Sensitive Vegetation & Wildlife Habitat Features

Taseko Mines Limited

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1.0 Purpose

This Environmental Protection and Management Plan (EPMP) is intended for exploration works through and around old forest, wetlands, communities of concern and rare plants, wildlife and wildlife features. This EPMP will provide a guide for exploration crews, supervisors and management, and will be referred to during work planning and operations when decisions are required regarding work locations and methods.

This EPMP is to ensure no eggs or birds occupying nests, or no nests of eagles, peregrine falcons, gyrfalcon, osprey, heron or burrowing owls, are impacted from exploration activities, as per Section 34 of the BC Wildlife Act that provides year-round protection to birds' nests:

A person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests or destroys
(a) a bird or its egg,
(b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl, or
(c) the nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg.

If you wish to remove or modify nest trees, you must seek permission and obtain a written permit from the Ministry of Environment's Permit & Authorization Service Bureau AND you should check with Environment Canada to see if a federal permit is required under the Migratory Birds Convention Act regulations.

This Environmental Protection and Management Plan (EPMP) is designed to meet the following goals:

- Minimize disturbance caused by exploration activities,
- Avoid any long-duration or irreversible impacts or changes on old forest, wetlands, rare plants and communities, and wildlife habitat, in order to avoid cumulative effects when considered along with other non-related activities in the area, and to avoid infringement on established Aboriginal rights;
- Manage all activities within sensitive vegetation and wildlife areas to maintain the integrity of the ecosystems and their values,
- Minimize effects on wildlife and humans as a result of any temporary changes in ecosystems,
- Comply with provincial and federal legislation and regulations.

2.0 Existing Environment

2.1 Forests

The area is within the MSxv and SBPSxc biogeolimatic zones and is dominated by lodge-pole pine. Due to mountain pine beetle, timber harvesting, exploration, forest fires and road building in the area, the landscape is a mix of old forest and immature stands. Wildlife values for some species, such as fisher, are high in the old forest areas. The immature forest stands provide forage and browse for wildlife and cattle. Cultural use values of balsam trees and trappers tea are high in the MSxv zone.

2.2 Wetlands

Wetland surveys have been conducted in the area in a comprehensive manner. Wetlands mainly consist of fens and herbaceous meadows. Fens are either dominated by sedges or by willows and scrub birch with moderate covers of brown mosses. Herbaceous meadows and shrub-carrs are less common than fens but dominate fluvial plains that feed and drain Fish Lake. For instance, rich meadows with various flowering herbs, sedges and willow species are common adjacent to fluvial channels to the north and south of Fish Lake.

2.3 Communities of Concern and Rare Plants

Terrestrial ecosystem mapping and reconnaissance level rare plant surveys have been completed throughout the area.

The exploration area contains one ecological community of conservation concern (i.e. rare plant ecosystem), the lodgepole pine - trapper's tea - crowberry unit (MSxv/05), which is in the vicinity of the exploration activities and Figure 2 outlines its distribution.

Three rare plants are found in the area:

- Bird's foot buttercup (*Ranunculus pedatifidus* spp. *affinis*)
- *Schistidium heterophyllum*
- *Drepanocladus longifolius*.

The provincially blue-listed Bird's foot buttercup (Ranunculus pedatifidus spp. affinis) is associated with the herbaceous meadow ecosystem.

2.4 Wildlife

Various wildlife research and inventory projects have been conducted in the area including wildlife habitat ratings, various species surveys (i.e. raptor, bat, ungulate, etc.), and habitat availability and suitability mapping. Wildlife features throughout the area were identified during baseline data surveys in the mid-1990's.

Specific wildlife features may include but are not limited to:

- A significant mineral lick,
- A nest of a bald eagle, osprey, great blue heron, or a category of species at risk that is limited to birds,
- A hibernaculum or maternity roost used by bats,
- A ground den of a grizzly bear,
- A hot spring or thermal spring,
- A non-classified wetland or ephemeral pond associated with a species at risk.

3.0 Management Plan Guidelines

3.1 General Best Practices

- Clearing of native vegetation and topsoil will be minimized as to lessen the impacts on vegetation and wildlife habitat in general. Specific efforts will be made to try to avoid removing larger trees that can provide habitat to species dependent upon old-growth forest.
- Exploration work will be planned to utilize existing access or open areas (i.e. wetlands when frozen) wherever possible to minimize new disturbance and clearing of forested habitat.
- Access trails that do require construction will be done so with care; avoiding grubbing, grading and blading whenever possible.
- Equipment will be clean prior to being brought on site and will be inspected prior to the start of work to prevent the introduction and spread of invasive species.

3.2 Protection of Wetlands

- Whenever possible, travel through and work in wetlands will occur during winter months when soils are frozen.
- Work on test sites in wetland areas will include removing surficial humus layer and vegetative mat with topsoil separately from subsoil and deeper overburden materials such that these three resources can be replaced in sequence to facilitate natural restoration.
- During spring, summer and fall seasons, travel through and work in wetlands will be avoided. Table 1 outlines the buffer zones for working in and around wetlands and will be adhered to wherever possible; however, wetland complexes may require some small sections of trails and roads to be within stated setbacks.

Table 1 – Riparian Management Areas (RMA): Setback Distance
(from the Health, Safety and Reclamation Code for Mines in British Columbia)

Riparian Type		Setback from Top-of-Bank (m)	
		Drilling	Exploration Access
Wetland (area in ha)	≥ 5	10	30
	≥ 1 and < 5	10	20
	≥ 0.25 and < 1	10	10

- During drilling the following will be applied where practicable:
    - The production of excess muds, additives and process water will be limited.
    - Surface drainage structures will be designed based on the expected flow, subgrade soil conditions and the expected duration of their use. Surface drainage structures (e.g. interceptor ditches) should be constructed to intercept and divert runoff, preventing erosion of the drill pad and sump.
    - Groundwater flowing from boreholes will be prohibited from negatively affecting wetlands by impacting water quality or normal hydrologic functioning.
- During road and trail building the following will be applied where practicable:
    - Where necessary, roads constructed through wetlands will be completed with care and following the guidelines provided in the Working in or Near Streams EPMP.
    - Where the soil is fine and wet, work will be minimized and all measures will be taken to alleviate any potential for erosion or compaction.
    - If a wetland must be crossed, the route selected will minimize the area impacted by construction and operation and existing roads or trails will be used wherever possible. New crossings should be parallel to the direction of water flow to the degree practical.
    - Erosion will be minimized through erosion control measures such as cross ditching or silt fencing and other actions recommended in the Working in or near Streams and Wetlands EPMP.
    - Natural water flows will be maintained: provide cross drainage to maintain natural surface and subsurface flows.

3.3 Protection of Communities of Concern and Rare Plants

- Communities of concern have been mapped and identified. Efforts will be taken to minimize the extent of grubbing, stripping and the removal of shrubs and herbaceous species within communities of concern.
- Known rare plant locations will be mapped and avoided. When nearby to proposed exploration activities, these sites will be flagged by field staff to avoid disturbance.
- When exploration trails require field fitting, the exploration staff will use the mapping and specific coordinates of rare plant sites to avoid them.

3.4 Protection of Wildlife Habitat and Wildlife Features

- Presence and/or occupancy of bird nests for proposed disturbance areas will be assessed by a qualified biologist prior to the start of work to enable avoidance. Any other wildlife features that are observed during the bird nest survey will also be identified and recorded.

- In the event that an occupied or protected bird nest or wildlife feature is identified in the exploration area, the access trail or test site will be rerouted to avoid the identified feature.
- A 'chance-find' procedure has been developed by the qualified biologist to outline appropriate steps should an occupied or protected bird nest be identified after exploration activities are underway. The 'chance-find' procedure is attached in Appendix 1.
- Field crews will undergo training on the 'chance-find' procedure prior to work commencing to ensure they understand and are aware of the appropriate steps.

3.5 Measures for Preventing Human-Wildlife Interactions

- Preventive measures will be taken to ensure human-wildlife interactions are minimized and non-lethal whenever possible. These measures will be discussed with exploration crews and may include:
  - Firearms are prohibited except when specifically authorized;
  - No littering;
  - No feeding or harassment of wildlife;
  - No hunting or fishing on the project site;
  - Project-related traffic will be restricted wherever possible to designated access roads and trails (including ATV and snowmobiles);
  - All waste that may be an attractant to bears or other wildlife (e.g. food wastes) will be properly handled in order to eliminate the potential for bear management concerns.
- Bear Aware Training and Bear Safety information will be provided to exploration crews prior to work commencing.

3.6 Reclamation

- Reclamation will be conducted in accordance with the Health, Safety and Reclamation Code of BC.
- In areas where wetlands are disturbed, humus layers and vegetation root mats will be preserved from disturbed areas and replaced during reclamation.
- Test pit and drill pad sites will have soils replaced and be recontoured so as to be consistent with adjacent landscape and prevent erosion.
- A provincially approved seed mix of certified seed quality will be used for seeding of ground disturbances. Seed will be applied in fall or spring months.
- All-terrain vehicle (ATV) access has been identified as an issue that potentially impacts sensitive vegetation communities or wildlife habitat. Reclamation of trails will include pulling-back fallen timber and brush to minimize access to ATVs. Breaks along the trails will be provided to enable crossing by wildlife, cattle and horses.

3.7 2017 Exploration Program Considerations

The 2017 program is designed to use existing access wherever possible, and new trail access is to avoid wetlands unless ground is frozen, then access through these opens is a reasonable option to avoid forest clearing.

One community of concern is identified in the vicinity of the exploration activities and is identified in Figure 2. Crews will be made aware of this area and efforts will be made to minimize the extent of grubbing, stripping and the removal of shrubs and herbaceous species within the identified community of concern.

Three rare plant sites are identified as being relatively close to the planned work (TRP 101, TRP 105, and TRP 110) (Figure 1). Crews will be made aware of these plant locations during flagging of the proposed works, and if necessary, rare plant sites will be flagged off.

One occurrence of a mineral lick east of Fish Lake was identified in the 1990s, but will not be affected by the 2017 exploration activities (Figure 2). The presence of features in the exploration area was further documented in 2011. All wildlife features identified during the 2011 survey were compiled and mapped. See Figure 2.

Exploration and access trail sites were surveyed for the presence and occupancy of bird nests prior to clearing or disturbance.

4.0 References

Ministry of Environment. 2005. Best Management Practices for Raptor Conservation during Urban and Rural Land Development in British Columbia. http://www.env.gov.bc.ca/wld/documents/bmp/raptor_bmp_final.pdf

Ministry of Environment. Proposed List of Wildlife Habitat Features – DRAFT http://www.env.gov.bc.ca/wld/documents/whf/WHF_web_order.pdf

Taseko Mines Limited. 2009. Prosperity Environmental Assessment, Volume 5, Section 5.3.5: Rare Plants, page 5-146.

Taseko Mines Limited. 2009. Prosperity Environmental Assessment, Volume 5, Appendix 5-6-J Wildlife Data Report.

Wetland Stewardship Partnership Wetland Ways. 2009. Interim Guidelines for Wetland Protection and Conservation in British Columbia. http://www.env.gov.bc.ca/wld/documents/bmp/wetlandways2009/wetlandways_docintro.html

5.0 Appendices

Appendix A – Chance-Find Procedure for Wildlife Features and Birds' Nests
New Prosperity Copper-Gold Project

Appendix B – Map of Sensitive Vegetation and Ecosystems
New Prosperity Gold-Copper Project

Appendix A –
Chance-Find Procedure for Wildlife Features and Birds' Nests
New Prosperity Gold-Copper Project

New Prosperity Copper-Gold Project

Chance-Find Procedure for Wildlife Features and Birds' Nests

A Chance Find Protocol provides those involved in ground disturbing activities with a framework for identifying wildlife features and nests, and assists in avoiding unforeseen disturbance to those habitat values.

This procedure provides descriptive information regarding features and nests commonly found in the region and those most likely to be encountered during the course of a specific project.

All exploration crew members directly involved in ground disturbing activities will be trained such that they are familiar with the types of nests and wildlife features present in the region of development.

Types of nests with greatest potential to be present in the exploration area:

Large stick nests of the following species have the greatest potential in the exploration area:

- Red-tailed hawk (*Buteo jamaicensis*)
- Northern goshawk (*Accipiter gentilis*)
- Osprey (*Pandion haliaetus*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Great blue heron (*Aredea herodias*)

Nests of all of these species are constructed in the upper portions of the tree, usually within the part of the tree where live branches are found. Both coniferous and deciduous trees can contain a nest. The osprey prefers their nest at the top of a tree, usually a dead tree, or a tree with a dead top such that the main bole can support the nest structure. Great blue herons nests are in groups of more than one nest in a single tree; these nest groups are called a 'heronry'. Sticks larger than about 2 cm diameter constitute the bulk of the nest material in the nests of all of these species although finer material including leaves, grass or twine, can be incorporated in the inner parts of the nest.

Photographs of an example nest from each of these species follows:

Red-tailed hawk nest

Northern goshawk nest

Osprey nest

Bald eagle nest

Great blue heron nests – a ‘heronry’

Two commonly seen tree features can be easily confused as bird nests, and should not be considered as such. These are:

- Squirrel nests
- Witches broom

Squirrel nests are usually lower down in the tree (bottom one-third) and are made of grasses and fine twigs.

Witches broom occurs on both lodgepole pine and spruce trees, however, are more common on spruce trees. The broom effect is created by a clustered outgrowth of fine branches as a reaction to a fungal pathogen, parasitic agent, or insect attack.

Photographs of an example of each follows:

Witches broom on a spruce tree

Squirrel nest

Types of wildlife features with the greatest potential to be present in the exploration area:

Specific wildlife features may include but are not limited to:

- A significant mineral lick,
- A nest of a bald eagle, osprey, great blue heron, or a category of species at risk that is limited to birds,
- A hibernaculum or maternity roost used by bats,
- A ground den of a grizzly bear,
- A hot spring or thermal spring,
- A non-classified wetland or ephemeral pond associated with a species at risk.

With specific regard to a bat hibernaculum, these are predominately found in secure underground sites that are less likely to be disturbed by light, noise and predators, and have the optimum humidity and stable low temperature requirements. These sites are in caves, old wells, mines, and deep rock crevices.

Maternity roosts used by bats would usually be alive or dead trees and tree stubs that have cavities that have been constructed by primary cavity excavating bird species, cracks, splits, and large trees and tree stubs where the tree bark is loose and falling off.

Three photograph examples of possible bat maternity roosts:

For photographic examples of nests of a bald eagle, osprey and great blue heron, see the previous section.

Photographs of an example of each of remaining wildlife features follows:

A significant mineral lick

A ground den of a grizzly bear

Two examples of a thermal spring

Three examples of an ephemeral pond

Three examples of a non-classifiable wetland

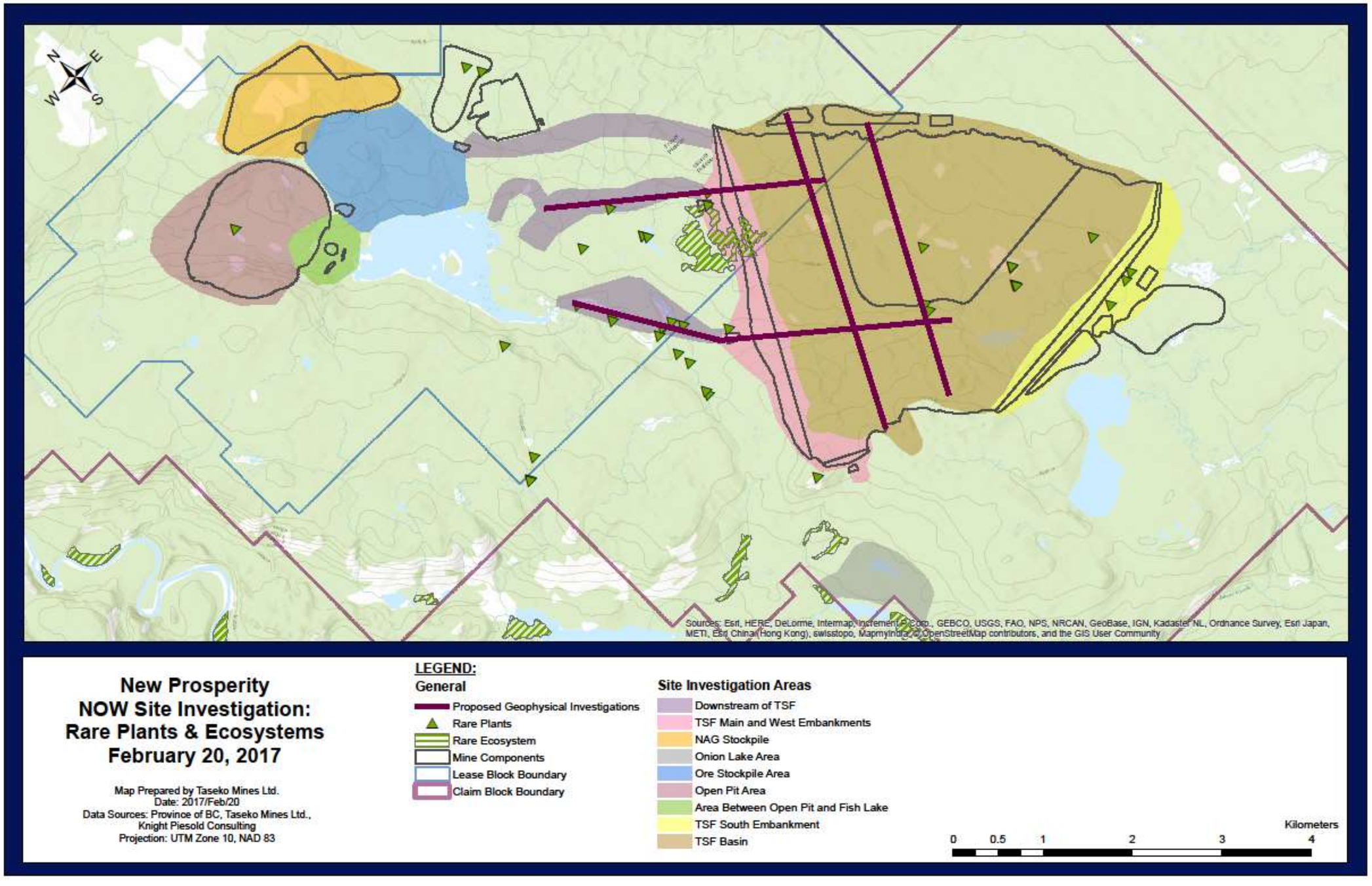
If you encounter a nest or wildlife features:

In the event that a nest or wildlife feature is encountered during the course of operations and is likely to be disturbed by planned work, the following procedure will be followed:

- Cease all forms of ground disturbance in the immediate vicinity of the find.
- Establish a protective buffer of at least 50 m surrounding the extent of the find area and demarcate the buffer in a highly visible and clear manner (e.g. 'No Work Zone' flagging)
- If possible, record GPS location of the find.
- Briefly note the type of nest or features you think you've encountered, and their location.
- Notify the Environmental Monitor or mine manager immediately to enable them to reroute or relocate the operation to ensure avoidance of the nest or feature.
- If avoidance of a nest is impractical, the mine manager will ensure a permit under the Wildlife Act is obtained prior to nest disturbance, if a permit is required.

While game trails need not be avoided by exploration, they should be noted where exploration activities cross them such that they can be considered during reclamation. Coarse woody debris pulled-back onto roads and trails to discourage ATV use should not be placed onto game trails to allow unrestricted travel by wildlife along the game trail.

Appendix B –
Map of Sensitive Vegetation and Ecosystems
New Prosperity Gold-Copper Project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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
New Prosperity
NOW Site Investigation:
Rare Plants & Ecosystems
February 20, 2017
Map Prepared by Taseko Mines Ltd.
Date: 2017/Feb/20
Data Sources: Province of BC, Taseko Mines Ltd., Knight Piesold Consulting
Projection: UTM Zone 10, NAD 83
LEGEND:
General
Proposed Geophysical Investigations
Rare Plants
Rare Ecosystem
Mine Components
Lease Block Boundary
Claim Block Boundary
Site Investigation Areas
Downstream of TSF
TSF Main and West Embankments
NAG Stockpile
Onion Lake Area
Ore Stockpile Area
Open Pit Area
Area Between Open Pit and Fish Lake
TSF South Embankment
TSF Basin
Kilometers
0 0.5 1 2 3 4