



RED MOON RESOURCES INC.

ACE GYPSUM PROJECT

Environmental Assessment Registration

Pursuant to the *Newfoundland & Labrador Environmental Protection Act (Part X)*

Submitted by:

Red Moon Resources Inc.
333 Duckworth Street
St. John's, NL
A1C 1G9

Prepared with the assistance of:

GEMTEC Consulting Engineers and Scientists Limited
10 Maverick Place
Paradise, NL
A1L 0J1

December 11 2017

Table of Contents

Table of Contents.....	ii
1.0 Introduction	1
1.1 Proponent Information	1
1.2 Rationale/Purpose/Need for the Undertaking.....	2
1.3 Environmental Assessment Process and Requirements.....	2
2.0 Project Description	3
2.1 Property Description and Location	3
2.2 Land Tenure	5
2.3 Alternatives to the Project	5
2.4 Project Components	8
2.4.1 Parking and Laydowns.....	10
2.4.2 Mobile Office and Lunch Trailer	10
2.4.3 Mobile Crusher and Screener	10
2.4.4 Crushed Ore and Fines Stockpiles.....	10
2.4.5 Overburden/Organics Stockpile	12
2.4.6 Security Gate	12
2.4.7 Water Supply	12
2.4.8 Waste Management.....	12
2.5 Site Development and Operations	12
2.6 Environmental Protection Plan.....	13
2.7 Possible Accidents and Malfunctions	13
2.8 Rehabilitation and Closure.....	13
2.9 Project Schedule	13
3.0 Existing Environment.....	14
3.1 Geology and Topography	14
3.2 Atmospheric Environment.....	15
3.3 Regional Climate	15
3.4 Vegetation	15
3.5 Wildlife, Avifauna and Species at Risk (SAR)	16
3.6 Water Resources	17
3.7 Historic Resources.....	17
4.0 Environmental Effects Analysis.....	17
4.1 Natural Environment	17
4.1.1 Atmospheric Environment.....	18
4.1.2 Wildlife, Avifauna and SAR	18
4.1.3 Water Resources	19
4.2 Socioeconomic Environment	19
4.2.1 Employment.....	19
4.2.2 Historic Resources.....	20
5.0 Approval of the Undertaking	20
6.0 Funding	20
Appendix A ACCDC Information.....	21

LIST OF FIGURES

Figure 1. Location of Ace Gypsum Project	4
Figure 2. Red Moon claims disposition, western Newfoundland.....	6
Figure 3. Historical Flat Bay gypsum quarries and access to RMR Mining Lease 239.....	7
Figure 4. Mining lease 239 land use	9
Figure 5. Haulage road from Ace gypsum deposit to Turf Point deep water port.....	11

LIST OF TABLES

Table 1: Mineral License Description	5
Table 2: Preliminary Project Schedule	14
Table 3: 1981 to 2010 Canadian Climate Normal Station Data for Black Duck.....	15
Table 4: Rare Flora Species.....	16
Table 5: Rare Fauna Species.....	16
Table 6: Occupations Required.....	20

1.0 Introduction

Project Name: Ace Gypsum Project

Red Moon Resources Inc. (RMR) plans to develop and mine the Ace gypsum deposit (the Project), near St. George's, in western NL. The proposed Project involves the expansion of a small, past producing quarry across a low ridge to extract gypsum (including anhydrite a form of gypsum) for sale to market. The Project area will comprise approximately 10.5 ha of surface disturbance, including an area of 2.5 ha that was disturbed in a previous quarrying operation by others. The mining process consists of simple physical quarrying without the use or addition of any chemicals for extraction and no associated tailings settlement ponds. Effectively 100% of the gypsum rock is "ore" without the need of sophisticated processing to produce a concentrate.

The mine will be developed in two, 5 to 10-meter-high benches based on an average expected thickness of approximately 15 m of gypsum, with lower levels consisting of anhydrite, a harder form of gypsum. Due to its soft nature, the gypsum will be excavated from the face of the active bench by excavators and placed directly into a mobile crushing and screening unit that will be located near the pit face and relocated as the face advances. In some zones, minor blasting will be required, however the blasting would be relatively low energy due to the naturally fractured nature of the gypsum. Crushed materials will be loaded directly into tandem trucks or temporarily stockpiled on site, prior to being loaded for transportation to the Turf Point deep water port and loading facility, located in the town of St. George's, for shipping. The port facility is currently being used by other quarry operators in the area. No new development or infrastructure is required relative to RMR's use of this facility.

The proposed Project involves permitting, quarry site development, operations, closure and rehabilitation activities.

1.1 Proponent Information

Name of Corporate Body:	Red Moon Resources Inc.
Corporate Address:	333 Duckworth Street St. John's, NL A1C 1G9 T: (709) 754-3186 ext 227
President and Chief Executive Officer:	Mr. Patrick Laracy
Principal Contact Person for the Purposes of EA	Mr. Patrick Laracy 333 Duckworth Street St. John's, NL A1C 1G9 T: (709) 754-3186 ext 227 Email. laracy@vulcanminerals.ca

1.2 Rationale/Purpose/Need for the Undertaking

RMR and its parent company, Vulcan Minerals, have been conducting exploration work in the St. George's and surrounding area for over 20 years and has an excellent record with respect to environmental protection and stewardship, as well as working with local contractors and communities in the execution of their projects.

The purpose of the proposed Project is to produce gypsum on a commercially competitive basis in order to acquire a share of the gypsum market, and contribute in positive ways to the local and provincial economy. The proposed Project is expected to provide 8 to 10 seasonal jobs over a project life of 10 to 12 years depending on the annual rate of production.

RMR plans to begin mining operations where previous mining/quarry activities were terminated by previous operators. RMR will start at the existing, disturbed pit face and excavate into it. Trees will be cut and stockpiled separately and likely chipped and used to supplement reclamation efforts, either progressively where possible or as part of a final closure plan. Organic materials and overburden will be excavated and stockpiled at various strategic locations around the perimeter of the site for re-use at closure. Stripping and stockpiling of organics and overburden will be carried out in stages as mining advances across the site.

Gypsum extraction at the proposed site will occur on an as-needed basis depending on sales volumes. Approximately 300,000 – 450,000 tonnes of annual production is currently expected as markets are developed over time. Initial production rates in the first few years may approximate 100,000 – 250,000 tonnes per year. The total resource within the development area is estimated to be 3 - 5 million tonnes and the life of mine will likely be 10 to 12 years.

1.3 Environmental Assessment Process and Requirements

The Newfoundland and Labrador *Environmental Protection Act* (NL EPA) requires anyone who plans a project that could have a significant effect on the natural, social or economic environment (an “Undertaking”) to present it for examination through the provincial Environmental Assessment (EA) process.

Under the NL EPA (definitions), an Undertaking “includes an enterprise, activity, project, structure, work or proposal and a modification, abandonment, demolition, decommissioning, rehabilitation and an extension of them that may, in the opinion of the minister, have a significant environmental effect”.

The associated *Environmental Assessment Regulations* (Part 3) list those projects (potentially including proposed modifications and extensions of same) that require registration and review. These include, for example:

“33(2) An undertaking that will be engaged in the mining, beneficiating and preparing of a mineral as defined in the Mineral Act whether or not these operations are to be performed in conjunction with a mine or at mills that will be operated separately.”

Following public and governmental review of this EA Registration, the Minister of Municipal Affairs and Environment will determine whether the Project may proceed, subject to any terms and conditions and other applicable legislation, or whether further assessment is required.

2.0 Project Description

The proposed Project is described in the following sections.

2.1 Property Description and Location

RMR's proposed Project involves the expansion of a small, existing pit across a low ridge to extract gypsum (including anhydrite) for sale to market. The mining process consists of simple physical quarrying without the use or addition of any chemicals for extraction and no associated settling or tailings ponds. Effectively 100% of the gypsum rock is "ore" without the need of sophisticated processing to produce a concentrate.

The proposed Project is located in a sparsely populated area of western Newfoundland (Figure 1). The site is located approximately 8.5 km southwest of the town of St. George's. The site is in an area previously developed by past-producing gypsum operations (the Flat Bay quarry area – Figure 2). The site is accessible by vehicle via existing site/haul roads that run from the site, through past-producing quarry operations, and connect to Route 403, which runs from the Trans-Canada Highway, approximately 6 km east of the property, to Flat Bay and other communities (Figure 2 & 3).

RMR has applied for and received a mining lease of approximately 11.8 ha, identified under Mining Lease 239, and named as the RMK Ace Zone. The location of RMK Ace Zone mining lease is depicted in Figures 2 and 3. The Project footprint is shown in Figure 4. The development plan for this Lease is to exploit approximately 10.5 ha of the 11.8 ha lease, including 2.5 ha of previously disturbed area. The 2.5 ha previously disturbed area includes the existing pit that measures approximately 1.8 ha, and an additional 0.7 ha of previously cleared area that is partially infilled with primarily alder growth. Details of the site, including the existing disturbed area, and the area to be disturbed as part of this proposed Project are shown in Figure 4.

The Project is situated approximately 9 km from the Turf Point deep water port and loading facility, located in the town of St. George's (Figure 5). The port was originally developed to ship gypsum from the former Flat Bay quarry and was recently used to ship aggregate and gypsum and prior to this was used by Teck to ship zinc concentrate from the Duck Pond mine in central Newfoundland.



Figure 1. Location of Ace Gypsum Project

Gypsum is currently being mined from the Coal Brook site, located approximately 8 km east of RMR's proposed Project, and that material is being shipped to market via the Turf Point facility.

The presence of gypsum is well known throughout this region due to surface exposure at various localities. Historic exploration and mining has occurred in the Flat Bay region since the 1950's. At least 540 drillholes have been documented within the greater Flat Bay gypsum quarry areas, including Quarry A, B, C, B West, and B Southwest and surrounding areas (Figures 3 and 5).

There are currently no active gypsum mines in the Flat Bay quarry area, however there is active quarrying of overburden for sand and gravel occurring adjacent to the Ace deposit (Figure 4).

RMR used 3D modelling software, 2017 and historical drilling data, field data and elevation surfaces to estimate the resource potential over the property. Modelling suggests there is an estimated 3-5 million tonnes of gypsum contained in the mining lease area.

2.2 Land Tenure

Gypsum mining in the area started in the 1950's and continued until 1990 when the former Flat Bay Gypsum Mine closed. Some remediation occurred at that time with the removal of on-site buildings. The edges of open pits were safeguarded. Roads within the area remained largely passable and have been upgraded and are used by the adjacent sand and gravel quarry. This existing access will provide full access to the proposed Project area.

RMR's proposed mining operations will be carried out under Mining Lease 239, identified as the RMK Ace Zone (Figures 2 and 3). The mining lease area is contained entirely within RMR's mineral exploration license 22132M, which consists of 130 claims (Table 1).

Table 1: Mineral License Description

Held By	License	Claims	Area (ha)	Issued Date	Renewal Date
Red Moon Resources Inc.	022132M	130	3250	12-Apr-04	12-Apr-19

2.3 Alternatives to the Project

The alternatives to the proposed Project include:

- Selection of an alternate mine site within RMR's current mineral license area;
- Delay of the proposed Project; and
- Alternative mining methods or approaches.

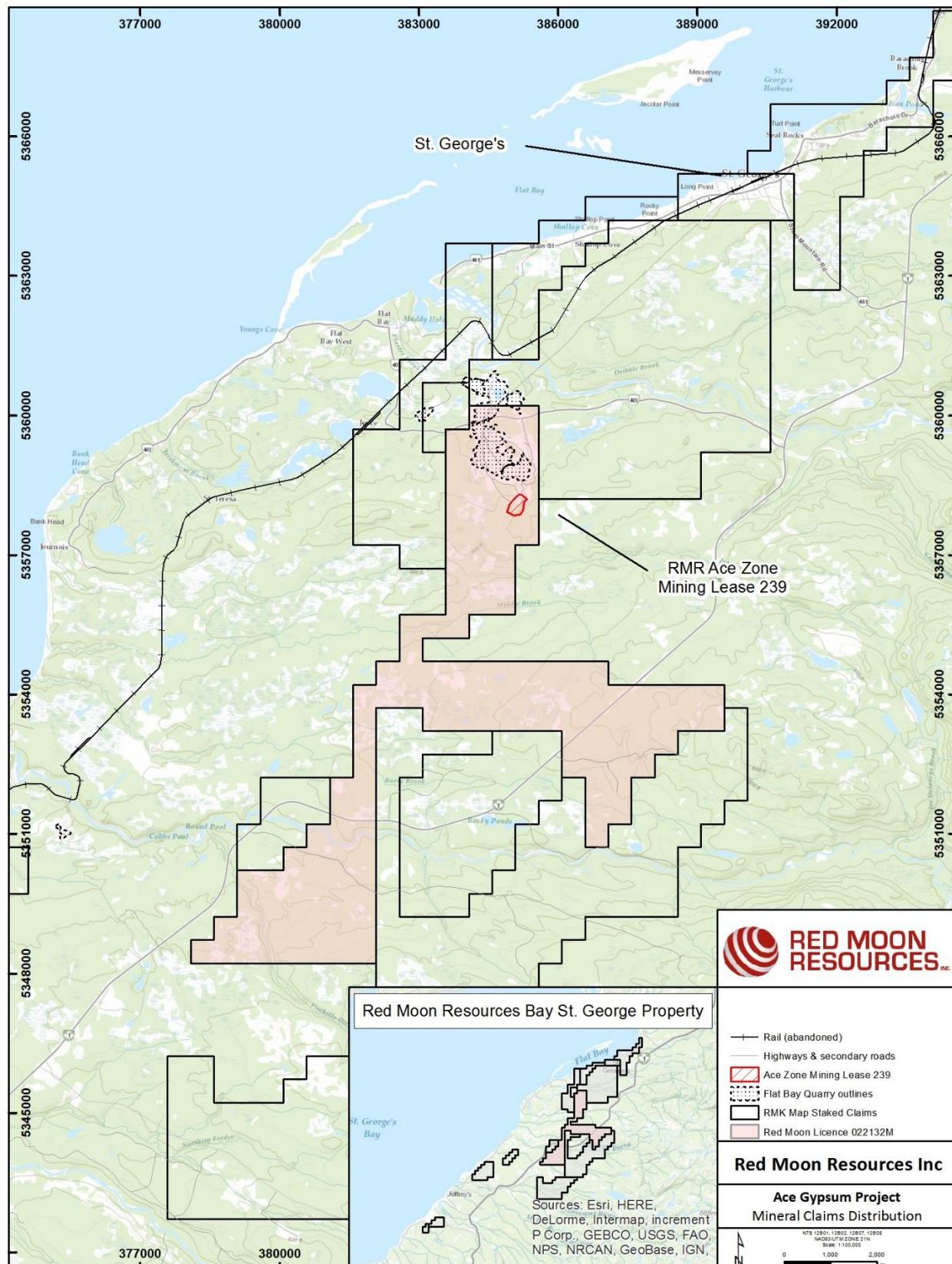


Figure 2. Red Moon claims disposition, western Newfoundland

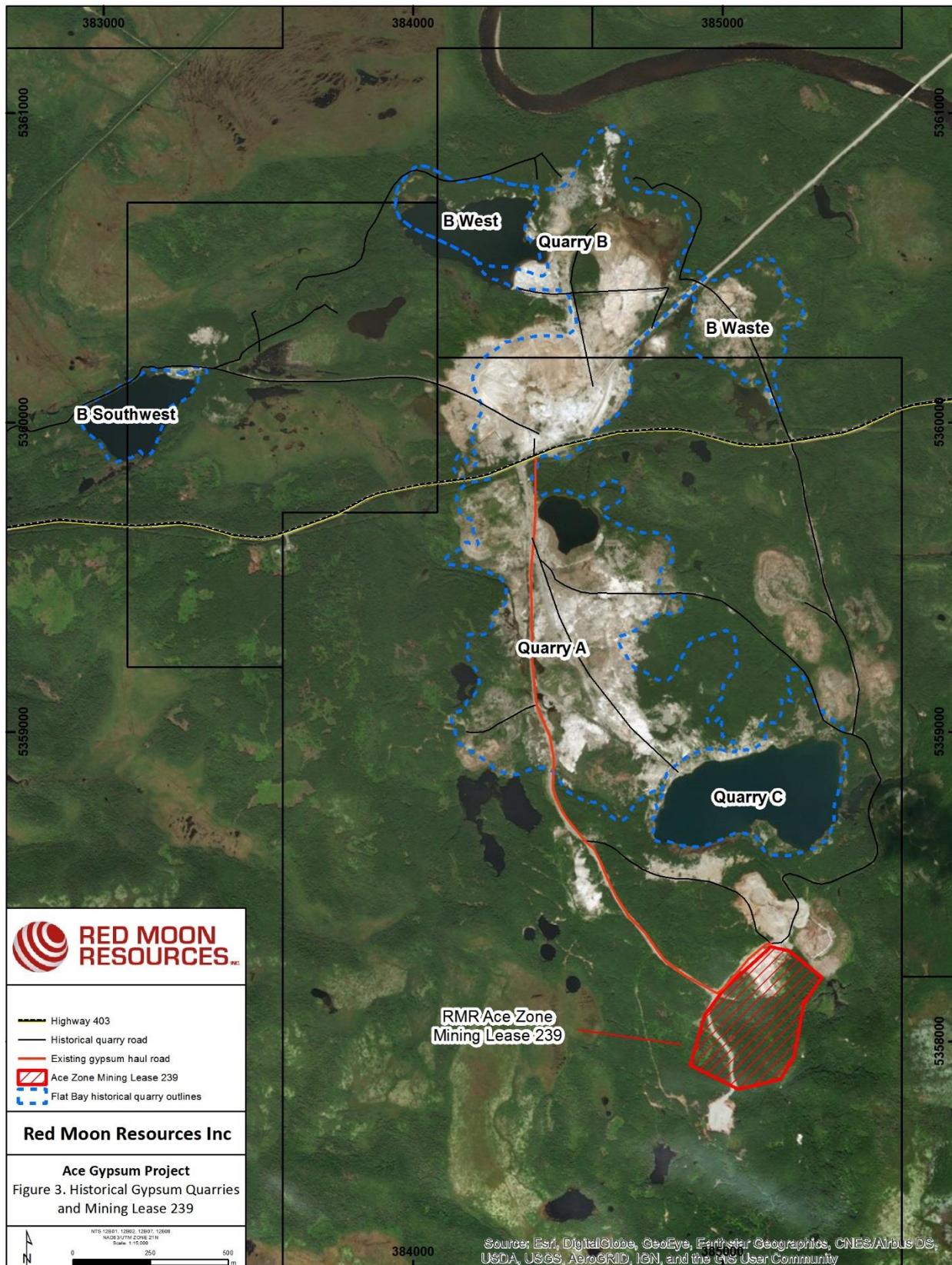


Figure 3. Historical Flat Bay gypsum quarries and access to RMR Mining Lease 239

RMR has considered alternate mining locations within their current mineral license areas, however due to a high variability in the remaining resources in most previously disturbed areas, and the potential for environmental issues related to thicker overburden with other areas of possible gypsum extraction, the currently proposed Project site was determined to have the least risk and lowest potential environmental impact.

The proposed Project will allow RMR to acquire a share of the North American gypsum market which is currently improving. Delay of the Project will likely impact RMR's competitive edge with respect to existing and accessible infrastructure, allowing existing and new competitors outside the province to take a greater share of the market.

The proposed open pit excavation, crushing, trucking, and shipping method is best suited to this type of deposit and is the lowest impact mining method feasible for the proposed Project. Alternative excavation and crushing methods generally require additional energy and water.

2.4 Project Components

The main components associated with the proposed Project include the following:

- Parking and Laydown Areas;
- Mobile Office/Lunch Trailer;
- Mobile Crusher and Screener;
- Crushed Ore and Fines Stockpiles;
- Overburden/Organics Stockpile;
- Security Gate;
- Water Supply; and
- Waste and Septic Management.

Each of these components is discussed below. Refer to Figure 4 for location and identification of Project components.

The site is accessible via existing gravel roads (Figure 3) that run from the site, through past-producing quarry operations, and connect to Route 403. The Trans-Canada Highway is located approximately 6 km east of the property (Figure 5).

New road construction will not be required for the proposed Project. Tandem dump trucks will transport the mined gypsum product along the existing gravel road to Route 403, crossing this local road, and continuing on to the Turf Point port facility via an existing gravel road and a short section of municipal road (Figure 5).

No permanent power is required at the site. A gas-powered generator will be used to power the site trailer as needed. The mobile crusher and screener as well as the necessary heavy equipment will be fuel powered and fuel will be delivered, via a fuel truck, as required. Fuel

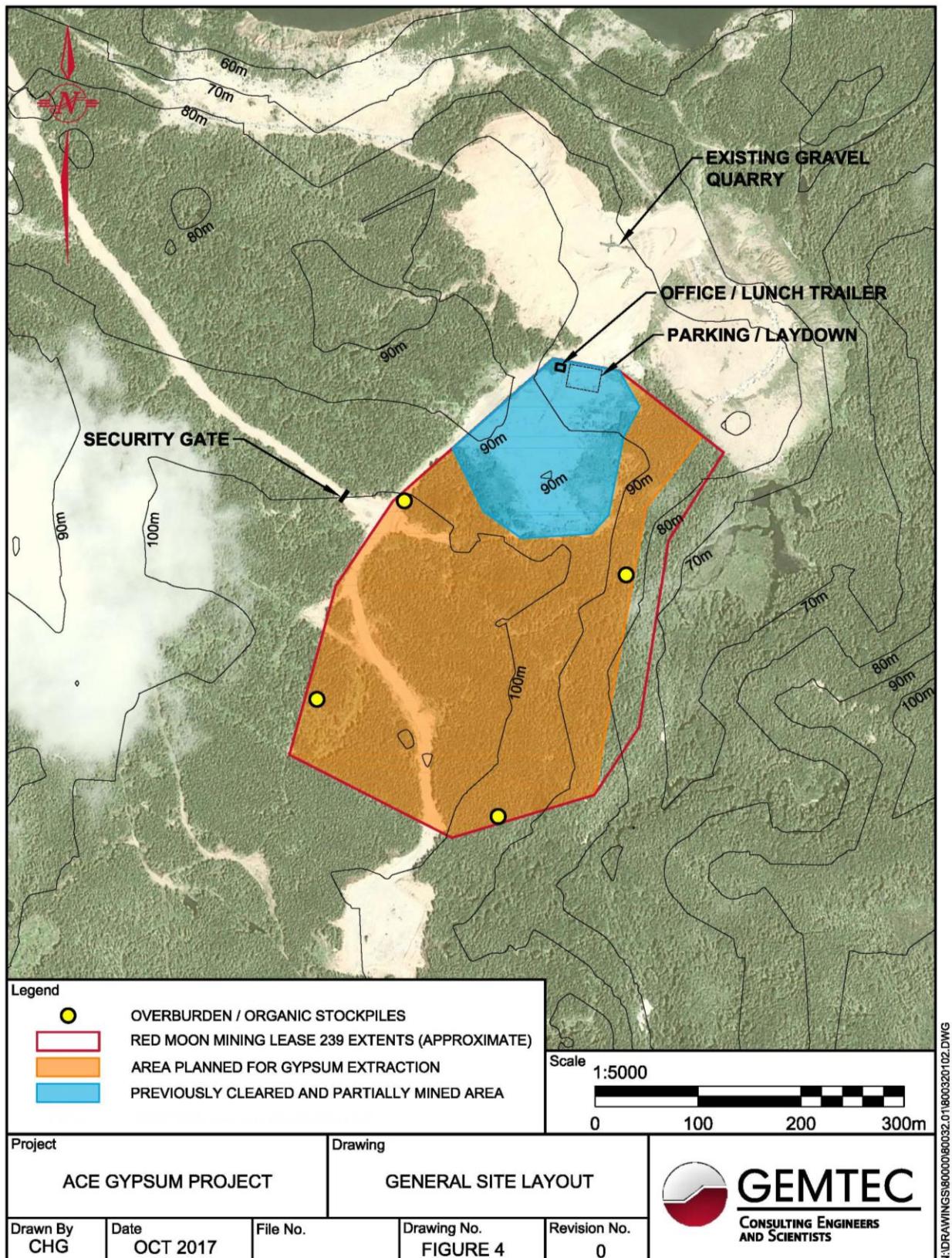


Figure 4. Mining lease 239 land use

required for the proposed Project will be provided by a local service provider and fuel handling will be the responsibility of the mining contractor. No bulk fuel storage is required on site.

All fuel handling and storage associated with equipment operation will comply with the *Storage and Handling of Gasoline and Associated Products Regulations*. If generated, waste oil will be disposed of by a licensed contractor and no significant quantities of fuel or lubricants will be stored onsite.

Mining equipment will consist of a tracked excavator, a front-end loader, tandem dump trucks, a mobile crushing and screening unit, a water truck, and a grader. The mining equipment and operators will be contracted from a local mining contractor for the duration of the project. The contractor will be responsible for the care and maintenance, fueling, operation, etc. of all equipment. Equipment may be removed from the Project site if mining ceases based on customer order and shipping schedules, or other breaks in the mining schedule.

2.4.1 Parking and Laydowns

The parking and laydown areas for equipment and personnel vehicles will be located in a previously disturbed area of the site.

2.4.2 Mobile Office and Lunch Trailer

The office and lunch room will be contained in a modular/mobile trailer located in a previously disturbed area of the site.

2.4.3 Mobile Crusher and Screener

Crushing will be carried out via a mobile crushing and screening unit. The unit will be relocated as the mine face progresses to allow excavators to operate at the face and shovel directly into the crusher feed bin. From there the mined material will either be placed in temporary (short term) stockpiles for later transport, or placed directly into trucks for transport to the Turf Point port facility.

2.4.4 Crushed Ore and Fines Stockpiles

As previously indicated, a crushing and screening unit will be located near the face of the quarry during operations. The screener will create crushed gypsum ore stockpiles, as well as small gypsum fines stockpiles to be trucked immediately or stored short term.

RMR does not anticipate any waste material as a result of mining operations, as the fines will likely be sold as product. Between shipments, fines will be stockpiled on site and kept damp to reduce dust movement and erosion.

While not anticipated, if any waste rock is acquired during operations, it will be stockpiled within the operational footprint and used for grading or sloping associated with later progressive rehabilitation activities.



Figure 5. Haulage road from Ace gypsum deposit to Turf Point deep water port

2.4.5 Overburden/Organics Stockpile

Overburden and organics will be stockpiled or windrowed separately at strategic locations around the perimeter of the site as operations progress. These stockpiles/windrows will be left in place, or used as needed, as progressive rehabilitation advances, or until final site rehabilitation.

2.4.6 Security Gate

A security gate will be installed at the only access road to the site. The gate will be locked whenever operations are ceased. Company or contracted personnel will regularly inspect the site during the shut-down periods.

2.4.7 Water Supply

The office/lunch trailer will contain washroom facilities complete with water and septic storage tanks. The water tank will be filled as needed by a contracted water supply truck. Drinking water will be delivered to site in bottles.

A water truck will be used for dust suppression, as required. Water will be sourced from on site water management ditches/collection or an alternate approved source.

2.4.8 Waste Management

The washroom facility located in the office/lunch trailer will be equipped with a septic tank. RMR will ensure installation is carried out according to any regulatory requirements. Sewage management will be handled by an approved contractor. The holding tank will be emptied via a septic/vacuum truck as needed by a local contractor and disposed of at an approved facility.

Domestic waste will be generated in small quantities and will be disposed of offsite in a proper manner. Any food or organic garbage onsite will be stored in animal-proof containers to prevent attracting wildlife.

No hazardous waste will be generated onsite. If any waste oil is generated, it will be disposed of by a licensed contractor.

2.5 Site Development and Operations

The start of Project activities is currently planned for March 2018 after all required permits and approvals are received from the appropriate regulatory departments. Where other regulatory approvals and permits are required prior to the start of Project activities, RMR will work to ensure those approvals and permits are complete and submitted to the appropriate regulators as soon as possible. RMR anticipates operations beginning as soon as the necessary equipment is mobilized to the site.

2.6 Environmental Protection Plan

RMR will develop an EPP based on current industry standards that will be implemented for all site activities. An EPP provides concise instructions to personnel regarding protection procedures and descriptions of techniques to reduce potential environmental effects associated with specific Project Activities. The EPP will reflect that the mining process consists of simple physical quarrying. The EPP will include procedures and measures relative to activities such as vegetation clearing, grubbing, blasting, quarrying, dust control, waste and sewage disposal, as well as contingency plans for unplanned events such as spills as well as for rehabilitation and compliance monitoring.

2.7 Possible Accidents and Malfunctions

Human health and safety and environmental protection are important to RMR during all phases of this proposed Project. RMR has, or will establish, safety procedures for all phases of their operations at this site. RMR's EPP will address contingency plans for unplanned events such as spills and accidental events.

Potential accidental events that may occur include, but are not limited to, the following:

- An accidental spill of fuel;
- A fire;
- Equipment failure; and
- Traffic mishaps.

2.8 Rehabilitation and Closure

The Rehabilitation and Closure Plan, as required under the *Mining Act*, for this site will involve:

- Removal of all infrastructure/equipment from site;
- Stabilization of any slopes; and
- Revegetation of disturbed areas.

Upon completion of the Project and removal of the office/lunch trailer and mobile equipment, rehabilitation and closure of the site will include spreading of the organics/overburden from the stockpiles and seeding. Only minor slopes are expected to be left based on the topography, these will be addressed as per Newfoundland and Labrador's Department of Natural Resources (NLDNR's) requirements, e.g., berms and signage, flattening etc. The ground surface sloping and rehabilitation will be conducted to ensure no surface water collection or concentrated flows. All Rehabilitation and Closure activities will comply with NLDNR's and NLDMAE's requirements.

2.9 Project Schedule

The permitting phase will take place in the 1st quarter of 2018. Site development including initial clearing and grubbing, trailer and equipment mobilization, etc., and operations will commence

when the appropriate permitting is in place, currently planned in early 2018. The life of mine is expected to be approximately 10 to 12 years. Site rehabilitation and closure, i.e., removal of equipment, sloping, spreading of organics and overburden etc., will commence during the final production season. Any deviations from this proposed schedule will be presented in the development plan, and in annual operational plans required by NLDNR. Refer to Table 2 for the preliminary Project schedule.

Table 2: Preliminary Project Schedule

Activity	Year 1 2018 (Q1)	Year 1 2018 (Q2-Q4)	Year 2 2019	Year 3 2020	Year 4 2021	Year 5 2022	Year 6 2023	Year 7 2024	Year 8 2025	Year 9 2026	Year 10 2027
Permitting and Approvals											
Initial Site Development and Gypsum Mining											
Site Operations											
<i>Progressive Closure (where possible)</i>											
<i>Final Site Closure (depending on life of mine)</i>											

3.0 Existing Environment

The sections below provide an overview of the existing natural and socioeconomic environments for the proposed Project.

3.1 Geology and Topography

The proposed Project occurs in the St. George's Bay subregion, a subregion of the Western Newfoundland Forest Ecoregion. This area is generally characterized by rolling hills, wetlands/bogs, and a broad plain typical of the Appalachian Region. It is also characterized by sandy to stony glacial till cover of variable thickness that blankets nearly all bedrock exposure in the lowlands. The bedrock contains primarily young sandstones and shales about 300 million years old. The subregion is almost uniformly covered by these rocks. Most soils in this subregion are either "humo ferric podzols" (brown soils containing mostly inorganic material that occur in relatively dry sites) or "ferro humic podzols" (dark soils with a high organic content and a high amount of iron and aluminum). (<http://www.flr.gov.nl.ca/publications/parks/index.html#brochures>)

3.2 Atmospheric Environment

There is an operating quarry located adjacent to this proposed Project and, similar to other quarrying and mining operations, there is some associated noise and dust associated with this operation. This is the only commercial/industrial activity in the immediate area.

3.3 Regional Climate

The area can be classified as northern boreal climatic zone with cooler, shorter summers than the Codroy subregion, but longer and warmer summers than other subregions in the Western Newfoundland Forest Ecoregion. The area also experiences cold winters. Refer to Table 3 for average monthly conditions.

Table 3: 1981 to 2010 Canadian Climate Normal Station Data for Black Duck

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily Average (°C)	-7.3	-8.1	-4.5	1.9	7.3	11.8	16.1	16.1	12.2	6.6	1.7	-3.1
Rainfall (mm)	30.5	29.9	40.4	67.2	111.9	108.7	136.7	139.1	141.7	132.5	105.3	50.8
Snowfall (cm)	119.8	84.8	53.3	16.2	2.3	0.0	0.0	0.0	0.0	2.1	28.2	97.4
Precipitation (mm)	150.3	114.7	93.8	83.4	114.2	108.7	136.7	139.1	141.7	134.6	133.5	148.2

3.4 Vegetation

The St. George's subregion is characterized by forests of balsam fir with an understory of mostly wood ferns. Black spruce can be found on poorly drained locations, or in areas with exposed bedrock. Alder swamps also occur in this subregion and are typically found where the soil is water-logged or poorly drained.

The Atlantic Canada Conservation Data Centre (ACCDC) database was consulted for any potentially occurring rare flora species in the proposed Project area. That search identified three plant species occurring within five kilometres of the proposed Project location (Table 4).

Table 4: Rare Flora Species

Species	Provincial Status	Habitat
Great Bulrush <i>Schoenoplectus tabernaemontani</i>	Sensitive	Grows in moist and wet habitat, and sometimes in shallow water.
Knotted Rush <i>Juncus nodosus</i>	Sensitive	Grows in wet places from freshwater to salt marsh habitat
Long-Stalked Yellow Sedge <i>Carex viridula</i> subsp. <i>brachyrrhyncha</i> var. <i>elatior</i>	Sensitive	A wetland species

Complete details of the ACCDC search can be found in Appendix B.

3.5 Wildlife, Avifauna and Species at Risk (SAR)

Typical wildlife species that can be encountered in this subregion include moose, mink, snowshoe hare, lynx, black bear, red fox, beaver, muskrat, and otter. Other mammals that can also occur in the area include eastern chipmunk, masked shrew, short-tailed weasel, and red squirrel. Birds occurring in forested areas of this region include osprey, yellow-bellied and alder flycatchers, finches, a wide variety of woodpeckers, and several species of thrushes. Some warblers, including yellow, magnolia, yellow rumped, and black-throated green, also occur here. <http://www.flr.gov.nl.ca/publications/parks/index.html#brochures>

Near waterbodies and coastlines in this subregion, aquatic birds including the American widgeon, black duck and green-winged teals can be found. Shorebirds such as the greater yellowlegs, common snipe and spotted sandpiper can also be found.

The ACCDC database was consulted for any potentially occurring SAR or rare fauna species in the proposed Project area. That search identified four species occurring within five kilometres of the proposed Project location (Table 5).

Table 5: Rare Fauna Species

Species	Provincial Status	Habitat
Mummichog <i>Fundulus heteroclitus</i>	Vulnerable	Aquatic Habitat
Banded Killifish <i>Fundulus diaphanus</i>	Vulnerable	Aquatic Habitat
Piping Plover <i>Charadrius melanotos</i>	Endangered	Cobble beaches, barrier island sandspits in marine environments
Newfoundland Marten <i>Martes americana</i>	Threatened (on the Island)	Old growth coniferous and mixed-wood forests with dense overhead cover.

Complete details of the ACCDC search can be found in Appendix B.

3.6 Water Resources

Due to the high elevation of the deposit, and its location on a ridge, it is unlikely that groundwater will be encountered within the planned mining depth of the gypsum deposit. As the excavation progresses, surfaces will be graded to promote positive surface runoff to the north and west and any surface water accumulation will be collected in shallow ditches and sumps and pumped to nearby vegetation, as required.

It should be noted that drainage from gypsum deposits is chemically inert and as such, will not negatively impact the surrounding environment. The mining process consists of simple physical quarrying without the use or addition of any chemicals for extraction and no associated tailings or settlement ponds.

There are no waterbodies within the approved mining lease area. The closest downgradient tributary (Flat Bay Brook) showing on 1:50,000 scale map is approximately 2.3 kilometers away (Figure 3 & 5).

There is a small, downstream wetland area, located approximately 20 m east of the eastern mining lease boundary, and at least 60 m from the developed area of the site. RMR will ensure their Project activities do not impact this small wetland through appropriate site sloping/grading and water control.

3.7 Historic Resources

RMR consulted with the Provincial Archaeology Office (PAO) to determine the potential for historic resources at this site. The PAO indicated they have no concerns with the location of RMR's proposed development and indicated that the potential for locating historic resources there was low.

4.0 Environmental Effects Analysis

4.1 Natural Environment

The Natural Environment is comprised of relevant components of the biophysical environment that may interact with the Project, including vegetation, avifauna, wildlife, atmospheric and water resources.

Given that the access roads are existing and mining operations will continue from where previous operations terminated, there are no construction activities required for this proposed Project. Minor site preparation may be required for the lunch/office trailer and mobile crushing/screening equipment. No additional footprint will be required for the placement of the mobile crushing/screening equipment. This equipment will be strategically placed in excavated areas and relocated as the mine advances.

As the pit advances, the organics and overburden will be stripped and stockpiled as required. The site will be rehabilitated and revegetated progressively as the gypsum resource is

exhausted or when operations cease. Given the preferred wet habitat of the rare flora species that occur within five kilometers of the site, it is highly unlikely the Project will have any negative effects on those species.

4.1.1 Atmospheric Environment

RMR intends to operate at the proposed Project site during regular business hours from Monday to Friday and the site is located a considerable distance from any residential areas. Given the proposed operating schedule and distance to the nearest community, it is not anticipated that Project activities will result in any noise disturbance to local residences.

RMR's activities will generate dust through excavating, crushing, occasional blasting, and from the ore stockpiles. Standard dust suppression protocols will be in place to ensure the air quality in the vicinity of the Project site is acceptable.

All equipment in use for Project activities will have the appropriate emission-control features in place. In addition, dust control measures (i.e., water application) will be applied as required for vehicle traffic on the access road and to ensure that no fugitive dust will be an issue as a result of any short-term gypsum stockpiling.

4.1.2 Wildlife, Avifauna and SAR

RMR does not anticipate any significant adverse effects to wildlife, avifauna or SAR as a result of the activities associated with the proposed Project. The Project will occur in an area with previous disturbance and activity and is surrounded by areas of relatively undisturbed forest and bog habitat. Given the habitat preferences of the SAR that may occur within five kilometres of the Project site, it is highly unlikely that Project activities will have any direct or indirect impacts on those species. Based on the abundance of undisturbed habitat surrounding the proposed Project site, it is unlikely that Project activities will have any negative effects on wildlife, avifauna, SAR or their habitats.

A number of measures will be implemented to further reduce the potential for interactions between Project activities and any wildlife that may occur in the area:

- Project area will be kept clear of garbage;
- Project personnel will not hunt or harass wildlife while on site;
- Equipment and vehicles will yield the right-of-way to wildlife; and
- Any nuisance animals will be dealt with in consultation with the NL Wildlife Division.

Whenever possible, any required clearing of vegetation will occur outside the migratory bird breeding season for this area, May to mid-July. If clearing is required during this period for some reason, RMR will ensure the following mitigations specific to avifauna are followed:

- Monitoring for bird nests will be conducted in advance of any site clearing during the breeding season (May – mid-July) and efforts will be made to avoid trees with nests during that time;
- Should a nest of a migratory bird be found, the following steps will be taken (in accordance with guidelines outlined in the Migratory Birds Convention Act (MBCA):
 - all activities in the nesting area should be halted until nesting is completed (*i.e.*, the young have left the vicinity of the nest);
 - any nest found should be protected with a buffer zone appropriate for the species and the surrounding habitat until the young have left their nest; and
 - nests should not be marked using flagging tape or other similar material as these increase the risk of nest predation.

4.1.3 Water Resources

Minimal site run-off is expected during site development however RMR will ensure proper ditching/check dams are installed to mitigate the potential for any runoff leaving the site. There is no requirement to wash the gypsum products prior to transport to the port facility, nor any other water use requirement relative to operation of the facility.

As gypsum tends to absorb water, and due to the elevated ridge topography of the site, only limited, direct precipitation is expected to accumulate during higher precipitation events or spring runoff. Any collected water will be pumped to nearby vegetation to provide natural attenuation. Note that there is no deleterious chemistry associated with drainage from gypsum deposits. No chemicals are used in the mining process and as such there are no associated tailings or settlement ponds.

There are no surface waterbodies within the mining lease or Project footprint and RMR does not anticipate any direct or indirect impacts to any waterbodies in the vicinity, *i.e.*, within 2-3 kilometers. There is a small, downstream wetland area, located approximately 20 m east of the eastern mining lease boundary, which will be at least 60 m from the developed area of the site. RMR will ensure that gypsum excavation will be conducted in a manner to ensure that the mine/quarry floor and faces excavated slope in a direction to prevent the release of any surface runoff to this small wetland.

4.2 Socioeconomic Environment

Current resource use of the Project area appears to be minimal due to the rugged environment, limited access to the area and a small local population. Resource conflicts, if any, during Project activities are likely restricted to big and small game hunting, berry harvesting and domestic wood cutting. Activities at this mine will have net positive effects on the local economy as new employment will be created over the medium to long-term, *i.e.* 10 to 12 years.

4.2.1 Employment

The anticipated employment opportunities are presented in Table 7.

Table 6: Occupations Required

Position	# of Personnel	National Occupation Code
Heavy Equipment Operator (loader, excavator, grader, and crusher)	2	7521
Truck Driver	4	7511
Foreman/Supervisor (will be one of the heavy equipment operators noted above)	NA	8221
Senior Manager	1	0016
Geologist	1	2113
Total	8	

4.2.2 Historic Resources

The PAO advised there was a low potential for heritage or historic resources in the area. If, however, during Project activities, historic resources are encountered, work in the area of the discovery will stop and appropriate measures, including contacting the PAO at (709) 729- 2462

5.0 Approval of the Undertaking

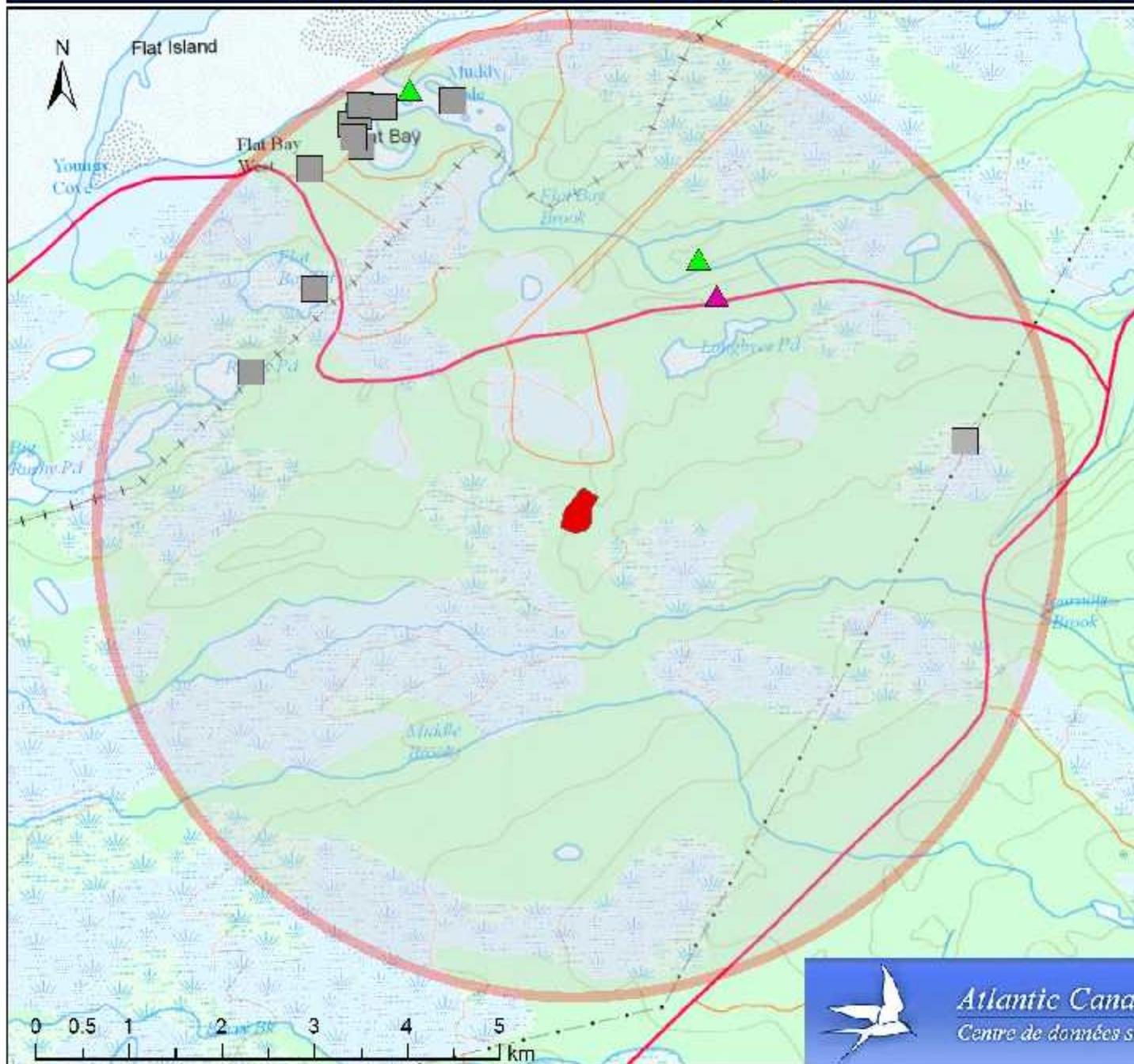
RMR holds a mining lease for the Project site. The Project requires a decision from the Minister of Municipal Affairs and Environment relative to this EA review of the proposed Project. RMR will obtain all necessary permits and approvals to develop, operate, and close the proposed Project in accordance with applicable legislation and industry standards.

6.0 Funding

No Government funding is required. Funding for this Project will be wholly provided by RMR.

Appendix A ACCDC Information

GIS Scan of Rare and Provincially/Federally Listed Species for Area of Interest near Flat Bay, Newfoundland and Labrador



Legend

- Point of Interest (POI)
- 5 km Buffer Around POI

RareFlora

- 1000m Acc.
- 10000m Acc.

RareFauna

- Unknown Acc.

Atlantic Canada Conservation Data Centre
September 26, 2017
For: GCMTEC Ltd.
Data Request: RQ0633

Datum: Transverse Mercator NAD83
Note: Interpretations of this map should
always be conducted in relation with
data provided in spreadsheets and any
other communications.



Atlantic Canada Conservation Data Centre
Centre de données sur la conservation du Canada Atlantique

DATA SOURCES:

All data housed at Atlantic Canada Conservation Data Centre (ACCDC). Refer to 'CITATION' field for data sources.

CAVEATS:

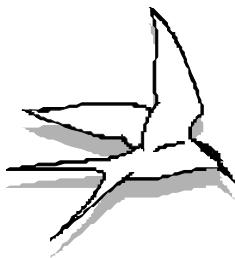
ACCDC rare taxa occurrence records are offered as a guide recognizing that the ability to find plants and animals will depend upon the season. The ACCDC makes a strong effort to verify the accuracy of all the data it obtains, generates and manages, but it will not be held responsible for inaccuracies in data that it provides.

PLEASE NOTE:

- * ACCDC data is restricted for use by the specified data user only; any third party requiring data must make its own request to the ACCDC.
- * Specified data users may not publish any information provided by the ACCDC or its partners without prior permission.
- * To ensure the currency of the data, the ACCDC requires Data Users to destroy all copies of data 18 months after the date of receipt.
- * ACCDC data reports are restricted to that data in our Data System at the time of the request.
- * Data accuracy is qualified as to location (Accuracy) and time (Date)
- * ACCDC data reports are not to be construed as exhaustive inventories of taxa in an area.
- * The non-occupancy of a taxon cannot be inferred by its absence in an ACCDC data report.
- * Museum databases, which are the basis for more accessible public databases, such as those of the ACCDC, are works in progress. Essentially, they are finding aids and dynamic data records, constructed primarily to serve scientists engaged in the continuing, active process of plant systematics and taxonomy. Ongoing additions of new collections, and frequent upgrades to the identifications of all plant specimens housed in museum herbaria, may not always be reflected, in real time, by databases such as those of the ACCDC. Specifically, the conservation status of individual species recorded in the ACCDC database may not be absolutely current. It is therefore the responsibility of the data user to contact the relevant museums directly, in order to check for the most current identifications of specimens of interest, and to ascertain from the scientists concerned, their current understanding of the conservation status of individual species in question. The absolute conservation status of any given species is dynamic, and subject to change over short periods of time.

DATA DICTIONARY

GNAME	Scientific Name of taxon	
GCOMNAME	Common name of taxon	
FAMILY	Family of taxon	
OBSERVER	Person or persons who observed the taxon	
TOTAL NUMBER	The number of specimens at a given observation.	
MONTH	Month of survey	
DAY	Day of survey	
YEAR	Year of survey	
SRANK	Subnational rank - CDC ranking system Draft 2010 Subnational rank - CDC ranking system (Flora Only) (Our ranks need to go out for one final expert review. They are unlikely to change, as they've already been thoroughly reviewed – nonetheless, these ranks remain provisional until that final review.)	
DRAFT_SRANK	National Rank - CDC ranking system	
NRANK	Global Rank - CDC ranking system	
GRANK	General Status text for the province in 2005	
GeneralStatusRanks	Denotes the COSEWIC status.	
COSEWIC_STATUS	Denotes if the species is on the provincial endangered species list.	
PROVINCIAL_STATUS	Denotes if the species is on the federal SARA list.	
SARA	HABITAT	Description of the habitat where plant or animal was found
HABITAT	ACCURACY	The accuracy in metres of the location.
ACCURACY	SYNAME	Synonym for the plant or animal name in cases it is known by more than one scientific name.
SYNAME	ACRONYM OF HERBARIA	Acronym of the herbarium where this specimen is kept, see the complete definitions of the acronyms in the HERBARIA.xls
ACRONYM OF HERBARIA	COLLECTION NUMBER	The collection number assigned to the specimen by the collector, this should be used to refer to the specimen when contacting the herbarium
COLLECTION NUMBER	CITATION	Primary source of the data
CITATION	IDNUM	Field Office Number: Internal ACCDC record reference (not the EONUM)



Atlantic Canada CDC Canada Atlantique

2012 Edition

Part I. Conservation Data Centre Subnational Rarity Ranks

Biological diversity or biodiversity can be described at a number of levels, from molecules to ecosystems. Biodiversity is a combination of species diversity (the variety of species), genetic diversity (the genetic variability among individuals of that species), and ecological diversity (the variety of ecosystems/habitats in which they live). Conservation Data Centres (CDCs), as part of The NatureServe* international network, track biodiversity at two levels: species and ecological communities. Species and ecological communities are referred to as **elements** of biodiversity. Elements are ranked in each jurisdiction (province or state) and at global and national levels in order to help prioritize conservation efforts.

NatureServe and all CDCs (called Heritage Programs in the US) use a standardized element ranking system that has evolved over some 30 years, with input from hundreds of scientists, managers and conservationists. The following material describes this element ranking system at the subnational (S) or provincial level and explains how ranks are assigned for species elements of biodiversity. (The community ranking process is slightly different.)

* Formerly known as The Nature Conservancy (TNC)

Definitions of Provincial (subnational) ranks - SRANKS

- S1 Critically Imperiled**—Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction.
- S2 Imperiled**—Imperiled in the jurisdiction because of rarity due to very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation from jurisdiction.
- S3 Vulnerable**—Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.
- S4 Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- S5 Secure**—Common, widespread, and abundant in the jurisdiction.
- SX Presumed Extirpated**—Species or ecosystem is believed to be extirpated from the jurisdiction (i.e., nation or state/province). Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SH **Possibly Extirpated**— Known from only historical records but still some hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in the jurisdiction.

S#S# **Range Rank** — A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem. Ranges cannot skip more than two ranks (e.g., SU is used rather than S1S4).

SU **Unrankable**—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNR **Unranked**—National or subnational conservation status not yet assessed.

SNA **Not Applicable** —A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities.

Not applicable cases:

Hybrid – Element represents an interspecific hybrid without conservation value. (Note that hybrids may be assigned a numeric rank if they do have a conservation value.)

Exotic Origin – Element is not native to the nation or subnation.

Accidental/Nonregular – Element is not regularly found in the nation or subnation, in other words, infrequent and outside of normal range.

Not Confidently Present – Element's presence in the nation or subnation has been reported, but the report is unconfirmed or doubtful; Element has been falsely reported, and may or may not potentially occur; Element may potentially occur (e.g., habitat is suitable); Element was never present in the nation or subnation despite presence in surrounding areas.

No Definable Occurrences – Element is native and appears regularly but lacks practical conservation concern in the subnation because it is transient or occurs in a dispersed, unpredictable manner.

Synonym – Element reported as occurring in the nation or subnation, but the national or provincial data center does not recognize this taxon; therefore the Element is not assigned a national or subnational rank.

Rank Qualifier

S#? **Inexact Numeric Rank**—Denotes inexact numeric rank. This designation should not be used with any of the variant national or subnational conservation status ranks or NX, SX, NH, or SH.

Breeding Status Qualifiers⁴

B **Breeding**—Conservation status refers to the breeding population of the species in the nation or state/province.

N **Nonbreeding**—Conservation status refers to the non-breeding population of the species in the nation or state/province.

M **Migrant**—Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the nation or state/province.

⁴ 4A breeding status is only used for species that have distinct breeding and/or non-breeding populations in the nation or state/province. A breeding-status S-rank can be coupled with its complementary non-breeding-status S-rank if the species also winters in the nation or state/province. In addition, a breeding-status S-rank can also be coupled with a migrant-status S-rank if, on migration, the species occurs regularly at particular staging areas or concentration spots where it might warrant conservation attention. Multiple conservation status ranks (typically two, or rarely three) are separated by commas (e.g., S2B,S3N or SHN,S4B,S1M).

Part II. The Ranking Process

To rank species elements, 8-10 different biological criteria are assessed for each species. The ten factors considered in assigning status ranks are described below.

Ranking Matrix Eight ranking criteria and value of letter scores for each criterion.

CRITERIA	MATRIX SCORE						Criteria Description
	A	B	C	D	E	F	
Population size	1-50	50-250	250-1000	1000-2500	2500-10000	10000-100000	100000-1000000
Range Extent	<100km ²	100-250km ²	250-1000km ²	1000-5000km ²	5000-20000km ²	20000-200000km ²	200000-250000km ²
Short-term Trend	Decline >90%	Decline of 80-90%	Decline of 70-80%	Decline of 50-70%	Decline of 30-50%	Decline of 10-30%	Relatively Stable (<1% change)
Long-term Trend	Decline >90%	Decline of 80-90%	Decline of 70-80%	Decline of 50-70%	Decline of 30-50%	Decline of 10-30%	Relatively Stable (<1% change)
Area of Occupancy	<0.4km ²	0.4-4km ²	4-20km ²	20-100km ²	100-500km ²	500-2000km ²	2000-4000km ²

Number of Element Occurrences (EOs)	0-5	6-20	21-100	>100			
Number of EOsWith Good Viability	No occurrences with excellent or good viability or ecological integrity	Very few (1-3) occurrences with excellent or good viability or ecological integrity	Few (4-12) occurrences with excellent or good viability or ecological integrity	Some (13-40) occurrences with excellent or good viability or ecological integrity	Many (41-125) occurrences with excellent or good viability or ecological integrity	Very Many (>125) occurrences with excellent or good viability or ecological integrity	
Environmental Specificity	Very Narrow	Narrow	Moderate	Broad			
Threat Scope	Pervasive (71-100%)	Large (31-70%)	Restricted (11-30%)	Small (1-10%)			
Threat Severity	Pervasive (71-100%)	Large (31-70%)	Restricted (11-30%)	Small (1-10%)			

1. Population Size

Population size is the estimated current total population of the species which is naturally occurring and wild within the area of interest (globe, nation, or subnation), and that is of reproductive age or stage (at an appropriate time of the year), including mature but currently non-reproducing individuals, which should be included in counts or estimates. Abundance is measured in different ways depending on the biology of the species. For animal populations it is usually measured by the number of individuals, for plants it may be measured by the area occupied by a distinct population, and for aquatic invertebrates it may be measured by the stream length that the species occupies:

- Z = Zero, no individuals believed extant (i.e., species presumed extinct)**
- A = 1–50 individuals**
- B = 50–250 individuals**
- C = 250–1,000 individuals**
- D = 1,000–2,500 individuals**
- E = 2,500–10,000 individuals**
- F = 10,000–100,000 individuals**
- G = 100,000–1,000,000 individuals**
- H = >1,000,000 individuals**
- U = Unknown**
- Null = Factor not assessed**

*A value range (e.g., DE) can also be used to indicate uncertainty.
(DE would indicate between 1000 – 10000 individuals).

2. Range Extent

This denotes the approximate range of the species as a percentage of the province's area. It is defined as the current area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of occurrence, but, *excluding* significant areas where the species does not occur due to unsuitable habitat. Thus the estimate of range for a species exhibiting a linear use of coastal forests or riverine habitats would not consider tracts of unsuitable habitat in the interior of the polygon.

Z = Zero (no occurrences believed extant; species presumed extinct or ecosystem believed eliminated throughout its range)

A = <100 km²

(less than about 40 square miles)

B = 100–250 km²

(about 40–100 square miles)

C = 250–1,000 km²

(100–400 square miles)

D = 1,000–5,000 km²

(400–2,000 square miles)

E = 5,000–20,000 km²

(2,000–8,000 square miles)

F = 20,000–200,000 km²

(8,000–80,000 square miles)

G = 200,000–2,500,000 km²

(80,000–1,000,000 square miles)

H = >2,500,000 km²

(greater than 1,000,000 square miles)

3. Short-term Trend

The rating code that best describes the observed, estimated, inferred, or suspected degree of change in population size, extent of occurrence (range extent), area of occupancy, number of occurrences, and/or number of occurrences or percent area with good viability or ecological integrity over the short term, whichever most significantly affects the conservation status assessment in the area of interest (globe, nation, or subnation). Consider short-term historical trend within ten years or three generations (for long-lived taxa), whichever is the longer (up to a maximum of 100 years), or, for communities and systems, typically 30 years, depending on the characteristics of the type.

The trend may be recent or current, and the trend may or may not be known to be continuing. Trends may be smooth, irregular, or sporadic. Fluctuations will not normally count as trends, but an observed change should not be considered as merely a fluctuation rather than a trend unless there is evidence for this. Conservation Status Assessments: Factors for Assessing Extinction Risk 25

In considering trends, do not consider newly discovered but presumably long existing occurrences, nor newly discovered individuals in previously poorly known areas.

Also, consider fragmentation of previously larger occurrences into a greater number of

smaller occurrences to represent a decreasing area of occupancy as well as decreasing number of good occurrences or populations.

A = Decline of >90%
B = Decline of 80–90%
C = Decline of 70–80%
D = Decline of 50–70%
E = Decline of 30–50%
F = Decline of 10–30%
G = Relatively Stable (10% change)
H = Increase of 10–25%
I = Increase of >25%
U = Short-term trend unknown
Null = Factor not assessed

4. Long-term Trend

The rating code that best describes the observed, estimated, inferred, or suspected degree of change in population size, extent of occurrence (range extent), area of occupancy, number of occurrences, and/or number of occurrences or percent area with good viability or ecological integrity over the long term (ca. 200 years) in the area of interest (globe, nation, or subnation).

A = Decline of >90%
B = Decline of 80–90%
C = Decline of 70–80%
D = Decline of 50–70%
E = Decline of 30–50%
F = Decline of 10–30%
G = Relatively Stable (10% change)
H = Increase of 10–25%
I = Increase of >25%
U = Long-term trend unknown
Null = Factor not assessed

5. Area of Occupancy

Area of occupancy for taxa can be defined as (modified from the International Union for the Conservation of Nature 2001):

“...the area within its ‘extent of occurrence’, which is occupied by a taxon or ecosystem type, excluding cases of vagrancy. The measure reflects the fact that a taxon or type will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases, (e.g., irreplaceable colonial nesting sites, crucial feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon. The size of the area of occupancy will be a function of the scale at which it is measured, and should be

at a scale appropriate to relevant biological or ecological aspects of the taxon or type, the nature of threats and the available data.”

A =	<0.4km ²
B =	0.4-4
C =	4-20 km ²
D =	20-100 km ²
E =	100-500 km ²
F =	500-2000 km ²
G =	2000-20000 km ²
H =	>20000 km ²

5b. Linear Distance of Occupancy

Ecosystems that occur as linear strips. They are often ecotonal between terrestrial and aquatic ecosystems. In undisturbed conditions, typical occurrences range in linear distance from 0.5 to 100 km.

A =	<4km ²
B =	4-40
C =	40-200 km ²
D =	200-1000 km ²
E =	1000-5000 km ²
F =	5000-20000 km ²
G =	20000-200000 km ²
H =	>200000 km ²

6. Number of Element Occurrences (EOs)

An “element occurrence” is the mapping unit of CDC methodology. It is generally defined as an area of land or water on which an “element of biodiversity” (plant and animal species or natural community) is or was present. It is a physical location important to the conservation of a species or community, an area worth preserving to insure the survival of a community or species at risk. For a species it is generally the habitat occupied by a local population, for a community it is the area containing a stand or patch. What constitutes an occurrence also varies between species (e.g. hibernacula, den sites, breeding ponds where adults, egg masses and/or larvae have been identified, breeding colonies, etc.). Some species can have more than one type of occurrence, for example breeding and wintering occurrences.

A single letter code (below) represents the number of estimated occurrences believed extant for the species in the province. When a species’ distribution is extremely limited and there are very few site occurrences, it is very susceptible to any number of ecological disturbances, both predictable and unpredictable. This criteria is therefore an important factor influencing SRANK when the number of occurrences is few. If the letter code for this field is A or B, the species usually qualifies for a rank of S1 or S2.

A =	0 - 5 occurrences
B =	6 - 20 occurrences

C = 21 - 100 occurrences
D = 101+ occurrences

7. Number of EOs with Good Viability

For species, an occurrence with at least good (i.e., excellent-to-good) viability exhibits favorable characteristics with respect to population size and/or quality and quantity of occupied habitat; and, if current conditions prevail, the occurrence is likely to persist for the foreseeable future (i.e., at least 20–30 years) in its current condition or better. See Hammerson et al. (2008) for more details. For ecosystems, an occurrence has excellent-to-good ecological integrity when it exhibits favorable characteristics with respect to reference conditions for structure, composition, and function, operating within the bounds of natural or historic disturbance regimes, and is of exemplary size (Faber-Langendoen et al. 2008). One would expect only minor to moderate alterations to these characteristics for an occurrence to maintain good ecological integrity.

For many occurrences, viability or ecological integrity assessments or ranks have been applied by biologists and ecologists throughout the NatureServe network. For species, these Element Occurrence (EO) ranks estimate the probability of persistence of the occurrence. For ecosystems, the rank is a succinct assessment of the degree to which, under current conditions, an occurrence of an ecosystem matches reference conditions for that system, without any presumptions made about future status or persistence. Ranks for species and ecosystems are based on a set of “occurrence rank factors,” namely size (including population size and/or occupied area), abiotic and biotic condition, and landscape context. These factors may be further refined to specific indicators or metrics. The overall ranks range from A = Excellent viability/integrity, to D = Poor viability/integrity

A = No occurrences with excellent or good (assessed as A or B) viability or ecological integrity
B = Very few (1–3) occurrences with excellent or good viability or ecological integrity
C = Few (4–12) occurrences with excellent or good viability or ecological integrity
D = Some (13–40) occurrences with excellent or good viability or ecological integrity
E = Many (41–125) occurrences with excellent or good viability or ecological integrity
F = Very many (>125) occurrences with excellent or good viability or ecological integrity
U = Unknown number of occurrences with excellent or good viability or ecological integrity
Null = Factor not assessed

8. Environmental Specificity

Environmental Specificity is the degree to which a species or ecosystem depends on a relatively scarce set of habitats, substrates, food types, or other abiotic and/

or biotic factors within the overall range. Relatively narrow requirements are thought to increase the vulnerability of a species or ecosystem. This factor is most important when the number of occurrences, and the range extent or area of occupancy, are largely unknown.

A = Very Narrow. Specialist or ecosystem with key requirements scarce. For species, specific habitat(s), substrate(s), food type(s), hosts, breeding/non-breeding microhabitats, or other abiotic and/or biotic factor(s) are used or required by the species or ecosystem in the area of interest, with these habitat(s) and/or other requirements furthermore being scarce within the generalized range of the species or ecosystem within the area of interest, and the population (or the number of breeding attempts) expected to decline significantly if any of these key requirements become unavailable. For ecosystems, environmental requirements are both narrow and scarce (e.g., calcareous seepage fens).

B = Narrow. Specialist or ecosystem with key requirements common. Specific habitat(s) or other abiotic and/or biotic factors (see above) are used or required by the species or ecosystem, but these key requirements are common and within the generalized range of the species or ecosystem within the area of interest. For ecosystems, environmental requirements are narrow but common (e.g., floodplain forest, alpine tundra).

C = Moderate. Generalist or community with some key requirements scarce. Broad-scale or diverse (general) habitat(s) or other abiotic and/or biotic factors are used or required by the species or ecosystem, but some key requirements are scarce in the generalized range of the species or ecosystem within the area of interest. For ecosystems, environmental requirements are broad but scarce (e.g., talus or cliff forests and woodlands, alvars, many rock outcrop communities dependent more on thin, droughty soils per se than specific substrate factors).

D = Broad. Generalist or community with all key requirements common. Broad-scale or diverse (general) habitat(s) or abiotic and/or biotic factors are used or required by the species or ecosystem, with all key requirements common in the generalized range of the species or ecosystem in the area of interest. For animals, if the preferred food(s) or breeding/non-breeding microhabitat(s) become unavailable, the species switches to an alternative with no resulting decline in numbers of individuals or number of breeding attempts. For ecosystems, environmental requirements are broad and common (e.g., forests or prairies on glacial till, or forests and meadows on montane slopes).

9. Threat Severity

Within the scope (as defined spatially and temporally in assessing the scope of the Threat), severity is the level of damage to the species or ecosystem from the Threat that can reasonably be expected with continuation of current circumstances and trends

(including potential new threats) (Table 7). Note that severity of Threats is assessed within a ten-year or three-generation time frame, whichever is longer (up to 100 years).

For species, severity is usually measured as the degree of reduction of the species' population. Surrogates for adult population size (e.g., area) should be used with caution, as occupied areas, for example, will have uneven habitat suitability and uneven population density. For ecosystems, severity is typically measured as the degree of degradation or decline in integrity (of one or more key characteristics).

Extreme	Within the scope, the Threat is likely to destroy or eliminate the occurrences of an ecological community, system or species, or reduce the species population by 71–100%
Serious	Within the scope, the Threat is likely to seriously degrade/reduce the effected occurrences or habitat or, for species, to reduce the species population by 31–70%
Moderate	Within the scope, the Threat is likely to moderately degrade/reduce the effected occurrences or habitat or, for species, to reduce the species population by 11–30%
Slight	Within the scope, the Threat is likely to only slightly degrade/reduce the effected occurrences or habitat or, for species, to reduce the species population by 1–10%

10. Threat Scope

Scope is defined herein as the proportion of the species or ecosystem that can reasonably be expected to be affected (that is, subject to one or more stresses) by the Threat within ten years with continuation of current circumstances and trends (Table 6). Current circumstances and trends include both existing as well as potential new threats. The ten-year time frame can be extended for some longer-term threats, such as global warming, that need to be addressed today. For species, scope is measured as the proportion of the species' population in the area of interest (globe, nation, or subnation) affected by the Threat. For ecosystems, scope is measured as the proportion of the occupied area of interest (globe, nation, or subnation) affected by the Threat. If a species or ecosystem is evenly distributed, then the proportion of the population or area affected is equivalent to the proportion of the range extent affected by the Threat; however, if the population or area is patchily distributed, then the proportion differs from that of range extent.

Pervasive	Affects all or most (71–100%) of the total population or occurrences
Large	Affects much (31–70%) of the total population or occurrences
Restricted	Affects some (11–30%) of the total population or occurrences.
Small	Affects a small (1–10%) proportion of the total population or occurrences.

11. Intrinsic Vulnerability

Note that this factor is not used if the Threats status factor has been assessed.

Intrinsic Vulnerability is the observed, inferred, or suspected degree to which characteristics of the species or ecosystem (such as life history or behavior characteristics of species, or likelihood of regeneration or recolonization for ecosystems) make it vulnerable or resilient to natural or anthropogenic stresses or catastrophes. For ecosystems, Intrinsic Vulnerability is most readily assessed using the dominant species and vegetation structure that characterize the ecosystem, but it can also refer to ecological processes that make an ecosystem vulnerable or lack resiliency (e.g., shoreline fens along estuarine and marine coasts subject to rising sea levels).

Since geographically or ecologically disjunct or peripheral occurrences may show additional vulnerabilities not generally characteristic of a species or ecosystem, characteristics of Intrinsic Vulnerability are to be assessed for the species or ecosystem throughout the area of interest, or at least for its better occurrences. Information on population size, number of occurrences, area of occupancy, extent of occurrence, or environmental characteristics that affect resiliency should not be considered when assessing Intrinsic Vulnerability; these are addressed using other status factors.

Note that the Intrinsic Vulnerability characteristics exist independent of human influence, but may make the species or ecosystem more susceptible to disturbance by human activities. The extent and effects of current or projected extrinsic influences themselves should be addressed in the comments field of the Threats status factor.

A = Highly Vulnerable. Species is slow to mature, reproduces infrequently,

and/or has low fecundity such that populations are very slow (>20 years or five generations) to recover from decreases in abundance; or species has low dispersal capability such that extirpated populations are unlikely to become reestablished through natural recolonization (unaided by humans). Ecosystem occurrences are highly susceptible to changes in composition and structure that rarely if ever are reversed through natural processes even over substantial time periods (>100 years).

B = Moderately Vulnerable. Species exhibits moderate age of maturity, frequency of reproduction, and/or fecundity such that populations generally tend to recover from decreases in abundance over a period of several years (on the order of 5–20 years or 2–5 generations); or species has moderate dispersal capability such that extirpated populations generally become reestablished through natural recolonization (unaided by humans). Ecosystem occurrences may be susceptible to changes in composition and structure but tend to recover through natural processes given reasonable time (10–100 years).

C = Not Intrinsically Vulnerable. Species matures quickly, reproduces frequently, and/or has high fecundity such that populations recover quickly (<5 years or 2 generations) from decreases in abundance; or species has high dispersal capability such that extirpated populations soon become reestablished through natural recolonization (unaided by humans). Ecosystem occurrences are resilient or resistant to irreversible changes in composition and structure and quickly recover (within 10 years).

U = Unknown

Null = Factor not assessed

12. Other Considerations

Other considerations in determining the rank that are not apparent from the letter codes selected for the above criteria. Generally, these considerations will raise rather than lower the rank, e.g., "Never sexually reproduces" or "All occurrences are in areas under development".

References

Master, L., D. Faber-Langendoen, R. Bittman, G. A. Hammerson, B. Heidel, J. Nichols, L. Ramsay, and A. Tomaino. 2009. NatureServe Conservation Status Assessments: Factors for Assessing Extinction Risk. NatureServe, Arlington, VA.

GNAME	GCOMNAME	FAMILY	Observer	TotalNumber	Month	Day	Year	SRANK_2015	SRANK_1	NRANK	GRANK	GeneralStat	COSEWIC_ST	PROVINCIAL	SARA	DESCR_HABIT	SITE_NAME	Accuracy	SYNAME	CITATION	IDNUM
Fundulus heteroclitus	Mummichog	Cyprinodont		0	-99	0	0	2006	S3	S1?	NNR	G5	Secure	0	0	0	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033456	
Fundulus heteroclitus	Mummichog	Cyprinodont		0	-99	0	0	2006	S3	S1?	NNR	G5	Secure	0	0	0	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033454	
Fundulus heteroclitus	Mummichog	Cyprinodont		0	-99	0	0	2006	S3	S1?	NNR	G5	Secure	0	0	0	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033453	
Fundulus diaphanus	Banded Killifish	Cyprinodont		0	-99	0	0	2006	S3	S1?	N5	G5	Secure	Special Concern	Vulnerable	Special Concern	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033451	
Fundulus diaphanus	Banded Killifish	Cyprinodont		0	-99	0	0	2006	S3	S1?	N5	G5	Secure	Special Concern	Vulnerable	Special Concern	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033449	
Fundulus diaphanus	Banded Killifish	Cyprinodont		0	-99	0	0	2006	S3	S1?	N5	G5	Secure	Special Concern	Vulnerable	Special Concern	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033448	
Fundulus diaphanus	Banded Killifish	Cyprinodont		0	-99	0	0	2006	S3	S1?	N5	G5	Secure	Special Concern	Vulnerable	Special Concern	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033446	
Fundulus diaphanus	Banded Killifish	Cyprinodont		0	-99	0	0	2006	S3	S1?	N5	G5	Secure	Special Concern	Vulnerable	Special Concern	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033445	
Fundulus diaphanus	Banded Killifish	Cyprinodont		0	-99	0	0	2006	S3	S1?	N5	G5	Secure	Special Concern	Vulnerable	Special Concern	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033441	
Fundulus diaphanus	Banded Killifish	Cyprinodont		0	-99	0	0	2006	S3	S1?	N5	G5	Secure	Special Concern	Vulnerable	Special Concern	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033440	
Fundulus diaphanus	Banded Killifish	Cyprinodont		0	-99	0	0	2006	S3	S1?	N5	G5	Secure	Special Concern	Vulnerable	Special Concern	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033438	
Fundulus diaphanus	Banded Killifish	Cyprinodont		0	-99	0	0	2006	S3	S1?	N5	G5	Secure	Special Concern	Vulnerable	Special Concern	0	Flat Bay	0	Gallant. R, Old WD Fish Dmstr1033431	
Charadrius melanotos	Piping Plover	Charadriidae	Monique Vassal	2	6	2	2003	S1B,SUM	S1B	N2B	G3	At Risk	Endangered	Endangered	Endangered	0	0	0	0	Nf.Birds, Data Entry by WD mstr1028930	
Martes americana	Newfoundland Marten	Mustelidae	Robert Penton	1	3	9	1985	S3		S1	N5	G5	At Risk	reatened (NF Island)	reatened (NF Island)	reatened (NF Island)	0	Unconf	0	ST0028	

GNAME	GCOMMONNAME	OBSERVER	MONTH	DAY	YEAR	SRANK_2005	SRANK_2010	SRANK_2015	NRANK	GRANK	GENERAL_STA	FAMILY	PROV_END_A	COSEWIC	DESCR_HABIT/ACCURACY_MESYNNAME	SITE_NAME	SURVEYSITE	ACRONYMS_O	COLLECTION	SOURCES	IDNUM	EST_NF_ID
<i>Schoenoplectus tabernaemontani</i>	great bulrush, softstem bulrush, 2015: Bell, J.		6	24	1867	S2	S2	S2	N5	G5	Sensitive	Cyperaceae	0	0	1000 <i>Scirpus tabernaemontani</i>	Flat Bay Brook	Flat Bay Brook, St Gr MT	195/3953	Bouchard, A. D; SP25601	750356		
<i>Juncus nodosus</i>	knotted rush	Wells, E.D.	8	9	1972	S2	S2	S2	NNR	G5	Sensitive	Juncaceae	0	0	Rich fen along r	1000 <i>Juncus nodosus</i>	Flat Bay, rd from TCH to FFB	1648; 1836	Bouchard, A. D; SP25611	750397		
<i>Carex viridula</i> subsp. <i>brachyrhyncha</i> var. <i>el</i> long-stalked yellow sedge		Wells, D.	8	9	1972	S?	S3S4	S3S4	NNR	G5TNR	Secure	Cyperaceae	0	0	Rich Fen along i	10000 <i>Carex flava</i> var. <i>St. George's</i>	Road from TCH to Fl: CAN	0	Herbarium Data	SP55631	750262	

SPECIES RANKING & HABITAT DESCRIPTION

Common Name	Scientific Name	Provincial Designation	SRANK	COSEWIC	Preferred Habitat and Distribution
Flora					
Great Bulrush	<i>Schoenoplectus tabernaemontani</i>	Sensitive	S2	na	Grows in moist and wet habitat, and sometimes in shallow water. It can be found throughout much of the world. It has been reported from every state in the United States (including Hawaii), and from every province and territory in Canada except Nunavut.
Knotted Rush	<i>Juncus nodosus</i>	Sensitive	S2	na	Grows in wet places from freshwater to salt marsh habitat.
Long-Stalked Yellow Sedge	<i>Carex viridula</i> subsp. <i>brachyrrhyncha</i> var.	Sensitive	S3S4	na	A wetland species.
Fauna					
Mummichog	<i>Fundulus heteroclitus</i>	Vulnerable	S3	Not at risk	Found in brackish (salty) waters, usually, in saltmarsh flats, estuaries and tidal areas, especially where vegetation is submerged. Mummichogs are very tolerant of a wide range of salinities and temperature. Mummichogs are surface feeders, feeding on algae, mollusks, crustaceans and vegetation such as eel grass. Widely distributed along the Canadian Atlantic coast and south to the U.S.
Banded Killifish	<i>Fundulus diaphanus</i>	Vulnerable	S3	Special concern	There are seven known sites for the Newfoundland population of Banded Killifish. The majority of these sites are coastal, in the southwestern portion of the island, although one site is inland, in the Indian Bay watershed of northeastern Newfoundland. Banded Killifish in Newfoundland tend to frequent quiet areas of clear lakes and ponds with a muddy or sandy bottom. For spawning, they depend on warm water where there is abundant submerged aquatic vegetation and considerable detritus. Although this type of habitat is abundant in Newfoundland watersheds, the species occurs only in very restricted areas of one or two of the lakes in the watersheds it occupies. It cannot use inland waters where there are barriers to migration, such as rivers with steep gradients; however, the Banded Killifish does not occur in habitats that meet the understood criteria and that appear to be accessible to existing populations.
Piping Plover	<i>Charadrius melanotos</i>	Endangered	S1B, SUM	Endangered	A shorebird that nests on wide sand, gravel, or cobble beaches, barrier island sandspits, or peninsulas in marine coastal areas. Early successional habitat, most often free of dense vegetation, is preferred for nest sites. Feeding areas must be locally available so flightless chicks can gain access to them. This shorebird nests on sandy beaches in all four Atlantic provinces and Québec. In this province it is only found on beaches on the southwest and west coasts of Newfoundland.
Newfoundland Marten	<i>Martes americana</i>	Threatened (on the Island)	S3	Threatened	The atrata subspecies of the American Marten is found in Canada, on the island of Newfoundland and in northern Quebec and Labrador. The Newfoundland population occurs only on the island of Newfoundland. The Newfoundland population of the American Marten is currently found in three main forest patches in western Newfoundland (Little Grand Lake, Red Indian Lake and Main River) and on the east coast of Newfoundland (Terra Nova National Park of Canada). Smaller populations occur in peripheral areas near St. George's and Lobster House Hill. Newfoundland Marten prefer mature (old growth) coniferous and mixed-wood forests and coniferous forests of varying ages. Martens require dense overhead cover, coarse woody debris, shrubs, and trees with low-hanging branches.