regulatory framework for mining activities in BC, although other legislation may also apply to individual projects. It is the responsibility of the Mine Manager to be familiar with and adhere to the *Mines Act* and Code in addition to all conditions within their *Mines Act* permit.

TIP: The requirement for Mine Supervisor Certification ensures all supervisors are familiar with the Code <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/health-safety/certifications>

Key components of the *Mines Act* and Code that lay down the foundation for regulatory reclamation requirements include:

- *Mines Act* Section 10 (1)
- Health Safety and Reclamation Code for Mines in British Columbia:
 - Parts: 9.10.1(6-7) and 9.13.1
 - Parts 10.7.1 to 10.7.21

TIP: A copy of the Health Safety and Reclamation Code for Mines in British Columbia is available at: <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/health-safety/health-safety-and-reclamation-code-for-mines-in-british-columbia>

Environmental Management Act

The Ministry of Environment and Climate Change Strategy administers the *Environmental Management Act* (EMA), which regulates industrial and municipal waste discharge, pollution, hazardous waste and contaminated site remediation. The EMA provides the authority for introducing wastes into the environment, while protecting public health and the environment. The EMA enables the use of permits, regulations and codes of practice to authorize discharges to the environment and enforcement options, such as administrative penalties, orders and fines to encourage compliance. Guidelines and objectives for air and water quality are developed under EMA.

EMA regulations that may apply to mining operations in BC include:

- Waste Discharge Regulation;
- Contaminated Sites Regulation;
- Hazardous Waste Regulation;
- Municipal Wastewater Regulation;
- Placer Mining Waste Control Regulation.

TIP: The *Environmental Management Act* can be viewed online at:
http://www.bclaws.ca/civix/document/id/complete/statreg/03053_04

Water Sustainability Act

Responsible use of British Columbia's valuable water resources is a primary objective of provincial environmental regulations. The principal provincial statute regulating surface and ground water resources is the *Water Sustainability Act*. The *Water Sustainability Act* is administered by the Ministry of Forests, Lands, Natural Resource Operations & Rural Development.

FACT: Under the *Water Sustainability Act*, a "stream" is "a natural watercourse...or a natural source of water supply, including, without limitation, a lake, pond, river, creek, spring, ravine, gulch, wetland or glacier, whether or not usually containing water."

A water licence or an approval under Section 6 of the *Water Sustainability Act* may be required for mine works, depending on the proposed activities. The requirement to obtain authorization to use water is dependent on the amount and type of mining. For example, a water licence or approval may be required for sites where one or any of the following are proposed:

- Placer operations processing greater than 2,000 m³ of pay dirt per claim (legacy or cell claim) or per lease per year and withdrawing water from a stream using a pump with an intake which measures 2 inches or greater in diameter requires a *Water Sustainability Act* authorization.
- Operations proposing to use multiple pumps with a combined intake capacity that is greater than 2 inches in diameter are subject to review and may require *Water Sustainability Act* authorization

- The diversion and dewatering of existing stream channels to access pay dirt requires a *Water Sustainability Act* authorization.
- Camps with 20 people or more may require a water use permit

TIP: *Water Sustainability Act* authorizations are available through FrontCounter BC. Further information on water licences and approvals is available at:

<http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/water-licences-approvals>

Mining specific information:

https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-rights/info_update_mineral_exploration_and_small_scale_placer.pdf

TIP: Further information on the *Water Sustainability Act* is available at:

<https://engage.gov.bc.ca/watersustainabilityact/>

TIP: Information on updated rules for water use in mineral exploration and small-scale placer mining operations is available at: <https://news.gov.bc.ca/releases/2019ENV0124-002472>.

A copy of the *Water Sustainability Act* amendment (Order in Council 0707) related to the mining activities is available at: https://www.bclaws.gov.bc.ca/civix/document/id/oic/oic_cur/0707_2019

Other Pertinent Legislation

There are additional federal and provincial legislation and regulations that may govern specific aspects of mine-related activities and reclamation in BC, including but not limited to:

Provincial

- *Forest and Range Practices Act* – Outlines how all forest and range practices and resource-based activities are to be conducted on Crown land in BC, consistent with objectives set by government for soils, timber, wildlife, water, fish, biodiversity, recreation resources, visual quality and cultural heritage resources.
- *Weed Control Act* – Lists provincial and regional noxious weed species. Under the Act, the proponent is required to control noxious weeds growing or located on land occupied by that person.
- *Wildlife Act* – Relates to the conservation and management of wildlife and wildlife habitat in BC.

- *Heritage Conservation Act* – British Columbia’s archaeological sites are protected under the *Heritage Conservation Act* (HCA). The provisions of the HCA apply whether sites are located on public or private land.
- *The Agricultural Land Commission Act* – Sets the legislative framework for the establishment and administration of the agricultural land preservation program. Reclamation planning and activities will need to take in account specific regulations and policies for projects within the Agricultural Land Reserve (ALR).

Federal

- *Fisheries Act* – The Act is intended to protect fish and fish habitat from harmful activities. This includes activities resulting in the loss or alteration of fish habitat, as well as the release of deleterious substances (e.g. sediment) into the aquatic environment. Authorized activities may require fish habitat compensation.
- *Migratory Birds Convention Act* – Relates to the protection and management of migratory birds in Canada. Mitigation measures including the scheduling of activities outside of breeding bird timing windows are required reduce the risk of incidental take of migratory birds, nests and eggs, and subsequent contravention of the Act.
- *Species at Risk Act* – The Act is intended to protect endangered or threatened species and their habitats, as well as species which are not yet threatened, but whose existence or habitat is in jeopardy. The presence of species at risk and associated habitat within a project area will require special consideration and possible implementation of species specific mitigation measures.

TIP: To determine when migratory birds might be nesting and to plan activities to reduce the risk of harming migratory birds, use the Map of the Nesting Zones in Canada found at: <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html>

Indigenous Governments

The Province is legally obligated to consult and accommodate Indigenous peoples, where required, on land and resource decisions that could impact their Indigenous Interests.

Based on the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), the Truth and Reconciliation Commission (TRC) Calls to Action, and the British Columbia Declaration Act, the Provincial Government has developed the *Draft Principles that Guide the Province of British Columbia’s Relationship with Indigenous People*. This document identifies ten draft principles modelled on principles introduced by the Federal Government in 2017. The Province’s principles provide high-level guidance on how provincial representatives should engage with Indigenous peoples.

Mining proponents are encouraged to conduct their own engagement with local Indigenous communities regarding project development and reclamation.

TIP: The Provincial Government has developed proponent resources for engaging Indigenous groups: <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations>

APPENDIX B:
Definitions

Definitions

All definitions in quotations below are taken directly from the Health, Safety and Reclamation Code for Mines in British Columbia (the Code).

As reclamation is the focus of this guidance, the term reclamation required a fulsome definition not included in the Code. For the purpose of this guidance:

Reclamation means a suite of activities conducted throughout the life of mine intended to minimize effects resulting from mining disturbances to:

- Ensure long-term stability and erosion control of the post-mine landforms and watercourses,
- Restore habitat, ecosystems, and biodiversity,
- Restore land capability,
- Mitigate metal leaching and acid rock drainage (ML/ARD),
- Protect water quality,
- Remove buildings and equipment,
- Remediate contaminated areas, and
- Restore the areas used temporarily for mining purposes to an acceptable end land use.

Code Definitions

“abandoned mine” means a mine for which all permit obligations under the Act has been satisfied and in respect of which the mineral claims have reverted to the government.

“acid rock drainage” means low pH surface or ground water that results from the oxidation of sulphide minerals or, elemental sulphur, or the dissolution of acid generating minerals found in rocks and coal.

“Chief Inspector” means the Chief Inspector of Mines appointed by the minister and includes a person designated by the Chief Inspector to act on behalf of the Chief Inspector.

“closed mine” means a mine at which all mining activities have ceased but in respect of which the owner, agent, manager or permittee remains responsible for compliance with the Act, the regulations, the Code and that person’s obligations under the permit for that mine.

“Code” means the Health, Safety and Reclamation Code for Mines in British Columbia.

“culvert” means a transverse drain pipe or log structure buried below the exploration access surface.

“deactivation” means stabilization of an exploration site or exploration access when active use of the site or access is suspended seasonally or for other reasons for a period of up to 3 years or longer if approved by an inspector.

“deleterious substance” means any substance that, if added to any water, would degrade or alter or form part of a process of degradation of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish and fish habitat or to the use by man or fish that frequent that water.

“exploration access” means trails and roads constructed, modified, excavated, bladed or created through frequent use including any associated structures.

“exploration activities” are those activities which are undertaken in the search for and development of coal and minerals, as defined in the *Mineral Tenure Act*, with the exception of placer minerals:

- (a) and include
 - (i) disturbance of the ground by mechanical means such as drilling, trenching and excavating;
 - (ii) blasting;
 - (iii) construction, modification deactivation and reclamation of exploration access and camps;
 - (iv) induced polarization surveys using exposed electrodes; and
 - (v) site reclamation.
- (b) But do not include
 - (i) prospecting using hand tools;
 - (ii) geological/geochemical surveying;
 - (iii) airborne geophysical surveying;
 - (iv) ground geophysical surveying without the use of exposed, energized electrodes;
 - (v) hand trenching without the use of explosives; or
 - (vi) establishment of exploration grid lines that do not require the felling of trees, with the exception of trees and shrubs that create a hazard to safe passage and danger trees as defined in the Workers’ Compensation Board Regulation.

“fish passage” means the movement of fish at all life stages consistent with the natural state of fish streams.

“fish stream” means all streams, unless,

- (a) a report from a qualified professional of technologist with adequate training or knowledge of fish habitat determines that the stream is a non-fish bearing stream, or
- (b) the stream has been identified in a fish inventory carried out in accordance with the Ministry of Forests’ publication “Fish Stream Identification Guidebook”, as amended from time to time, as not containing any fish, or
- (c) the stream is located upstream of a known barrier to fish passage, identified on a fish and fish habitat inventory map, where all reaches upstream of the barrier are simultaneously dry at any time during the year and no perennial fish habitats occur in any part of the upland drainage.

“inspector” means a person appointed by the Chief Inspector as an inspector of mines.

“land capability” means the capability of achieving a specified land use estimated by limitations as a result of climate, topography and soils.

“landform” means a designated structure that can be considered to have a risk profile similar to the surrounding environment.

“manager” means the person appointed under section 21 of the Act to be responsible for the management and operation of a mine.

“mine” includes

- (a) a place where mechanical disturbance of the ground or any excavation is made to explore for or to produce coal, mineral bearing substances, placer minerals, rock, limestone, earth, clay, sand or gravel.
- (b) all cleared areas, machinery and equipment for use in servicing a mine or for use in connection with a mine and buildings other than bunkhouses, cook houses and related residential facilities,
- (c) all activities including exploratory drilling, excavation, processing, concentrating, waste disposal and site reclamation.
- (d) closed and abandoned mines, and
- (e) a place designated by the Chief Inspector as a mine.

“mining activity” means any activity related to

- (a) the exploration and development of a mineral, a placer mineral, coal, sand, gravel or rock, or
- (b) the production of a mineral, a placer mineral, coal, sand, gravel or rock, and includes the reclamation of a mine.

“overburden” means all unconsolidated naturally occurring material overlying bedrock

“owner” includes every person who is the immediate holder, proprietor, lessee, occupier or permittee of a mine or of any part of it, but does not include a person who

- (a) receives only a royalty or rent from a mine that is subject to a lease, grant or other authority for its working, or
- (b) is the owner of the surface rights of the land, in on or under which a mine exists but who is not the immediate holder, proprietor, lessee, occupier or permittee.

“permit” means a permit issued under section 10 of the Act.

“permittee” means the holder of a permit issued under section 10 of the Act.

“progressive reclamation” means a reclamation activity that is undertaken concurrent with mining activities, prior to the end of mine life and which contributes to the final reclamation and closure goals, targets and end land use objectives of the site.

“qualified professional” means an individual who

- (a) is registered, and in good standing, with a professional organization in British Columbia governed under an enactment, and
- (b) is acting within his or her area of professional expertise.

“riparian setback” means an area of land adjacent to a stream, wetland or lake of a width defined in Table 9.1 of the Code.

“road prism” means cross-section of the ground containing the exploration access surface, including the cut and fill slopes.

“soil” means the naturally occurring, unconsolidated mineral or organic material that is capable of supporting plant life.

“stream” means any naturally occurring reach flowing on a perennial or seasonal basis with a continuous channel bed and banks, whether or not the bed or banks of the reach are locally obscured by overhanging or bridging vegetation or soil mats, if the channel bed

- (a) is scoured by water, or
- (b) contains any material collection of inorganic alluvium deposited by water.

“stream width” means the horizontal distance between stream banks on opposite sides of the stream measured

- (c) at right angles to the general orientation of the banks, and
- (d) between the points of each bank indicated by a defined change in vegetation and sediment texture marking the normal annual flood level and sometimes shown by the edges of rooted terrestrial vegetation.

“surficial soil material” means those soils commonly contained in the upper layers of the overburden mass, which are suitable for use in reclamation, either as growth medium, soil covers and seals, or other reclamation requirements.

“watercourse” means a natural stream or source of water, whether usually containing water or not, and includes any lake, river, creek, spring, ravine, swamp and gulch.

“wetland” means an area of 0.25 ha or greater, unless a smaller area is identified as regionally significant wildlife habitat, that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in wet or saturated soil conditions.

(all definitions from the Health, Safety and Reclamation Code for Mines in British Columbia)