



Crown-Indigenous Relations
and Northern Affairs Canada

Relations Couronne-Autochtones
et Affaires du Nord Canada

Gordon Lake Group of Sites Closure Report

PROJECT ID: Gordon Lake Group Remediation Project



Canada 



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Executive Summary

The Gordon Lake Group (GLG) Remediation Project encompasses the remediation of nine former mine and advanced exploration sites (the Sites) located approximately 80 kilometres (km) northeast of Yellowknife, Northwest Territories (NT). The Sites are located on Crown Land on or near Gordon Lake.

With the Sites abandoned, environmental concerns arose from materials and debris left behind. To identify and characterize areas of environmental concern and remedial actions necessary, various assessments were completed. The findings of the assessment programs were integrated into the remedial action plan (RAP) which formed the basis of the remediation program.

The remediation contract was awarded to Delta Nahanni Joint Venture (DNV) in November 2016. Stantec Consulting Ltd. (Stantec) was selected in December 2016 to provide engineering and technical support and construction contract supervision, acting as Departmental Representative (DR) at the Sites during the Project. The Mackenzie Valley Land and Water Board issued a Type A Land Use Permit in December 2016, and a Type B Water Licence in February 2017. The remediation program was implemented between 2017 and 2019. Following active remediation, Stantec was engaged to provide ongoing monitoring support at the Sites.

The Project has been completed in compliance with the 10-step Federal Contaminated Sites Action Plan (FCSAP). This Closure Report has been developed as part of Step 9 of the FCSAP process.





1.0 Type and Purpose of the Project Closure Report

The Gordon Lake Group (GLG) Remediation Project (the Project) is part of the Northern Contaminated Site Program (NCSP) which covers the management, remediation, closure and long-term monitoring of Crown Indigenous Relations and Northern Affairs Canada's (CIRNAC's) northern contaminated sites.

The Project encompasses the remediation of nine former mine and advanced exploration sites located approximately 80 kilometres (km) northeast of Yellowknife, Northwest Territories (NT). The Sites (or GLG Sites) are located on Crown Land on or near Gordon Lake (refer to Figure B1, Appendix B) and include:

- Burnt Island (mine site)
- Camlaren (mine site)
- Goodrock (mine site)
- Kidney Pond (mine site)
- Murray Lake (advanced exploration site)
- Storm Property (advanced exploration site)
- Treacy (mine site)
- Try Me (advanced exploration site)
- West Bay (mine site)

The Project has been completed in compliance with the 10-step Federal Contaminated Sites Action Plan (FCSAP) which guides federal departments, agencies and consolidated Crown corporations in the management of contaminated sites.

This Contaminated Site Remediation Project Closure Report is a part of Step 9 of the FCSAP process. The purpose of this Closure Report is to document the history of the remediation phase of the Project including field activities and outstanding components for site remedial activities. The secondary purpose of the Closure Report is to evaluate the overall performance of the Project at a high level to facilitate the sharing of project deficiencies, successes, lessons learned and best practices. This report summarizes the post-remediation site conditions at the time of report development and includes specifications for on-going maintenance and monitoring requirements.

2.0 Project Description

2.1 SITE LOCATION

The Project is within the Yellowknives Dene First Nation (YKDFN) asserted Drygeese Territory. It is also within the Akaitcho Dene First Nations Primary Use Area as set out in an overlap agreement between the Tłıchǫ First Nation and the Akaitcho Dene First Nations (INAC, 2017). The GLG Sites are also within the boundary of the Mōwhi Gogha De Nītlēè (as defined by the Tłıchǫ Agreement). The area is asserted as a traditional use area for Métis people of the Great Slave Lake area, who are represented by the Northwest Territory Métis Nation (NWTMN) and the North Slave Métis Alliance (NSMA).





The Gordon Lake area is used by hunters, trappers, and for recreational fishing. Sandy Point Lodge and several cabins owned by YKDFN members are located to the north of the Sites. Historically, trappers were active in the area, with a few trappers' cabins and camp sites being present.

There is no all-season access road through this area. During winter months, the Tibbit to Contwoyto Joint Venture winter road (JV Winter Road) is constructed and runs north-south through the centre of Gordon Lake, connecting the Ingraham Trail (Highway 4) to mines northeast of Yellowknife. At other times of the year, access is by float plane or helicopter.

2.1.1 Project Environment

2.1.1.1 Climate

The Gordon Lake area is in Northern Canada and although it is south of the Arctic Circle, it is subject to extreme weather. According to historical averages provided by the Government of Canada's Climate Normals Station Data (1981-2010) Station ID 2204100 (located in Yellowknife, NT), Gordon Lake's temperatures typically reach subzero daily averages for seven months of the year (October to April). Temperatures in this area have historically reached below -50°C in these winter months. In the remaining five months of the year, the average daily temperature is above the freezing point. The daily average temperature is below 10°C for the months of May and September, while between June and August, the daily average temperature ranges from 13-17°C. The total average annual precipitation is 288.6 millimetres (mm). Rainfall averages (approximately 170.7 mm) are higher than snowfall averages (156 centimetres (cm) or approximately 117.9 mm precipitation); snowfall can occur during any month of the year but has a very low likelihood in the months of June to August (Environment Canada, 2015a).

2.1.1.2 Hydrology

The watershed surrounding the GLG Sites is difficult to define as the area is encompassed by a vast number of smaller water bodies. The Cameron River system, which is located near the West Bay site, has been defined as the location to which Gordon Lake's water outlets. Seven months of the year, typically subzero temperatures cause the surface water to freeze. This may cause a flux in precipitation infiltration, which results in either surface water runoff or a greater accumulation on the surface (Humphries, 2005).

2.1.1.3 Surficial Geology and Mineralization

Gordon Lake lies within the Slave Province, an Archean granite-greenstone terrane located in the northwestern Canadian Shield. The supracrustal rocks of this terrane comprise sedimentary and volcanic rocks intruded by granitic bodies that have undergone multiple phased deformation events and date between 2.71 and 2.65 Ga (1x10⁹ years ago) (Mortensen *et al.*, 1988). The GLG Sites occur within the Burwash Formation, part of the Duncan Lake Group, assigned to the Yellowknife Supergroup (Bleeker and Villeneuve, 1995). The metasedimentary rocks of the Burwash Formation are dominantly low to high grade metamorphosed turbidite (metaturbite) sequences of well-preserved mudstone grading to greywacke. The GLG Sites are situated on two members of the Burwash Formation, Atl and Atm, low-grade and medium-grade metaturbites, respectively.





The Slave Province is recognized for its province-wide zoning of three major gold deposit types; gold hosted in 1) quartz veins, 2) shear zones, and 3) iron formations. Most gold deposits formed before the intrusion of the major granitic bodies (Ferguson *et al.*, 2005). The GLG Sites feature mainly gold-sulphide bearing white-smoky quartz veins hosted in metaturbites of the Burwash Formation. Sulphide minerals are associated with these deposit types.

This region was last covered by the Late Wisconsin glaciation event until about 11,000 years before present and was completely ice-free by 10,000 BP (Dyke and Prest, 1987). Paleo ice flow was generally to the southwest (Kerr, 1990) as apparent by orientation of drumlins and eskers (Othof *et al.*, 2014).

Retreating ice-sheets deposited fine-grained glaciolacustrine sediments 320-350 metres (m) below elevation in the Great Bear and Great Slave basins. In the Gordon Lake area, re-worked glacial and glaciofluvial sediments are the dominant surficial material with till thickness and distribution increasing westerly and northwesterly. Till thickness varies but is generally greater than 2 m occurring as silt to gravel blankets, following bedrock topography, and may include patches of till veneer or drumlinoids.

With respect to permafrost, the Gordon Lake area is located within the extensive discontinuous permafrost zone, where permafrost can be found on 50% to 90% of the land (Department of Energy, Mines and Resources Canada, 1995). Within the extensive discontinuous permafrost zone, ground ice content in the upper 10 m of ground is believed to range from low to medium (<10% to approximately 20% by volume) and consist mainly of frozen pore water (i.e., interstitial ice), ice lenses and ice veins (i.e., segregated ice and reticulated ice). Ice wedges, which are a type of patterned ground resulting from thermal contraction and cracking of the ground surface (ACGR, 1988), might occur locally.

The distribution of the permafrost in the area is related to several interconnected factors such as the local climate, ground surface topography, material types and textures, vegetation coverage and drainage conditions. Similarly, the variation in the amount of ground ice within the permafrost is found to be directly related to factors such as the nature of the surficial deposits and characteristics of the local terrain.

No data is currently available on the local distribution of the permafrost in the Gordon Lake area; however, knowledge of northern environments suggests that peat bogs and fine-grained deposits (e.g., silty to clayey lacustrine and/or glaciolacustrine sediments) are likely the only terrain units containing permafrost in the area. Bedrock outcrops and well- to rapidly-drained, coarse-grained deposits such as till and glaciofluvial deposits are likely free of permafrost. Where permafrost is present, the active layer (i.e., the portion of soil that thaws each summer and refreezes in the winter) would typically range between 0.5 m and 1.5 m deep and would vary greatly depending on local ground conditions.

2.1.1.4 Bedrock Geology

Most of the bedrock in the Gordon Lake Area is Archean (over 2.5 billion years old) or Paleoproterozoic (1.6 – 2.5 billion years old) in age (Ecosystem Classification Group [ECG], 2008). The bedrock surface is often highly fractured (frost shattered) and subject to extensive frost heave. The borrow assessment completed at the GLG Sites identified discontinuous veneers of till and glaciofluvial deposits. The till veneers generally consist of sandy material with variable amounts of angular to sub-rounded gravel to boulder size fragments. The glaciofluvial material, mainly eskers and/or outwash deposits, are





predominantly sandy material, with localized gravel. Coarse fragments were generally located at the surface (i.e. 0 to 30 cm in depth) and their frequency decreases rapidly with depth. The material is well sorted and contains very low amounts of fines (i.e. silt and clays).

2.1.1.5 Biological Environment

The GLG Sites are located northwest of the East Arm of Great Slave Lake, which falls into the Northwestern Boreal Uplands of Canada (ECG, 2008). The GLG Sites are within the Taiga Shield - Great Slave Upland Low Subarctic Ecoregion of NT, which is characterized by interconnected lakes, low-relief, glacially polished bedrock plateaus with thin silt to gravel till cover, black-spruce-lichen woodlands, peat bogs and large forest fire burnt areas (ECG, 2008; Olthof *et. al.*, 2014).

This region is within the tree-line to tundra transition and features discontinuous permafrost as well as prominent examples (i.e. Zenith Island) of frost-jacking throughout most of the Sites. This Ecoregion is known for having a bedrock-dominated landscape that is sloped towards the southwest, which supports scattered black spruce woodland growth on the bedrock outcrops. In areas of till veneers and blankets, it is common to have dense black spruce forests occur. In areas of outwash, white spruce woodlands are common and Jack pine can be found in areas of lower elevation (ECG, 2008).

2.1.2 Site Description

The GLG Sites are now unoccupied but have a long history with some sites dating back to the 1930s. Activities ranged from open-pit mining to exploratory drilling and the activities were generally done independently between the Sites. Mining and exploration activity in this area was related to gold and tungsten and was undertaken by various owners and companies through the years. Some sites had exploration shafts only while others had mining, milling and processing on-site. With the Sites abandoned, environmental concerns arose from materials and debris left on-site.

The historical significance to mining heritage has been discussed with the Yellowknife Historical Society (formerly the NWT Mining Heritage Society) and the Prince of Wales Northern Heritage Centre. Archeological and traditional knowledge studies were conducted in the area, in consultation with these groups and the YKDFN.

All nine Sites fall under the custodial responsibility of CIRNAC, and remediation of the Sites was coordinated by CIRNAC. A summary of the GLG Sites is provided in Table 1.





Table 1 Summary of the GLG Sites

	Burnt Island	Camlaren	Goodrock	Kidney Pond	Murray	Storm	Treacy	Try Me	West Bay
Type of Site	Mine Site	Mine Site	Mine Site	Mine Site	Advanced Exploration Site	Advanced Exploration Site	Mine Site	Advanced Exploration Site	Mine Site
FCSI No. of Contaminated Site	23547	162	351	24120	24158	24145	24141	24155	C1037001
Exact Site Name as listed in IDEA	Burnt Island Mine Site	Camlaren Mine	Goodrock Mine	Kidney Pond / Knights Bay	Murray Lake Exploration Site	Storm Property	Treacy Mine	Try Me Exploration Site	West Bay / Black Ridge
Alternative Site Name	N/A	N/A	N/A	Knight Bay	N/A	N/A	N/A	N/A	Blackridge Mine
Reporting Organization	CIRNAC	CIRNAC	CIRNAC	CIRNAC	CIRNAC	CIRNAC	CIRNAC	CIRNAC	CIRNAC
Legal description or metres and bounds	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Approximate Site Area (ha)	12.9	12	2.67	10	3.2	2.4	0.5	2.5	2.5
Centre of Site Coordinates Lat/Long (degrees, min, sec)	63°3'49" N 113°10'6" W	62°59'8" N 113°12'19" W	63°01'51" N 113°08'1" W	62°57'20" N 113°20'9" W	63°00'45" N 113°24'30" W	63°00'21" N 113°07'29" W	63°56'28" N 113°20'14" W	63°04'09" N 113°28'32" W	62°55'1" N 113°14'4" W
Centre of Site Coordinates UTM	6994531m N 390423m E	6985896m N 388258m E	6990816m N 392056m E	6982742m N 381430m E	6989573m N 278251m E	6988017m N 392413m E	6981182m N 381894m E	6995654m N 374744m E	6978287m N 386523m E
NWT Contaminated Site Database Number	220	205	466	474	490	471	475	488	221/302
Notes: FCSI = Federal Contaminated Sites Inventory IDEA = Interdepartmental Data Exchange Application (References: Stantec, 2016a; Stantec, 2018a; Stantec, 2019a)									





2.1.3 Environmental Concerns

Contamination varied between the GLG Sites but generally included impacted soil, physical hazards (including mine openings, underground workings, trenches, abandoned infrastructure, and abandoned site buildings), waste rock, tailings, and hazardous and non-hazardous waste. Impacts to soil included petroleum hydrocarbon fractions (PHC F1, F2, F3), metals, or both (i.e. co-mingled). The following contaminants of concern (COCs) were identified at the GLG Sites:

- Arsenic
- Cobalt
- Lead
- Mercury, inorganic
- PHC F1
- PHC F2
- PHC F3

The sections below provide a brief site history and details on the environmental concerns that were identified for each of the GLG Sites, as summarized by SLR in previous reports. A summary of all sites is provided in Table 2, in Section 2.1.3.10.

2.1.3.1 Burnt Island

Burnt Island (Figure B1.1, Appendix B) is a former gold mine located on Gordon Lake, near the central portion of the lake towards the east side. Initial mineral exploration activities commenced in the late 1930s and continued periodically until 1990 when decommissioning activities started. Equipment and structures previously located on-site during operation were removed during decommissioning of the site in 1993 (SLR, 2013a). Burnt Island is divided into several areas including:

- Knutsen Camp (Figure B1.2, Appendix B)
- Shaft Area (Figure B1.3, Appendix B)
- Waste Rock Area (Figure B1.4, Appendix B)
- Old Saw Mill Area (Figure B1.5, Appendix B)
- Old Mill Area (Figure B1.6, Appendix B)
- Tailings Impoundment Area (Figure B1.7, Appendix B)

Based on previous assessments, several components were identified for remediation. The Knutsen Camp included a sump, a dock, several small cabins and building footprints, burn pits, and non-hazardous debris including tin can dumps and drill core. The Shaft Area included a shaft, a headframe, a pipe rack, a core rack, burn pits, drill rig (brakes containing asbestos material), waste rock and non-hazardous debris including wood and metal debris. The Waste Rock Area included waste rock piles, and a portal. The Old Saw Mill Area contained non-hazardous debris including a tin can dump, and wood and metal debris. The Old Mill Area included mill buildings, trenches, a burn pit, and waste rock piles. An Indigenous grave site is also present at the Knutsen Camp.





2.1.3.2 Camlaren

Camlaren (Figure B2.1, Appendix B) is located within Gordon Lake on Muir Island and includes the northern tip of Zenith Island, located 1.5 km southwest of Muir Island. A former gold mine, initial mineral exploration activities commenced at Muir and Zenith Islands in the late 1930s, after mineral claims on the islands were staked in 1936. Between the late 1930s and the early 1960s, exploration on the islands was intermittent. Activities on the islands continued until 1982, when the site was decommissioned. Heavy equipment, structures, and bulk fuel storage tanks previously located at the site during its operation were removed during the decommissioning of the site in 1982 (SLR, 2013b). Camlaren is divided into several areas including:

- Mine Area North and Mine Area South (both located on Muir Island)
- North Cabin
- Zenith Island

Remedial work was identified for each of these areas. The Mine Areas (Figures B2.2 and BA2.3, Appendix B) consisted of various items from mining activities, including a tailings containment area (TCA), collapsed structures, a wooden culvert, a trench, an old chimney, vent raise and pipe vents, mill pad, hoist pad, mine shaft cap, old dock, several burn pits, concrete divide, drums, a fuel tank, non-hazardous debris including crucibles, wood debris, metal debris, hoses, and polyvinyl chloride (PVC) piping and hazardous waste including burned batteries. The North Cabin area (Figure B2.4, Appendix B) consisted of remnants including remains of former structures, drums, burn pits and solid non-hazardous debris including wood debris, metal debris, crucibles, tin cans, drill cores, and stone stove, and hazardous waste including burned batteries. Zenith Island (Figure B2.5, Appendix B) consisted of multiple trenches, waste rock piles, a shaft, and non-hazardous debris including wood debris, metal debris, tin cans, and drill rods.

2.1.3.3 Goodrock

Goodrock (Figure B3.1, Appendix B) is located on the eastern shore of Gordon Lake. Initial mineral exploration activities commenced at Goodrock in the late 1930s and continued into the late 1970s, when exploration activities for gold and tungsten were undertaken at the site. Although no recorded mining activities occurred recently, a habitable cabin remains on the site and is part of the Goodrock Recreational Lease. A second habitable cabin is currently used by the lease holder for storage purposes. Fire swept through the area in 1998 and suspected fire retardant was observed in localized areas of the site during a 2009 site investigation (SLR, 2013c). Goodrock is divided into two areas: the Camp Area and the Mill Area.

The Camp Area (Figure B3.2, Appendix B) can be accessed via Gordon Lake, while the Mill Area (Figure B3.3, Appendix B) is located inland. Prior to remediation, the Camp Area included trenches, waste rock, an incinerator, drums, non-hazardous debris including tin cans, drill core, wood and metal debris and hazardous materials including batteries. The Mill Area included a north mine shaft, south pit, trenches, waste rock, crusher foundation, and non-hazardous debris including tin cans, drill cores, wood debris, metal debris, pipes, and crucibles.





2.1.3.4 Kidney Pond

Kidney Pond (Figure B4.1, Appendix B) is located on the southwestern portion of Gordon Lake (within Knight Bay). Historical gold mining activities at Kidney Pond commenced in the late 1930s and continued periodically until 2003 when, after being re-staked, work halted. No processing of mined ore occurred on-site, and therefore no tailings were observed (SLR, 2013d). The Kidney Pond site is divided into several areas including:

- 1983 Camp
- Exploration Camp
- 1939 Camp
- Southeast Portal Area
- Portal Area
- Kidney Pond Area

Before remediation took place, the 1983 Camp area (Figure B4.2, Appendix B) included non-hazardous waste (including a wood platform, latrine, pipes, burn pits, crucibles and metal jars), hazardous waste (including battery remnants) and a wooden dock. The Exploration Camp area (Figure B4.3, Appendix B) included non-hazardous waste (including a cabin footprint, spent blasting caps, core boxes and cans), trenches and scattered waste rock. The 1939 Camp area (Figure B4.4, Appendix B) included non-hazardous waste (including a wood cabin with walls intact, former building, building footprint, core shack, drill core, core boxes, wood platform and cans). The Southeast Portal Area contained trenches. The Portal Area (Figure B4.5, Appendix B) included non-hazardous waste (a burn pit, core racks, drums, crucibles, blasting caps, and an airtight stove), hazardous waste (including a battery), trenches, a portal and a large waste rock area. The Kidney Pond Area (Figure B4.6, Appendix B) contained non-hazardous waste (including a burn pit, cabin footprint, core racks and metal pipe), waste rock, trenches and a dock.

2.1.3.5 Murray Lake

Murray Lake (Figure B5.1, Appendix B) is situated approximately 8 km west of Gordon Lake. Between the late 1930s and 1940s, significant gold exploration activities were undertaken at the site. Exploration activities continued intermittently until 2008, after which no further mining works were reported. Fire reportedly swept through the site area around 1995 (Columbia, 2013a). The Murray Lake site is divided into two areas: 1938/2008 Camp and the Trench Area.

Prior to remediation, the site consisted of various remaining items from the historical mining activities. The 1938/2008 Camp area (Figure B5.2, Appendix B) included non-hazardous waste (including structure remains, burnt tent frames, sumps, wood waste and tin cans). The Trench Area (Figure B5.3, Appendix B) is a series of small areas containing exploration trenches and included non-hazardous waste (including a burnt tent frame, structure remnants and various waste piles), a main shaft, a deep trench/shaft, several trenches and scattered waste rock.

2.1.3.6 Storm Property

Storm Property (Figure B6.1, Appendix B) is located on the east side of Gordon Lake. Initial gold exploration commenced in the early 1940s and once exploration commenced, a profitable amount of





tungsten ore was found. Further mining activities occurring at the site in the late 1970s into the early 1980s, when they were discontinued (WESA, 2010). Storm Property is divided into two areas: the Shaft Area and the Camp Area.

Prior to remedial activities, the Shaft Area (Figure B6.2, Appendix B) included trenches, a North and South Shaft, waste rock, and non-hazardous debris including drill core, metal spool, and wood and metal debris. The Camp Area (Figure B6.3, Appendix B) encompassed non-hazardous debris (including tin can dumps, drill core, metal and wood debris), and hazardous materials such as batteries.

2.1.3.7 Treacy

Treacy (Figure B7.1, Appendix B) is located on the southwestern portion of Gordon Lake, within Knight Bay. Mineral exploration activities (for gold and sulphides) commenced at Treacy Mine in the mid-1940s, after the initial mineral claims on the islands were staked in 1945. Ore processing occurred at Treacy between 1951 and 1953, after which there was a decline in site activity until the 1980s. Activities on the islands continued until the early 2000s (SLR, 2013e). Treacy is divided into two areas, both located on the shore of Gordon Lake: the Mill Area and the Camp Area.

Prior to remediation, the Mill Area (Figure B7.2, Appendix B) included non-hazardous waste (mill remains, a burn pit and garbage), hazardous waste (including lead-based paint on scattered wood debris), trenches (including East Trench and West Trench), tailings and waste rock. The Camp Area (Figure B7.3, Appendix B) contained non-hazardous waste (including structure remains, building pad, drums, can dumps and stove remnants).

2.1.3.8 Try Me

Try Me (Figure B8.1, Appendix B) is situated near the shore of Mac Lake, which is roughly 12 km west of Gordon Lake. Mineral exploration activities commenced at Try Me in the late 1930s. Initial mineral claims were staked in 1938, with the focus on the gold-bearing quartz vein. Between the early 1940s and the late 1980s, no gold exploration activities were undertaken at the site. Exploration activities continued in 1989 but only for a short time after which no further mining works were conducted. Fire reportedly swept through the site area in the late 1990s (Columbia, 2013b). The site is divided into two main areas including: the Main Camp and the Western Camp.

Based on previous assessments, prior to remediation, the Main Camp Area (Figure B8.2, Appendix B) included a mine shaft, trenches, waste rock, structure remains, core racks, drums, former dock, rail spur, hazardous waste (batteries), and non-hazardous debris including wood and metal debris. The Western Camp (Figure B8.3, Appendix B) included non-hazardous debris such as wood and metal debris, drums, and tin cans, and hazardous materials (batteries).

2.1.3.9 West Bay

West Bay (Figure B9.1, Appendix B) staked its first claim in the mid-1940s and began mining for gold in an open pit from 1947 to 1948. Site activities ceased until the early 1980s, at which time significant gold





exploration activities resumed. Further mine activities continued in the early 1990s, with no reported activity after 1991 (EBA, 2009).

The site consists of the South Area (Figure B9.2, Appendix B). Prior to remediation, West Bay contained non-hazardous waste (including structure remains, core racks, drums and metals cans), hazardous waste (including batteries), a dock, trenches, an open pit, tailings and two large waste rock areas.

2.1.3.10 Summary

A summary of past activities, sources of contamination, contaminants of concern, as well as other important considerations for each of the GLG Sites is provided in Table 2.





Table 2 Summary of Environmental Concerns

	Burnt Island Mine Site	Camlaren Mine Site	Goodrock Mine Site	Kidney Pond Mine Site	Murray Lake Advanced Exploration Site	Storm Property Advanced Exploration Site	Treacy Mine Site	Try Me Advanced Exploration Site	West Bay Mine Site
Summary of past activities	Former gold mine. Exploration from 1930s to 1990. Decommissioned in early 1990s.	Former gold mine. Exploration was intermittent in late 1930s and 1960s. Activities continued until decommissioning in 1982.	Exploration for gold tungsten from late 1930s to 1970s. Fire swept through area in 1998. Some habitable cabins still on-site.	Gold mining activities occurred from late 1930s until 2003. Mined ore was not processed on-site, and no tailings were observed.	Significant gold exploration activities in 1930s and 1940s. Some intermittent exploration occurred until 2008. Fire in area around 1995.	Gold exploration started in 1940s; profitable amount of tungsten ore was found. Further mining activity occurred in 1970s and 1980s, then discontinued.	Exploration for gold and sulphides in mid-1940s. Processing of ore in 1951-1953 followed by decline in activity until 1980s. Activities continued until early 2000s.	Mineral exploration in late 1930s (focus on gold). From 1940s to 1980s: no exploration activities (except some in 1989). Fire swept through area in 1990s.	Gold mining (open pit) from 1947-48. Gold ore processed using mercury amalgamation. No activity until 1980s, when gold exploration resumed. Further activity in early 1990s.
Sources of contamination	<ul style="list-style-type: none">• Impacted soil• Waste rock• Tailings• Hazardous waste• Other debris	<ul style="list-style-type: none">• Impacted soil• Waste rock• Tailings• Hazardous waste• Other debris	<ul style="list-style-type: none">• Impacted soil• Waste rock• Hazardous waste• Other debris	<ul style="list-style-type: none">• Impacted soil• Waste rock• Hazardous waste• Other debris	<ul style="list-style-type: none">• Impacted soil• Waste rock• Other debris	<ul style="list-style-type: none">• Impacted soil• Waste rock• Hazardous waste• Other debris	<ul style="list-style-type: none">• Impacted soil• Waste rock• Tailings• Hazardous waste• Other debris	<ul style="list-style-type: none">• Hazardous waste• Other debris	<ul style="list-style-type: none">• Impacted soil• Waste rock• Tailings• Hazardous waste• Other debris
Contaminants of Concern	<ul style="list-style-type: none">• Lead• Mercury (inorganic)• PHC F2• PHC F3	<ul style="list-style-type: none">• Arsenic• Cobalt• Lead• Metals hotspot*• PHC F1• PHC F2• PHC F3	<ul style="list-style-type: none">• Metals hotspot*	<ul style="list-style-type: none">• Arsenic• Metals hotspot*• PHC F1• PHC F2• PHC F3	<ul style="list-style-type: none">• Arsenic	<ul style="list-style-type: none">• Arsenic• Metals hotspot*	<ul style="list-style-type: none">• Arsenic• PHC F2• PHC F3		<ul style="list-style-type: none">• Arsenic• Lead• Mercury• PHC F1• PHC F2• PHC F3
Affected media	Soil	Soil	Soil	Soil	Soil	Soil	Soil		Soil
Is site impacted by another site	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Degree to which aquatic environment / receptors are present	Site is located on an island on Gordon Lake (fish bearing).	Site is located on two islands (Muir Island and Zenith Island) on Gordon Lake (fish bearing).	Site is located proximal to Gordon Lake (fish bearing).	Site is located proximal to Gordon Lake (fish bearing), Middle Pond and Sentinel Lake.	Site is located proximal to Murray Lake (fish bearing)	Site is located proximal to Gordon Lake (fish bearing)	Site is located proximal to Gordon Lake (fish bearing).	Site is located proximal to MacDonald Lake (fish bearing)	Site is located proximal to Gordon Lake (fish bearing).
Physical Risks	<ul style="list-style-type: none">• Mine Shaft• Portal• Sumps	<ul style="list-style-type: none">• Underground workings• Crown Pillar• Zenith Shaft	<ul style="list-style-type: none">• North Mine Shaft• South Pit and adjacent Trench	<ul style="list-style-type: none">• Portal	<ul style="list-style-type: none">• Main Shaft• Deep Trench/Shaft• Sump	<ul style="list-style-type: none">• North and South Mine Shafts	<ul style="list-style-type: none">• East and West Trenches	<ul style="list-style-type: none">• Mine Shaft	<ul style="list-style-type: none">• Open Pit
Current / proposed development plan for site(s)	N/A	The YKDFN purchased the Zenith Island camp from DNV which it plans to use as a base for traditional land-based activities.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<div>Notes: F1, F2, F3 – PHC Fractions 1-3 *Metals “hotspot” as identified in the Human Heath and Ecological Risk Assessment (HHERA) completed by SLR (SLR, 2014) References: EBA, 2009; WESA, 2010; Columbia, 2013a,b; SLR 2013a-e; SLR, 2014, Stantec, 2015a; Stantec, 2016a</div>									





2.1.4 National Classification System for Contaminated Sites

As per the FCSAP 10-step process, the GLG Sites were scored using CCME's NCSCS. The NCSCS score and class were determined in Steps 4 and 6 of the FCSAP process for each of the GLG Sites and are presented in Table 3. No other classification scores were used for the Project.

Table 3 Summary of CCME NCSCS Scores

FCSAP Step	Site								
	Burnt Island	Camlaren	Goodrock	Kidney Pond	Murray Lake	Storm Property	Treacy	Try Me	West Bay
Step 4 Classify Site	78.8 (Class 1)	79.1 (Class 1)	75.7 (Class 1)	78.1 (Class 1)	52.7 (Class 2)	59.1 (Class 2)	72.2 (Class 1)	56.2 (Class 2)	76 (Class 1)
Step 6 Re-classify Site	75.4 (Class 1)	86.5 (Class 1)	82.9 (Class 1)	89.1 (Class 1)	N/A	N/A	66.2 (Class 2)	N/A	83.5 (Class 1)

2.2 PROJECT BACKGROUND

All the Sites are unoccupied, but Kidney Pond has an active mineral lease (#3248) which expires in 2030 for lease holder Silver Pursuit Resources Ltd.

With the Sites abandoned, environmental concerns arose from materials and debris left on the Sites (e.g. impacted soil, waste rock/tailings, various physical hazards, etc.). The main concern from a human health perspective was the accessibility of the Sites and the risk of exposure to environmental concerns and physical hazards at the Sites. The JV Winter Road enables access to many of these Sites each year. There are interested groups nearby such as Sandy Point Lodge, a Recreation Lease holder, and mineral rights holders (Indigenous and Northern Affairs Canada [INAC], 2017). Guests from Sandy Point Lodge may occasionally visit the Sites, as well as people pursuing recreational and traditional wilderness practices (INAC, 2017).

To identify and characterize the Areas of Environmental Concern (AECs) at the Sites and the remedial actions necessary, environmental site assessments (ESAs) were completed to assess the environmental quality of soil, sediment, and surface water. Risk assessments were completed to determine if the COCs posed unacceptable risks to human and/or ecological receptors. The findings of the ESA and risk assessment programs were integrated into the remedial action plan (RAP) which formed the basis of the remediation program (CIRNAC, 2019).

Physical hazards at the sites included shafts, trenches and the open pit at West Bay. Most of the contamination stemmed from metal and PHC impacted soil, tailings, and potentially acid generating (PAG) waste rock. Excavation areas were identified in the Gap Assessment Report (Stantec 2016c).

The remediation contract was tendered in August 2016 and was awarded to Delta Nahanni Joint Venture (DNV) in November 2016. Stantec Consulting Ltd. (Stantec) was selected in December 2016 to provide engineering and technical support and construction contract supervision, acting as Departmental





Representative (DR) at the Sites during the Project. Following active remediation, Stantec was engaged to provide ongoing monitoring support at the Sites.

The Mackenzie Valley Land and Water Board (MVLWB) regulates the use of land and water in NT through the issuance of Land Use Permits (LUPs) and Water Licences (WLs). A Type "A" LUP was received in December 2016 and the Type "B" WL in February 2017. Due to a request for compensation by a third-party stakeholder during the MVLWB review period, issuance of the Type "B" WL required to carry-out work, major mobilization and earthworks was delayed from Winter 2017 to Winter 2018. Light mobilization via winter road was carried out in late March/early April 2017. A camp was constructed at Zenith Island to support the Summer and Winter spur road construction programs.

The Summer 2017 program focused on debris consolidation, impacted soils excavation and consolidation at West Bay Mine, and assessments by DNV to confirm site conditions (borrow source and site access reconnaissance, validation of impacted soil volumes, mine opening closure assessments, etc.). Hazardous waste was also collected in 2017 and disposed of at an approved facility (INAC, 2018).

Mobilization via the JV Winter Road occurred in January 2018. Spur roads off the main JV Winter Road were constructed to Camlaren, Kidney Pond, West Bay, Treacy, Burnt Island and the Zenith camp. Borrow source GD-37 near the West Bay site was used to quarry material required for the Project. Non-hazardous waste from all nine Sites was transported via spur roads and placed in the TCA at Camlaren. This facility was upgraded to a Tailings and Soil Containment Area (TSCA) constructed as part of the Project and was used for disposal of impacted material (soil, tailings, waste rock) and non-hazardous debris (metal, wood, etc.) from the Sites (CIRNAC, 2019; Stantec, 2019b). Portal openings at Burnt Island and Kidney Pond were backfilled. Sand covers were placed on the tailings deposit on Burnt Island as well as the former waste rock area at Kidney Pond.

The Summer 2018 program (June – September) consisted of transportation of consolidated waste from sites, finalization of TSCA construction, sealing of remaining mine openings, revegetation in areas of high erosion risk and construction of a fence around the open pit at West Bay (CIRNAC, 2019; Stantec, 2019b). A timeline of the Project is provided in Table 4.

The following parties are responsible for the GLG Project:

- CIRNAC: Site Custodian, landowner, WL and LUP holder for the Sites
- Public Services and Procurement Canada (PSPC): Project Manager for the Project, on behalf of CIRNAC
- YKDFN, NWTMN and the NSMA: Asserted traditional rights holders.





Table 4 Timeline of the GLG Remediation Project

Dates	Phase	Brief Description of Major Activities
1993-2013	Assessment	<ul style="list-style-type: none"> Sites were identified Phase I, II and/or III ESAs were completed at each of the Sites Sites were classified under the CCME NCSCS as Class 1 (Camlaren, Kidney Pond, Burnt Island, Treacy, Goodrock) or Class 2 (Murray, Try Me, Storm)
2013-2015		<ul style="list-style-type: none"> HHERA was completed Site-Specific Remedial Targets (SSRTs) were developed for remediation planning (refer to Section 3.2.1.2) Various other assessments were completed (i.e. Borrow Source assessments, Archeological Impact Assessments (AIA), and Traditional Knowledge (TK) Study)
2016	Assessment / Consultation / RAP Development / Permitting	<ul style="list-style-type: none"> Supplemental Site Assessment was conducted RAP for all nine sites was finalized Remediation contract tendered in August; awarded to DNV in November DR (Stantec) selected in December Received LUP in December
Feb – Apr 2017	Mobilization	<ul style="list-style-type: none"> Received WL and Quarry Permit in February Light mobilization via Winter Road in late March/early April
Aug – Oct 2017	Mobilization / Construction / Remediation	<ul style="list-style-type: none"> Establishment of temporary camp at Zenith Island Upgrades to make Zenith camp suitable for winter use Assessment of borrow sources GD-18, GD-37, and GD-45 Consolidation of non-hazardous waste at Burnt Island, Camlaren (including Zenith), Goodrock, Kidney Pond, Murray, Treacy, and West Bay Burning of wood debris at Burnt Island, Camlaren (including Zenith), Kidney Pond and West Bay Hazardous waste remediation by BluMetric Environmental Inc. Excavation of impacted material at West Bay
Jan – Mar 2018	Construction / Remediation	<ul style="list-style-type: none"> Establishment/maintenance of permanent camp at Zenith Clearing, grubbing and burning of brush for access Winter road construction and maintenance Development/operation/closeout of borrow sources (GD-37 and GD-45) Consolidation of non-hazardous waste Burning of wood debris at GD-37 and Camlaren Placement of material over tailings at Burnt Island Excavation of impacted material from Burnt Island, Camlaren, Kidney Pond, and Treacy and transportation to the TSCA Backfilling of excavations at various Sites Backfilling and sealing of mine portals at Burnt Island and Kidney Pond Installation of erosion control (wattles) at Kidney Pond, Treacy, Camlaren Placement of geofabric filter cloth and sand fill over portion of TSCA Demobilization activities
April / May 2018	Care and Maintenance / Monitoring	<ul style="list-style-type: none"> Ongoing care and maintenance of camp at Zenith Security presence throughout GLG Sites Sediment and erosion control inspections Freshet monitoring Regrading of stockpiles





Table 4 Timeline of the GLG Remediation Project

Dates	Phase	Brief Description of Major Activities
June – Sept 2018	Construction / Remediation	<ul style="list-style-type: none">• Additional camp upgrades as required• Consolidation of non-hazardous waste from Burnt Island, Camlaren, Goodrock, Kidney Pond, Murray, Storm, Treacy, Try Me and West Bay at TSCA• Burning of wood debris at Burnt Island and Camlaren• Placement of sand cover over GOO_HS_01• Excavation of impacted material at Burnt Island, Camlaren, Kidney Pond, West Bay• Surveillance Network Program (SNP) sampling*• Installation of fence around pit at West Bay• Mine shaft closures at Burnt Island, Goodrock, and Storm• Construction of the TSCA and installation of instrumentation• Completion of As-Builts and Final Surveys at TSCA• Removal of wattles at Camlaren and Kidney Pond• Regrading of excavated areas• Revegetation work at Camlaren, Kidney Pond, Treacy• Preparation for winter demobilization
March / April 2019	Demobilization	<ul style="list-style-type: none">• Ice road construction/maintenance• Site demobilization (Zenith and Camlaren)• General clean-up
July 2019	Demobilization / Monitoring	<ul style="list-style-type: none">• General clean up• Camp Assessment• SNP sampling• Long Term Monitoring (LTM) monitoring and sampling
September 2019	Monitoring	<ul style="list-style-type: none">• SNP sampling• LTM monitoring and sampling
2019 -2024	Long-Term Monitoring (LTM)	<ul style="list-style-type: none">• Implementation of the Phase I LTM Plan
2024		<ul style="list-style-type: none">• Assessment of the Phase I LTM Plan results and development of the Phase II LTM Plan
2025-beyond		<ul style="list-style-type: none">• Implementation of the Phase II LTM Plan
Notes: *A requirement of the WL References: CIRNAC, 2018 and 2019; Stantec, 2018a and 2019b		

2.3 PROJECT OBJECTIVES

As described in the RAP, the following remedial goals were considered when assessing remedial options for the GLG Sites (Stantec, 2016a):

- Reduce, and where possible eliminate, the risk to the environment and human health,
- Effectively reduce federal financial liability associated with these Sites using cost effective solutions,
- Reduce residual risks with the goal of site closure,
- Promote socio-economic benefits to Indigenous people and other northerners, and
- Balance the consequential impacts of remediation with the benefits of reducing human and environmental risk.





3.0 Remediation Activities

3.1 PRE-SITE REMEDIATION CONSTRUCTION ACTIVITIES

This section provides details of assessment and remedial action / risk management planning actions undertaken for Steps 1 – 7 of the FCSAP ten-step process and where these are documented.

Identification and historical reviews were carried out between 1993 and 2007. Phase II ESAs were conducted on all nine sites between 2009 and 2013. Following the initial testing program (FCSAP Step 3), the Sites were scored using the CCME NCSCS system (FCSAP Step 4). Six of the Sites (Burnt Island, Camlaren, Goodrock, Kidney Pond, Treacy and West Bay) were determined to be Class 1 and three sites (Murray, Try Me and Storm) were determined to be Class 2 (see Table 3). As per FCSAP Step 5, Phase III ESAs were conducted between 2010 and 2013 at the six sites scored as Class 1. The Sites were then reclassified (FCSAP Step 6).

Supplementary assessments were completed between 2014 and 2017 (Table 5). An HHERA was completed in 2014 and SSRTs were developed for remediation planning (SLR, 2014). The RAP (incorporating all nine sites) was finalized in March 2016 following engagement with the YKDFN (Stantec, 2016a). Borrow source assessments, an AIA, and a TK Study were completed between 2015 and 2016 (Stantec, 2015; Points West, 2016; Stantec 2017a; YKDFN, 2015). A supplemental site assessment program was conducted in the summer of 2016 to address gaps within the HHERA and Phase III ESAs (Stantec, 2016b & 2017b).

The RAP recommended that the existing TCA at Camlaren be upgraded to a TSCA, and a Waste Rock and Soil Containment Area (WRSCA) be constructed at Kidney Pond. In February 2017, the GLG Design Basis Report (DBR) was issued, which built on the conceptual remedial designs in the RAP.

Table 5 provides a summary of documents which record the activities that occurred between 1993 and 2017. These documents are included in the project document register (refer to Section 9.0).



**Table 5 Summary of Assessment and Remediation / Risk Management Action Planning**

FCSAP Step	Actions	Year	Documents
1: Identify suspect site 2: Historical review	Phase I ESA	1993	Thurber Environmental Ltd. Review and Summary of Assessment & Remediation Options for Abandoned Mine Sites, NT, Volume II
		2006	DIAND Water Resources. Abandoned Mines in the Yellowknife Area 2004 Report, (Beaulieu, Burnt Island, Camlaren, Hidden, Ruth, Thompson/Lundmark and West Bay Mines)
		2007	Dillon Consulting. Phase I ESA West Bay/Black Ridge Mine. SM 302
3: Initial testing program 4: Classify site using the CCME National Classification System (NCS)	Phase II ESA	2009	EBA Engineering Consulting Ltd. Phase II ESA West Bay/Black Ridge Mine. SM 302
		2010	WESA. Phase II ESA. SM220-Burnt Island
		2010	WESA. Phase II ESA. SM205-Camlaren
		2010	WESA. Phase II ESA. SM466-Goodrock Mine.
		2010	WESA. Phase II ESA. SM474-Kidney Pond/Knight Bay
		2010	WESA. Phase II ESA. SM471-Storm Property
		2010	WESA. Phase II ESA. SM475-Treacy Mine
		2013	Columbia Environmental. Phase I/II ESA. Murray Lake Property SM490
		2013	Colombia Environmental. Phase I/II ESA. Try Me Property (SM488)
5: Detailed testing program 6: Re-classify site using the CCME NCS	Phase III ESA	2010	AECOM. Phase III ESA. West Bay Mine
		2013	SLR Consulting. Burnt Island Mine Phase III ESA.
		2013	SLR Consulting. Camlaren Mine Phase III ESA
		2013	SLR Consulting. Goodrock Mine Phase III ESA
		2013	SLR Consulting. Kidney Pond Mine Phase III ESA
		2013	SLR Consulting Ltd. Treacy Mine Phase III ESA
7: Develop remediation/risk management (R/RM) strategy	Development of R/RM strategy	2014	SLR Consulting. Human Health and Ecological Risk Assessment. Gordon Lake Mine Sites
		2014	Stantec. Technical Review of HHERA for Nine Former Mine Sites, Gordon Lake
		2014	Stantec. Review of SSRTs, Summary, and Conclusions of the HHERA for Nine Former Mine Sites
		2014	Stantec. Supplemental Assessment of Site-Specific Remedial Targets for Nine Former Mine Sites, Gordon Lake, NT
		2014	Stantec. Remedial Options Analysis Gordon Lake Mines
		2015	Stantec. Gordon Lake Gap Analysis
		2015	Stantec. Supplemental Assessment of Site-Specific Remedial Targets for Nine Former Mine Sites
		2015	Stantec. Preliminary Remedial Action Plan for Gordon Lake Mine Sites
		2015	Stantec. Final Report: Gordon Lake Group - Revised Detailed Work Plan
		2015	Stantec. Final Report: Gordon Lake Group - Revised Gap Analysis





Table 5 Summary of Assessment and Remediation / Risk Management Action Planning

FCSAP Step	Actions	Year	Documents
		2015	YKDFN Land and Environment. Homiiti (Gordon Lake) Traditional Knowledge and Current Use Report.
		2015	Stantec. Gordon Lake Mine Site Borrow Assessment.
		2016	Stantec. GLG Mine Site Remediation - Evaluation of West Bay Waste Rock Acid Rock Drainage
		2016	Stantec. GLG Remedial Action Plan.
		2016	Independent Peer Review Panel (IPRP). Technical Review – Elements of the GLG Remediation
		2017	Stantec. GLG Additional Assessment Report.
		2017	Stantec. GLG Design Basis Report.
		2017	Stantec. Archaeological Impact Assessment - Gordon Lake and Bullmoose Area Mines Remediation
		2018	Stantec. Design Volume Refinement Program Summary
		2018	Stantec. Redesign of the Tailings and Soil Containment Area (TSCA)
		2018	Stantec. Final Report: Cover Design Plan
		2018	Stantec. TSCA Investigation and Design Path Forward
		2018	Stantec. Updated Report: Construction and Post Construction Monitoring Plan
		2018	Stantec. Risk Evaluation for Soil Hotspots
		2018	Stantec. Updated Report: GLG Design Basis
		2018	Stantec. Letter - Design Basis Addendum.

3.2 SITE REMEDIATION / RISK MANAGEMENT OBJECTIVES

Based on the overall project objectives (described in Section 2.3), the active remediation phase was divided into several hazard components with individual objectives for each. The hazard components requiring action during remediation were based on a review of previous assessments and observations made during a supplemental site assessment conducted in 2015. The hazard components included (Stantec 2016a, 2016c):

- Impacted Soil (including co-mingled, PHC and metals impacted soil)
- Physical Hazards (including mine openings, underground workings, trenches, abandoned infrastructure, and abandoned site buildings)
- Waste Rock
- Tailings
- Hazardous Waste
- Non-Hazardous Waste
- Sediment
- Water





The sections below summarize the regulatory framework for each hazard component. Table 8 (at the end of this Section) summarizes the hazard components, provides a description, and outlines the remedial objective for each component, as described in the RAP.

3.2.1 Regulatory Framework

Remedial guidelines for the GLG Sites were based on federal and territorial guidelines (Stantec, 2016a). There are individual guidelines for each hazard component, however the key documents used to guide the process were the Decision-Making Framework (DMF) for FCSAP (2013) and the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVWLB/Aboriginal Affairs and Northern Development Canada [AANDC], 2013).

3.2.1.1 Overall Framework

The DMF document outlines the framework for remediation on federally managed sites and is considered a roadmap that outlines the specific activities and requirements for addressing federal contaminated sites in Canada. The DMF is based on a Federal Approach to Contaminated Sites, a 10-step process guiding federal custodians in the aspects of working with contaminated sites (FCSAP, 1999).

Step 7 of FSCAP outlines the process to develop a R/RM strategy and requires the selection of either a guideline or risk assessment approach for the remedial program. For this site, a risk assessment approach was chosen and Project specific recommendations in the HHERA outlined the assessed levels of risk from COCs. If the conditions change (i.e. land use changes), the findings of the risk assessment will need to be re-evaluated.

Under the FCSAP process, once a risk assessment is completed, the proponent can decide if the resulting risk is acceptable or not and opt for risk management or mitigation strategies in order to reduce the resulting risk to an acceptable level, as appropriate. Risk management is the systematic process of minimizing, monitoring, and controlling the probability and/or impact of identified risks. These mitigation strategies and approaches form the basis of the risk management strategy. The key to risk management is to identify risks that are intolerable and to either eliminate them or mitigate them to a tolerable level. The benefit of using a risk matrix is that it identifies those elements of risk that drive the resulting risk level that can then be targeted for mitigation. This targeted approach allows for more effective risk mitigation.

3.2.1.2 Soil

Soil impacted with hydrocarbons and metals was identified at the Sites in specific areas linked to previous mining or exploration activities. Initially, the contaminant concentrations were compared to the applicable federal and territorial guidelines. The applicable guidelines were then further refined through a risk assessment process which resulted in site SSRTs being developed (refer to the RAP and the Gap Assessment [Stantec, 2016a, 2016c]).





Initial Guidelines

The guidelines used to screen soil initially included (Stantec, 2016a):

- Canadian Environmental Quality Guidelines, (CCME, 2014)
- Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil, (CCME, 2008a)
- Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rational Supporting Technical Document, (CCME, 2008b)
- Environmental Guideline for Contaminated Site Remediation, (Government of the Northwest Territories [GNWT], 2003)
- Guidelines and Standards from other Provincial jurisdictions including Alberta and Ontario, in cases where federal guidelines did not apply

SSRTs

COCs were identified during initial assessment work in comparison to the generic environmental quality guidelines listed above. SSRTs were developed based on more representative exposure conditions for receptors. Further information on the development of the SSRTs can be found in the HHERA (SLR, 2014), the Supplemental Assessment of the SSRTs (Stantec, 2014), the RAP (Stantec, 2016a), the Gap Assessment report (Stantec, 2016c), and the Risk Evaluation for Soil Hotspots (Stantec, 2018b).

The SSRTs represent the target levels for maximum allowable concentration of COCs monitored, are specific to terrestrial (i.e. soil) COCs and are thresholds for significant risk (Stantec, 2016a; 2018b). During the Project, the SSRTs were applied to the results of the confirmatory soil samples as outlined in the Construction and Post Construction Monitoring Plan (CPCM; Stantec, 2018c). The final SSRTs recommended for the Sites are shown in Table 6.

Table 6 Final Recommended SSRTs (mg/kg)

COPC	Lowest Calculated SSRT	CCME SGQ _{HH} (Residential)	Background	Final SSRT (First Nations Resident - Chronic exposure; >90 days)
Arsenic	69	31	44.4	69
Cobalt	130	n/a	15.6	130
Lead	332	140	17.9	332
Mercury, inorganic	13	6.6	0.085	13
PHC F1	--	700	--	700 ^{a, b}
PHC F2	--	1,000	111	1,000 ^{a, b}
PHC F3	--	2,500	2,910	2,910 ^c
Notes: a: Not assessed for indoor air infiltration. b: CCME (2008) Management Limit (coarse-grained soil, agricultural and residential land use; not risk-based). c: Based on measured background concentration. References: Stantec 2016a; 2018b				

As noted in Section 1.6.2.2 of the RAP, if the risk assessment assumptions are revisited or revised to include consideration for agricultural land use, the SSRTs should be reconsidered (Stantec, 2016a).





3.2.1.3 Physical Hazards

Physical hazards include features such as mine openings (shafts, portals, trenches), underground workings, trenches, abandoned infrastructure, and abandoned site buildings (Stantec, 2016a). The applicable regulatory guidelines for these items include:

- Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories, (MVLWB/AANDC, 2013)
- Northwest Territories *Mine Health and Safety Act* and Mine Health and Safety Regulations

A site-wide hazard assessment (SWHA) was completed by Stantec which included a complete regulatory review and evaluation of site hazards, including physical hazards (Stantec, 2016d). The recommended remedial options for physical hazards as outlined in the SWHA were formulated to be consistent with the recommended remedial options outlined in the RAP.

3.2.1.4 Waste Rock (Metal Leaching/Acid Rock Drainage)

Hazards associated with waste rock included potential for metal leaching/acid rock drainage (ML/ARD), governed by the following guidelines (Stantec, 2016a):

- Mine Environment Neutral Drainage (MEND) Prediction Manual for Drainage Chemistry from Sulphidic Geological Materials MEND Report 1.20.1 (Price, 2009).
- The Global Acid Rock Drainage Guide, International Network for Acid Prevention (GARD, 2014).

In addition, the following documents are used to evaluate sample results:

- Guideline for Industrial Waste Discharges in the NWT, published by the Department of Environment and Natural Resources, (GNWT, 2004)
- Metal Mining Effluent Regulations SOR/2002-222*, Schedule 4 (MMER, 2015)
*Note: now referred to as *Metal and Diamond Mining Effluent Regulations SOR/2002-222*
- Average Continental Crust Concentration in Shales for evaluation of metals in waste rock (Price, 1997).

Waste rock at the GLG Sites was assessed for the risk of the material to cause a significant effect to the receiving environment, as shown in Table 7. Further details on the waste rock testing methods is provided in the Gap Assessment Report (Stantec, 2016c).

Table 7 Waste Material Risk Criteria

Risk Classification	Evidence of impact
High	High concentrations of metals are observed in the receiving environment media (i.e., surface water, soil, and/or sediment samples), likely to reach or has reached aquatic habitat
Moderate	Moderate to high concentrations of metals are observed, although not present in each media, little or no surface water present to transport metals, contamination unlikely to reach aquatic habitat
Low	Little or no impacts observed in receiving environment
Reference: Stantec 2016c	





3.2.1.5 Tailings

There are no guidelines specific to tailings. However, based on their composition (a soil type medium), the analytical results for tailings were compared to the soil SSRTs to determine the level of environmental risk associated with leaving tailings, or whether action would be required (Stantec, 2016a).

3.2.1.6 Hazardous Materials

Hazardous waste present at the sites includes asbestos, lead based paint, and batteries. The regulatory guidelines for these items are listed below and were referenced as appropriate (Stantec, 2016a):

- Guideline for the Management of Waste Asbestos (GNWT, 2004).
- Guideline for the Management of Waste Batteries (GNWT, 1998).
- Guideline for the Management of Waste Lead and Lead Paint (GNWT, 2004*).
- Guideline for the General Management of Hazardous Waste in the NWT (GNWT, 1998*).
- *Note: These two guideline documents have been updated and are now dated October 2017*
- Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149) (Canadian Environmental Protection Act [CEPA], 2005).
- Interprovincial Movement of Hazardous Waste Regulations (SOR/2002-301) (CEPA, 1999).

Further assessment of asbestos-containing materials (ACMs) and lead-based paint was completed and is summarized in the Gap Assessment Report (Stantec, 2016c).

3.2.1.7 Non-Hazardous Waste

Non-hazardous waste present at the Sites included scattered wood and metal debris. The applicable regulatory guidelines for these items are listed below (Stantec, 2016a):

- Guidelines for Closure and Remediation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB, 2013)
- Waste Reduction and Recovery Act, S.N.W.T. 2003, c.29, as amended by S.N.W.T 2010, c.16. (GNWT, 2010)

3.2.1.8 Sediment

COCs for sediment were assessed based on the CCME Sediment Quality Guidelines (SQG) for the Protection of Freshwater Life (FWL). Ecological COPCs included arsenic, cadmium, chromium, copper, mercury, lead, zinc, cobalt, nickel and thallium. The sediment criteria discussed were applied to historical and supplemental site assessment results, used for comparison purposes and for background concentration considerations, as outlined in the Gap Assessment Report (Stantec, 2016c).

The RAP determined that disruption of the aquatic habitat during dredging would likely produce more harm than good to ecological health, and it was therefore recommended that remediation of the aquatic environment at the GLG Sites not occur in favor of risk management, and that further work be undertaken to reduce the uncertainty associated with this recommendation.





Further work was completed to assess the impact of COCs on the aquatic environment, as detailed in the Additional Assessment Report (Stantec, 2017b). Based on sediment, surface water and *Hyalella azteca* sampling, effects of the mine were present, but these effects were not reflected in an increased toxicity in *Hyalella*. It was determined that remediation of the aquatic environments was not required.

3.2.1.9 Water

The following guidelines were referenced for surface water and groundwater sampling (Stantec, 2016a):

- CCME Canadian Environmental Quality Guidelines (CEQGs)
- Health Canada Guidelines for Canadian Drinking Water Quality
- Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites (FIGQGs)

Remedial options were not assessed for impacted water in the RAP because, with the exception of Kidney Pond, impacted surface water appeared to be localized and was to be addressed by discharging overland a minimum of 30 m from surface water bodies. The impacted water at the Kidney Pond portal was to be managed as part of the portal closure design.

3.2.2 Hazard Components and Remedial Objectives

Table 8 summarizes the hazard components, provides a description, and outlines the remedial objective for each component, as described in the RAP.





Table 8 Descriptions and Remedial Objectives of Hazard Components at the GLG Sites as Described in the Remedial Action Plan

Hazard	Description	Remedial Objective	BUR	CAM	GOO	KID	MUR	STO	TRE	TRY	WES
Co-Mingled Impacted Soil	Soil containing concentrations of metals and PHCs greater than the SSRTs.	Protect human and ecological health by achieving the SSRTs while using processes that minimize Project costs.	X	X	-	X	-	-	-	-	X
Metals Impacted Soil	Soil containing concentrations of metals greater than the SSRTs.	Protect human and ecological health by achieving the SSRTs while using processes that minimize Project costs.	-	X	X	X	X	X	X	-	X
PHC Impacted Soil	Soil containing concentrations of PHCs greater than the SSRTs.	Protect human and ecological health by achieving the SSRTs while using processes that minimize Project costs.	X	X	-	X	-	-	X	-	X
Mine Openings (Physical Hazards)	Hazards including portals, shafts, and declines that are open or not properly sealed.	Limit access to underground workings from surface openings, for the safety of humans and wildlife.	X	X	X	X	X	X	-	X	X
Underground Workings (Physical Hazards)	Hazards including stability concerns or where rock geo-mechanical information is limited.	Limit access from surface openings for the safety of humans and wildlife and reduce the potential for structural collapse as a result of remediation activity.	X	X	-	X	-	-	-	-	-
Trenches (Physical Hazards)	Hazards include trenches of varying sizes.	Protect human and ecological health and limit any metals leaching.	X	X	X	X	X	X	X	X	-
Abandoned Infrastructure (Physical Hazards)	Hazards including former core racks, docks and former machinery.	Protect human and ecological health and limit long term liability associated with maintenance.	X	X	X	X	X	-	-	X	X
Abandoned Site Buildings (Physical Hazards)	Hazards include former site buildings, headframes.	Minimize contamination to the environment, reduce the potential for the building to act as a physical hazard to visitors, and retain culturally significant features where possible.	X	X	X	X	-	-	X	X	X
Waste Rock	Rock that was removed and crushed to access ore-bearing deposits (potential ML or PAG source).	High risk impacting waste rock - minimize generation of poor water quality including ML/waste rock and/or impacts to downgradient soils. Moderate risk impacting waste rock - confirm there are no impacts to any proximate water bodies in the long term through monitoring.	X	X	X	X	X	X	X	-	X
Tailings	Ore-bearing rock that was milled and often treated with chemicals to extract the ore (ML/PAG source) that contain concentrations of COCs greater than SSRTs and/or present an aesthetic concern.	Eliminate direct contact, stabilize embankments and surfaces of tailings containment areas, blend piles with local topography where appropriate, and minimize the occurrence of impacted leachate being produced.	X	X	-	-	-	-	X	-	X
Hazardous Waste	Material containing asbestos in excess of the territorial guidelines or material painted with lead-based paint in excess of the territorial guidelines. Also includes batteries.	Meet regulatory requirements for proper management and disposal of this material.	X	X	X	X	-	X	X	X	X
Non-Hazardous Waste	Building materials tested to confirm the absence of asbestos, lead and/or PCB paint materials, and scattered wood and metal debris.	Address the physical hazard and meet aesthetic expectations during the remediation.	X	X	X	X	X	X	X	X	X





3.3 REMEDIATION CONSTRUCTION ACTIVITIES

3.3.1 Evaluation and Selection of Remedial Options

A variety of potential remediation options were initially evaluated in the Preliminary RAP prepared by Stantec (2015a). These options were referenced from the Federal Remediation Technologies Roundtable (FRTR) Treatment Technologies Screening Matrix, which lists 59 industry-standard remedial options suitable for sites requiring remediation (FRTR, 2007). This list was supplemented with options that have been used at other northern sites. Project-specific considerations such as remoteness, ability to travel between sites, the northern climate and other conditions (e.g. proximity to water and size of each site) were used to conduct a preliminary elimination of remedial options that were not practical for the Sites (Stantec, 2016a). A complete list and brief description of each remedial option is included in the Preliminary RAP, along with rationale for the preliminary elimination (Stantec, 2015a).

Remedial options carried forward from this initial evaluation were further assessed in the RAP, submitted in March 2016. The RAP summarized what was present at each site (including hazard components), identified relevant regulations, outlined remediation objectives, reviewed / evaluated remedial options, and recommended options that would meet remedial objectives (Stantec, 2016a). Remedial options were assessed for their ability to meet remedial targets, timeline to closure, ease of implementation, regulatory and community acceptability, and cost. The planning team consisted of CIRNAC (formerly INAC/AANDC), PSPC (formerly Public Works and Government Services Canada [PWGSC]), Stantec, and the YKDFN.

For further details on the selection of the remediation / risk management remedial options refer to the preliminary RAP (Stantec, 2015a), the RAP (Stantec, 2016a) and/ the Gap Assessment Report (Stantec, 2016c).

3.3.2 Description of Remediation / Risk Management Approach

The RAP recommended that the existing TCA at Camlaren be upgraded to a TSCA, and a WRSCA be constructed at Kidney Pond.

The RAP listed the following remedial options for the common hazard components (Stantec, 2016a):

- Co-Mingled Impacted Soil – dispose of the co-mingled impacted soil in a consolidated landfill
- Metals Impacted Soil – dispose of the metals impacted soil in a consolidated landfill
- PHC Impacted Soil – landfarm and disposal of treated soil as cover material; with disposal of any untreated PHC impacted soil in a consolidated landfill
- Waste Rock – construct a consolidated waste rock containment area
- Tailings – construct a consolidated tailings and soil containment area
- Hazardous Waste – containerize for off-site disposal
- Non-Hazardous Waste – burn and/or crush and place in consolidated landfill

In February 2017, Stantec issued the DBR, which built on the conceptual remedial designs in the RAP (Stantec, 2017c). DNV provided a draft Remediation Methodology report in September 2017. In preparation for a Project meeting scheduled for October 2017, a field program to support volume





estimates was conducted on October 13 and 14, 2017. More detailed field data was obtained, and volumes were updated, including remediation volumes and other design considerations for the Project.

On October 17, 2017, CIRNAC, PSPC, Stantec and DNV met to discuss the Project. The Contractor revised its proposed work plan to target expected impacted soil / tailings / waste rock volumes (versus worst case volumes as outlined in Specifications), which precipitated changes to the proposed methods for excavation. In addition, the availability of borrow materials by type and volume was anticipated to make production of the required volumes of construction materials difficult. Furthermore, DNV proposed to complete work within one year, instead of two.

3.3.2.1 Changes to the Project

Based on the October field work, volumes were updated (including remediation volumes) and Project design details were reconsidered (Stantec, 2018d). The volume of impacted soil originally planned for treatment in the Landfarm had been reduced and it was no longer viable to construct this facility. Additionally, availability of borrow material was limited, which was anticipated to make production of construction materials difficult. Similarly, construction of the WRSCA was no longer required based on the reduction in volumes of impacted soil, waste rock and non-hazardous waste from the Sites; the revised volume could be accommodated in the TSCA.

A redesign of the TSCA was required due to the following changes:

1. Impacted soil was now to be consolidated within one facility, located at Camlaren TSCA (WRSCA and Landfarm no longer included in the design) and the TSCA facility size needed to be adjusted to reflect this additional volume
2. Requested changes to the TSCA cover:
 - a. Use of a bituminous geomembrane (BGM) liner versus the specified LDPE
 - b. Changes to the mix of borrow materials for the cover towards greater use of sandy materials, with erosion protection materials along berm slopes and perimeter ditches only
3. Acceleration of construction to one season, from the planned two-seasons approach

Following the design volume refinement, it was determined that the updated design for the TSCA would contain approximately 19,840 m³ of added waste. This update considered the field program detailed above, removal of Landfarm and WRSCA and, following review, the decision to leave some material in place. These changes were outlined in a letter which was submitted to the MVLWB (Stantec, 2018e). Additional details and analysis pertaining to the design modifications of the TSCA are provided in the Updated Design Basis Report (Stantec 2018f) and the TSCA As-Built Report (Stantec, 2018g).

A risk management evaluation was completed at several of the sites to reduce disturbance during remediation and construction activities. Based on the nature of the chemical risk, it was recommended that soil be left in place where impacts were determined not to pose a risk to potential receptors. For further details, refer to the memo titled *Risk Evaluation for Soil Hotspots* (Stantec 2018b). Table 9 summarizes the locations where a risk management approach was implemented.



**Table 9 Risk Managed Soil Locations**

Site	Location	Excavation Area	Impact Type	Estimated Volume (m³)
Burnt Island	Waste Rock Area	BUR_SO_06	PHC	5.8
Camlaren	Mine Area South	CAM_SO_02	Metals	20
		CAM_SO_13 ¹	PHC	5
	Mine Area North	CAM_SO_17	Metals	3
	Zenith Island	CAM_SO_24	Metals	5
Goodrock	Mill Area	GOO_HS_01 ²	Metals	7
Kidney Pond	Portal Area	KID_SO_08	Metals	1
		KID_SO_09	PHC	0.25
		KID_SO_13 ³	PHC/Metals	29.1
	Kidney Pond Area	KID_SO_12	Metals	1
Murray Lake	1938/2008 Camp	MUR_SO_01	Metals	5
Storm Property	Camp Area	STO_HS_01	Metals	4
Notes: ¹ CAM_SO_13 was partially excavated during the 2018 Winter season. ² Due to elevated concentrations of lead, a cover was placed at GOO_HS_01 which will require monitoring. ³ KID_SO_13 was excavated in the 2018 Winter season. Reference: Stantec, 2018b				

3.3.2.2 Mobilization, Site Preparation and Final Demobilization

Remedial work at the GLG Sites occurred over several field seasons between 2017 and 2019. Remediation was coordinated by CIRNAC, and DNV was contracted to complete the remedial work at the Sites. Stantec provided engineering and technical support and construction contract supervision, representing PSPC on-site during remediation as the DR. The following sections provide details on the remediation program.

Winter Access

To facilitate the transfer of borrow material, contaminated soil, debris, hazardous waste, equipment, personnel and supplies, DNV constructed spur roads off the JV Winter Road to access Burnt Island, Zenith Island, Camlaren, Kidney Pond, West Bay and GD-18 (Stantec, 2019b). The bulk of the spur road construction occurred in January and February of 2018. Prior to construction, DNV submitted a Mobilization and Demobilization Plan and Ice Construction Guidelines outlining its proposed approach. NOR-EX Engineering Ltd. conducted the initial ice profiling work and provided load charts based on ice thickness. DNV was responsible for monitoring ice thickness and condition while spur roads were in use. Ongoing construction and maintenance (including flooding) was conducted throughout the season. Public use of the spur roads was discouraged by posted signs indicating that the road was not for public access. Radio channel information was posted at the beginning of the spur roads (Stantec, 2019b).





Summer and Fall Site Access

During summer and fall field programs, personnel and supplies were transported to and from the Sites via fixed-wing (floats) and rotary-wing (i.e. helicopter) aircraft from Yellowknife. Personnel were primarily transported to the camp facilities located at Zenith Island. Personnel, materials and supplies were transported to and from the satellite sites via helicopter, by boat, or by all-terrain vehicle (ATV), depending on the work activities being completed (Stantec, 2019b).

DNV installed floating dock systems at the Camp and Camlaren during the 2017 Summer season (Stantec, 2019b). Throughout the Project, these docks were used for boat and plane access and enabled safe transfer of personnel, equipment and supplies and were modified as conditions and site access requirements changed.

Camp Facilities

DNV was responsible for establishing and maintaining a camp to support remediation work at the GLG Sites, which occurred from later 2017 to early 2019. Temporary camp facilities were established in August 2017, followed by construction of hard-sided buildings. Subsequent upgrades were made in Fall 2017 to prepare the camp for winter use. The Camp consisted of wooden, hard-sided structures (kitchen, offices, generator shed, sleeping quarters, washrooms, etc.), a storage area, and a greywater discharge soak-away pit. Structures were heated using camp stoves that were connected to aboveground storage tanks (ASTs). Additional work was completed at the camp as needed throughout the Project (Stantec, 2019c).

When most of the demobilization was complete in March 2019, structures at the camp were emptied and cleaned. The YKDFN expressed interest in using the Camp once the remediation program was completed, so the empty wooden structures at the Camp location were left in place. However, electrical cables were removed, camp stoves were disassembled and removed from the cabins, and ASTs were removed (Stantec 2019c). The greywater discharge pipe was disassembled, and the sump was filled in. A general site assessment of the Camp was completed by Stantec following demobilization (Stantec, 2019c).

Hazardous Materials Processing Areas / Temporary Storage Areas / Fuel Containment Area

As per the contract specifications, DNV constructed a Hazardous Materials Processing Area (HMPA), Temporary Storage Areas (TSAs) and Fuel Containment Areas (FCAs) during the Project. The purpose of the HMPA was to provide an area to consolidate, process, and containerize hazardous wastes. The HMPA was located northwest of the Camp and was built at least 30 m from any water body or drainage course. It was used as the staging area for all collected hazardous waste from the GLG sites by BluMetric (2017).

The purpose of the TSAs was to provide areas for the storage of supplies, equipment, containerized waste and materials. TSAs established at Camlaren included seacans, a small machine shop and a two-stage incinerator (used for burning camp waste). Supplies stored here varied with the season, and included wood, wattles, boats, seacans (used for storage), signage, etc. A small TSA with a few seacans was located near the Camp, used for storing safety equipment and camp supplies (Stantec, 2019b).





The FCAs were constructed to provide an appropriate place for fuel storage as per contract specifications. A temporary FCA was established in 2017 within the footprint of the TSCA at Camlaren. This FCA was used for diesel and gasoline storage until the end of the 2018 Winter season (i.e. March). Another FCA was established in preparation for the 2018 Summer season, north of the former FCA and outside the footprint of the TSCA, near the TSAs at Camlaren. This FCA had a liner, and a berm was constructed around the perimeter. An aboveground storage tank (diesel), 45-gallon drums (gasoline and diesel), and aviation fuel were stored here.

Demobilization

Final demobilization was completed in March 2019 and involved the removal of equipment and supplies from site and the dismantling of the FCA at Camlaren, and the Camp at Zenith Island. Equipment and supplies (e.g. seacans, trailers, incinerator, generators) were prepared and staged for transport back to Yellowknife. Various pieces of mobile equipment (e.g. dozer, rock truck, excavators) were also transported off-site (Stantec, 2019b).

3.3.2.3 Remediation of Hazard Components

Construction of the TSCA

The pre-existing TCA at Camlaren was upgraded to a TSCA and was designed to incorporate impacted material (soil, tailings, waste rock) and non-hazardous debris (metal, wood, etc.) from the GLG Sites. Impacted material and non-hazardous debris were consolidated in 2017 and 2018. Construction of the TSCA began in July 2018 and was completed in September 2018 (Stantec, 2019b).

Impacted Soil

Impacts to soil included PHCs, metals, or both (i.e. co-mingled). As described in Section 3.3.2.1, it was determined (through a risk-based approach) that some of the impacted soil areas previously planned to be removed would remain in place (CIRNAC, 2018 and 2019). Remaining impacted areas were excavated and material was disposed of in the TSCA. During winter operations, impacted material was excavated, loaded onto trucks, and transported via ice roads to the TSCA. During summer operations, excavated material was placed in soil bags and transported to the TSCA via rotary-wing aircraft or by boat. Some impacted material removed from West Bay in the 2018 Summer season was transported off-site for disposal at an approved facility.

Excavations were advanced as per the contract specifications until confirmatory samples indicated concentrations of COCs in soil were below the SSRTs, or until bedrock was encountered (Stantec, 2019b). Excavations were backfilled to prevent ponding and physical hazards (CIRNAC, 2019; Stantec, 2019b). A summary of impacted soil remediation is presented in Table 10.



**Table 10 Summary of R/RM Approach Implemented for Impacted Soil at the Sites**

Site	R/RM Approach	Excavation Areas ¹	Figure(s) in Appendix B
Burnt Island	Six impacted areas were excavated – material was transported to the TSCA	BUR_SO_01, BUR_SO_02, BUR_SO_03, BUR_SO_04, BUR_SO_05, BUR_SO_07	B1.3, B1.4, B1.6
	One area was left in place using a risk management approach	BUR_SO_06	B1.4
Camlaren	19 impacted areas were excavated – material was transported to the TSCA	CAM_HS_01, CAM_SO_01, CAM_SO_03, CAM_SO_04, CAM_SO_05, CAM_SO_06, CAM_SO_07, CAM_SO_08, CAM_SO_09, CAM_SO_10, CAM_SO_11, CAM_SO_12, CAM_SO_14, CAM_SO_15, CAM_SO_16, CAM_SO_18, CAM_SO_19, CAM_SO_20, CAM_SO_23	B2.2, B2.3, B2.4, B2.5
	Four areas were left in place using a risk management approach	CAM_SO_02, CAM_SO_13 ² , CAM_SO_17, CAM_SO_24	B2.2, B2.3, B2.5
	Two areas were situated within the footprint of the TSCA and did not require excavation		Not shown on Figures
Goodrock	One impacted area was left in place using a risk management approach	GOO_HS_01 ³	B3.3
Kidney Pond	Eleven impacted areas were excavated – material was transported to the TSCA	KID_HS_01, KID_SO_01, KID_SO_02, KID_SO_03, KID_SO_04, KID_SO_05, KID_SO_06, KID_SO_07, KID_SO_10, KID_SO_11, KID_SO_13 ⁴	B4.2, B4.3, B4.5
	Following initial excavation, additional work was completed at two of these impacted areas (Stantec, 2018h)	KID_SO_07, KID_SO_11	B4.5
	Three areas were left in place using a risk management approach	KID_SO_08, KID_SO_09, KID_SO_12	B4.5, B4.6
Murray Lake	One impacted area was left in place using a risk management approach	MUR_SO_01	B5.2
Storm Property	One impacted area was left in place using a risk management approach	STO_HS_01	B6.3
Treacy	Three impacted areas were excavated – material was transported to the TSCA	TRE_SO_01, TRE_SO_02, TRE_SO_03	B7.2, B7.3
Try Me	No remedial excavation undertaken		N/A
West Bay	Seven impacted areas were excavated – material was transported to the TSCA	WES_SO_02, WES_SO_03, WES_SO_04, WES_SO_05, WES_SO_06, WES_SO_07, WES_SO_08	B9.2
Notes: 1: For further information on how excavation areas were determined, refer to the Gap Assessment Report (Stantec 2016c). 2: CAM_SO_13 was partially excavated during the Winter 2018 season. 3: Due to elevated concentrations of lead, a cover was placed at GOO_HS_01 which will require monitoring. 4: KID_SO_13 was planned to be left in place but was excavated in Winter 2018.			





Mine Openings and Underground Workings

Mine openings were sealed as per the contract specifications (Table 11). DNV prepared Construction Plans prior to mine closure activities and obtained approval from the Workers' Safety and Compensation Commission (WSCC) for closures, as required. Mine openings at Goodrock, Storm and Murray Lake contained water which required discharge prior to closure (Stantec, 2019b). Water was pumped and directed to soak-away pits located a minimum of 30 m from any surface water bodies (Stantec, 2019b). DNV provided photos and coordinates of discharge locations to the Authorities having Jurisdiction (AHJ) before discharge activities began. Although the LUP required discharge 100 m from water bodies, a variance was obtained as many of the sites are within 100 m of water bodies. Water treatment was not required, as approved by MVLWB, as water was pumped and directed to soak-away pits (Stantec, 2019b).

Table 11 Summary of R/RM Approach Implemented for Mine Openings at the Sites

Site	R/RM Approach
Burnt Island	<ul style="list-style-type: none"> An engineered concrete cap was used to seal the mine shaft and the portal was backfilled
Camlaren	<ul style="list-style-type: none"> The shaft at Zenith was sealed using an engineered cap
Goodrock	<ul style="list-style-type: none"> The north mine shaft and south pit were sealed; mine opening water was pumped out of the openings into a soak-away pit prior to backfilling, as approved by the MVLWB
Kidney Pond	<ul style="list-style-type: none"> The decline at Kidney Pond was backfilled and the portal was sealed
Murray Lake	<ul style="list-style-type: none"> Both the main shaft and deep trench/shaft were sealed; mine opening water was pumped out of the openings into a soak-away pit prior to backfilling, as approved by the MVLWB
Storm	<ul style="list-style-type: none"> The north and south mine shafts were sealed; mine opening water was pumped out into a soak-away pit prior to backfilling, as approved by the MVLWB
Treacy	<ul style="list-style-type: none"> No mine openings or underground workings present requiring remediation
Try Me	<ul style="list-style-type: none"> The mine shaft was sealed
West Bay	<ul style="list-style-type: none"> A chain link fence was installed around the open pit

Trenches

Trenches were identified at all the Sites except for West Bay. Typically, no remedial action was required for trenches as they were relatively shallow. The exception was at Treacy, where the east trench (deep) and west trench (filled with tailings that required removal) were backfilled.

Abandoned Infrastructure and Site Buildings

All the Sites had abandoned infrastructure and/or site buildings except for Storm. Infrastructure that presented a physical hazard required remedial action (i.e. sumps at Burnt Island and Murray). Former wooden docks were removed from Burnt Island, Camlaren, Kidney Pond and Goodrock. Larger metal items removed from the Sites included ball mills from Burnt Island and Treacy, rail tracks from Try Me, and a motor from West Bay. Metal items were cut into manageable pieces (typically 2m or less) before being placed in the TSCA.

For sites where wood waste was not impacted by forest fire activity, or where the wood was not classified as hazardous waste (i.e. not painted with lead-containing paint), the wood waste was burned on-site.





Controlled burns of wood debris were conducted at Camlaren, Zenith Island, Burnt Island and Kidney Pond. Burning of wood waste required Burn Permits from the Department of Environment and Natural Resources (ENR) and were obtained by DNV as required. Water was withdrawn at these areas for fire suppression in the months of August and October (2017), and June and July (2018). Further details can be found in the Post Construction report (Stantec, 2019b), Annual WL reports (CIRNAC, 2018 and 2019), and in the monthly SNP reports. A summary of abandoned infrastructure remediation is presented in Table 12.

Table 12 Summary of R/RM Approach Implemented for Abandoned Infrastructure/Site Buildings at the Sites

Site	R/RM Approach
Burnt Island	<ul style="list-style-type: none"> Abandoned buildings were burned on-site during controlled burns and former sumps at the Site were regraded. Other infrastructure items (e.g. dock, drill rig) were removed from site and transported to the TSCA for disposal
Camlaren	<ul style="list-style-type: none"> Abandoned buildings were either burned on-site during controlled burns or taken to the TSCA for disposal. Remaining materials were demolished and/or burned and consolidated as non-hazardous debris in the TSCA. The hoist and mill pad were left in place.
Goodrock	<ul style="list-style-type: none"> Abandoned infrastructure items were dismantled and transported to the TSCA
Kidney Pond	<ul style="list-style-type: none"> Abandoned infrastructure items (e.g. airtight stove) were taken to the TSCA for disposal. Wooden items (including the dock) were burned on-site during controlled burns. Any remaining items were removed from site and transported to the TSCA for disposal
Murray Lake	<ul style="list-style-type: none"> Former sumps were regraded
Storm	<ul style="list-style-type: none"> No abandoned infrastructure or site buildings present
Treacy	<ul style="list-style-type: none"> Structure remains were taken to the TSCA for disposal
Try Me	<ul style="list-style-type: none"> Abandoned infrastructure/site buildings were disassembled and transported to the TSCA for disposal
West Bay	<ul style="list-style-type: none"> Abandoned infrastructure items/structure remains were burned on-site or transported to the TSCA for disposal

Waste Rock

A risk-based approach was used to classify waste rock areas as low, moderate, or high risk based on volume, area, proximity to water body, and evidence of impacts in downgradient soil, surface water, and/or sediment (Stantec, 2019b). High-risk impacting waste rock was removed and disposed of in the TSCA during the remediation program. Low and moderate risk waste rock was left place, with moderate risk waste rock carried forward into LTM (i.e. to be visually assessed for signs of ARD-related impacts). Waste rock at Burnt, Goodrock, Storm and West Bay, and some of the waste rock at Kidney Pond was left in place. Waste rock from Camlaren, Treacy and some from Kidney Pond was excavated and consolidated into the TSCA. A summary of the remediation of waste rock is presented in Table 13. Refer to the Figures in Appendix B for the location of waste rock areas.





Table 13 Low, Moderate, and High-Risk Impacting Waste Rock at the GLG Sites

Area	Figure in Appendix B	Pre-Remediation Physical Description	Remedial Approach / Approximate Volume Left in Place	Carried forward into LTM?
BUR_WR_01	Figure B1.6	Scattered waste rock resulting from trenching in the area identified as potentially acid generating (PAG) and classified as moderate risk.	Left in place / 48 m ³	Yes
CAM_WR_01A	Figure B2.3	Waste rock at south Muir Island intermingled in soil and previously determined to be non-PAG.	Excavated and consolidated into TSCA	No - no risk remains
CAM_WR_01B	Figure B2.3	Waste rock found along the perimeter of the TSCA.	Incorporated into the TSCA	No - no risk remains
CAM_WR_02A	Figure B2.5	Waste rock at Zenith Island found to have high acid generating potential.	Excavated and consolidated into TSCA	No - no risk remains
CAM_WR_02B	Figure B2.5	Waste rock north of the Shaft.	Excavated and consolidated into TSCA	No - no risk remains
CAM_WR_03	Figure B2.5	Waste rock resulting from trenching in area.	Excavated and consolidated into TSCA	No - no risk remains
GOO_WR_01	Figure B3.2	Scattered waste rock near Camp Area trenches identified as PAG and classified as moderate risk.	Left in place / 63 m ³	Yes
GOO_WR_02	Figure B3.3	Scattered waste rock near Mill Area trenches identified as PAG and classified as moderate risk.	Left in place / 221 m ³	Yes
KID_WR_01	Figure B4.5	Waste rock in area determined to be PAG.	Excavated and consolidated into TSCA	Yes ¹
KID_WR_02	Figure B4.6	Waste rock in area determined to be PAG.	Excavated and consolidated into TSCA	No - no risk remains
KID_WR_03	Figure B4.5	Scattered waste rock near Portal Area trenches identified as PAG and classified as moderate risk.	Left in place / 25 m ³	Yes
KID_WR_04	Figure B4.3	Scattered waste rock near Exploration Camp trenches identified as PAG and classified as moderate risk.	Left in place / 25 m ³	Yes
MUR_WR_01	Figure B5.3	Scattered waste rock near Trench Area Main Shaft identified as PAG and classified as moderate risk.	Left in place / 297 m ³	Yes
MUR_WR_02	Figure B5.3	Scattered waste rock near Trench Area various trenches identified as PAG and classified as moderate risk.	Left in place / 300 m ³	Yes
STO_WR_01	Figure B6.2	Waste rock piles near Shaft Area North Shaft and South Shaft identified as PAG and classified as moderate risk.	Left in place / 80 m ³	Yes



**Table 13 Low, Moderate, and High-Risk Impacting Waste Rock at the GLG Sites**

Area	Figure in Appendix B	Pre-Remediation Physical Description	Remedial Approach / Approximate Volume Left in Place	Carried forward into LTM?
STO_WR_02	Figure B6.2	Scattered waste rock near Shaft Area trenches identified as PAG and classified as moderate risk.	Left in place / 30 m ³	Yes
TRE_WR_01	Figure B7.2	Three ore piles in the Mill Area - tripping hazard, PAG.	Excavated and consolidated into TSCA	No - no risk remains
WES_WR_01	Figure B9.2	East waste rock pile south of open pit identified as PAG however classified as moderate risk following further assessment.	Left in place / 5,679 m ³	Yes
WES_WR_02	Figure B9.2	West waste rock pile south of open pit identified as PAG however classified as moderate risk following further assessment.	Left in place / 9,337 m ³	Yes
Note: ¹ KID_WR_01 was backfilled following remedial excavation. Backfill will be monitored as part of the LTM Plan.				

Tailings

Tailings were identified at four of the Sites. The tailings impoundment area at Burnt Island was left in place and covered. Tailings at Camlaren were within the footprint of the TSCA and were incorporated into the facility. Tailings areas at Treacy (TRE_TL_01) and West Bay (WES_TL_01) were excavated and placed in the TSCA.

Hazardous Waste

DNV retained BluMetric Environmental Inc. (BluMetric™) to provide hazardous waste remediation oversight for the Project. BluMetric's Hazardous Materials Specialist was on-site from August 9 - 12, 2017, based at the temporary camp located on Zenith Island. BluMetric's report (dated October 4, 2017) provides a summary of the scope of work completed, which included removal of hazardous waste from Burnt Island, Treacy, Kidney Pond, Camlaren, Try Me, Goodrock and Storm (summarized in Table 14). Access to these sites was provided by DNV using boats, ATVs, and helicopters (CIRNAC, 2018 and 2019; Stantec, 2019b).

Table 14 Summary of R/RM Approach Implemented for Hazardous Waste at the Sites

Site	R/RM Approach
Burnt Island	<ul style="list-style-type: none"> Asbestos-containing brake pads on the drill rig were removed by BluMetric in 2017, prior to removal of the drill rig from site
Camlaren	<ul style="list-style-type: none"> Seven lead-acid batteries were removed by BluMetric in 2017
Goodrock	<ul style="list-style-type: none"> A lead-acid battery was removed by BluMetric in 2017
Kidney Pond	<ul style="list-style-type: none"> Three lead-acid batteries were removed by BluMetric in 2017
Murray Lake	<ul style="list-style-type: none"> No hazardous waste was identified for remediation



**Table 14 Summary of R/RM Approach Implemented for Hazardous Waste at the Sites**

Site	R/RM Approach
Storm	<ul style="list-style-type: none"> A lead-acid battery was removed by BluMetric in 2017
Treacy	<ul style="list-style-type: none"> Lead-containing painted wood was removed from site by BluMetric in 2017
Try Me	<ul style="list-style-type: none"> A lead-acid battery was removed by BluMetric in 2017
West Bay	<ul style="list-style-type: none"> One battery in an advanced state of decay was removed during remedial excavation

Non-hazardous Waste

In addition to the abandoned infrastructure and site buildings, other non-hazardous debris (i.e. scattered surficial debris) was also present at the GLG Sites. Much of this debris consisted of scattered wood and metal waste but other items (such as core racks) were also present. To focus the clean-up effort, scattered debris areas were delineated. Non-hazardous waste from these areas was collected primarily during the summer seasons and disposed of in the TSCA or burned.

3.3.3 Construction Completion Inspections

During the Project, Stantec reviewed work completed by DNV on an ongoing basis while work was being conducted on-site. This included:

- On-site submittals, records, and documents
 - Stantec reviewed documents prior to submission, including plans, progress claims, and change order requests.
 - Stantec tracked construction activities completed for comparison to the quantities reported by DNV (i.e. borrow material production, excavation of impacted soils, hazardous waste, non-hazardous waste).
- Licence, permit and specification conditions
 - Stantec reviewed the execution of remediation tasks by DNV to ascertain conformance with the regulatory requirements, specifications, and subsequent approvals provided by PSPC (through approved change orders).
- Remediation works
 - During the remediation program, one to two Stantec DRs completed oversight of the activities completed by DNV (e.g. debris clean-up, remedial excavation, environmental controls, TSCA construction, etc.). Inspections of individual areas identified in the specifications were conducted following the completion of remedial/clean-up activities on an ongoing basis.

Remedial excavations were advanced as per the contract specifications until confirmatory samples indicated concentrations of COCs in soil were below the SSRTs, or until bedrock was encountered. Stantec collected the confirmatory samples as outlined in the CPCM. Samples collected during the remediation program are discussed in detail in the Post Construction report (Stantec, 2019b).

As the active remediation phase was nearing an end, CIRNAC, PSPC, and Stantec conducted inspections of some of the work areas to visually confirm that remedial objectives had been met. Due to time and logistic constraints, most of these inspections included only a few areas at each Site. Inspections by the Project team are summarized in Table 15.



**Table 15 Post Construction Inspections Completed by the Project Team**

Site	Deficiencies Noted	
	August 15, 2018	September 11, 2018
Burnt Island	<ul style="list-style-type: none"> Slope root cellar sides to reduce erosion risk Rake gravel from around sump into the sump Backfill shaft with sand, some debris pick up remaining A sign to be removed near the portal 	<ul style="list-style-type: none"> No deficiencies noted
Camlaren	<ul style="list-style-type: none"> Wattles need to be removed Regrading required near CAM_SO_14 and CAM_SO_01 	<ul style="list-style-type: none"> Some debris from ongoing construction was noted¹
Goodrock	N/A - No inspection completed	<ul style="list-style-type: none"> No deficiencies noted
Kidney Pond	<ul style="list-style-type: none"> Wattles to be removed A sign to be removed near former wood cabin/platform Crucibles to be removed from near KID_HS_01 	<ul style="list-style-type: none"> No deficiencies noted
Murray Lake	N/A - No inspection completed	<ul style="list-style-type: none"> No deficiencies noted
Storm	N/A - No inspection completed	<ul style="list-style-type: none"> No deficiencies noted
Treacy	<ul style="list-style-type: none"> Drill pipe protruding from bedrock (requires cutting and sealing) 	<ul style="list-style-type: none"> No deficiencies noted
Try Me	N/A - No inspection completed	<ul style="list-style-type: none"> No deficiencies noted
West Bay	<ul style="list-style-type: none"> Fence still needs to be installed Debris clean-up still required in several areas Trees that were cut down need to be spread out Mercury exceedances to be excavated and removed from site Drill pipe to be cut near WES_SO_04 	<ul style="list-style-type: none"> No deficiencies noted²
Notes: ¹ An additional assessment was conducted at Camlaren and the camp at Zenith Island in 2019 following final demobilization. Refer to the 2019 Annual WL Report and the Camp Assessment Report (CIRNAC, 2020 and Stantec, 2019c). ² West Bay was also inspected on September 17, 2019 when the fence around the pit was complete		

3.3.3.1 TSCA

Stantec, as the Engineer of Record (EOR) completed several inspections throughout construction of the TSCA, as well as a post-construction inspection on October 2, 2018, which is summarized in the Post Construction Inspection report (Stantec, 2018i). This report contains TSCA observations, photos, and recommendations. Furthermore, DNV conducted a survey to produce As-Built drawings following the completion of the TSCA construction. Stantec prepared an As-Built Construction report summarizing the design details, deviations, and Stantec's interpretation of the As-Built drawings (Stantec 2018g).





3.3.4 Operations and Maintenance (O&M) of Treatment Systems

During the remediation phase of the Project, there were no treatment systems that required O&M.

An important part of the GLG Project was the upgrade of the TCA at Camlaren to a TSCA. Impacted material and non-hazardous debris were consolidated in 2017 and 2018 and construction of the TSCA was completed in September 2018 (Stantec, 2019b). This facility requires ongoing O&M, which is discussed in Section 3.4.2, along with other O&M requirements at the Sites.

3.4 REDUCTION OF SITE LEGACY RISKS

3.4.1 Description of Site Legacy Risks

Table 16 lists legacy risks from the Project and outlines their initial risk level as well as the risk level upon completion of remediation. This information was taken from the Project's risk register. The comments provide an explanation of the change in risk level and what mitigations or monitoring is in place should the risk still exist.

Table 16 Summary of Remediation Legacy Risk Levels

Risk Scenario	Site	Risk Level		Comments
		Initial	End	
Failure of the dyke leads to release of tailing during spring freshet leading to environmental impact and fish kill	Camlaren	Moderately High	Closed	Dyke was redesigned into TSCA
Metal leaching from underground mine and/or ore/waste rock piles lead to impacted sediment	Kidney Pond	Moderately High	Closed	Ore and waste rock removed, mine portal closed
Acid generation and metal leaching from waste rock leads to environmental impact	Kidney Pond	Moderately High	Closed	High risk waste rock disposed of in TSCA
Public access to open pit leads to serious injury or fatality	West Bay	Moderately High	Moderately High	Fence erected around open pit
Person entering the open shaft becomes entrapped in confined space leading to fatality	Camlaren	Moderately High	Closed	Shaft was backfilled, engineered precast slabs were placed over mine opening, and cover material placed over slabs
Public access of mine shaft and portal leads to injury	Burnt Island	Moderately High	Closed	Mine shaft capped; portal backfilled
Person enters open portal and become entrapped, or opening may collapse causing injury	Kidney Pond	Moderately High	Closed	Portal backfilled
Migration of contaminated water from the portal impacts the environment	Kidney Pond	Moderately High	Closed	Portal closed
Person falls into open shaft, leading to fatality	Storm	Moderately High	Closed	North and south shafts sealed



**Table 16 Summary of Remediation Legacy Risk Levels**

Risk Scenario	Site	Risk Level		Comments
		Initial	End	
Person falls into open shaft, leading to fatality	Goodrock	Moderately High	Closed	North mine shaft and south pit sealed
Person falls into open shaft, leading to fatality	Murray Lake	Moderately High	Closed	Mine shaft and deep trench/shaft sealed
Existing caps collapse causing injury or death and lead to legal prosecution under Mine Health and Safety Act	Camlaren	Moderately High	Closed	Caps replaced
Cabin might collapse and cause injury or death	Camlaren	Moderately High	Closed	Structures demolished
Roof might collapse if building is entered causing injury or death	Camlaren	Moderately High	Closed	Structures demolished
Site debris such as batteries, fire assay, and metals causes environmental risks	Camlaren	Moderately High	Closed	Debris removed
Hydrocarbon contaminated soil throughout the site causes environmental damage	Camlaren	Moderately High	Closed	Impacted soil excavated and placed in TSCA
Dilapidated headframe, old mill building, and cabins might collapse if entered, lead to injury/fatality	Burnt Island	Moderately High	Closed	Structures demolished
Retaining wall collapse leads to release of containments to the lake	Camlaren	Moderate	Moderate	Retaining wall left as is. Surface water sampling at Camlaren will monitor this risk.
Tailings get mobilized by wind or ground water leading to environmental impact.	Camlaren	Moderate	Closed	Tailings incorporated into the TSCA
Surface contact with tailing by animals or people causes health issues	Camlaren	Moderate	Closed	Tailings incorporated into the TSCA
Wind blow exposure and surface contact to humans or animals causes health issues	Burnt Island	Moderate	Closed	Tailings Impoundment Area covered
Remobilization of underwater sediments from previous tailings spills cause risk to the environment	Camlaren	Moderate	Moderate	Sediments left as is. Surface water sampling at Camlaren will monitor this risk.
Remobilization of near shore sediments from previous tailings spills cause risk to the environment	West Bay	Moderate	Moderate	Sediments left as is. Surface water sampling will monitor this risk.
Remobilization of underwater sediments from previous tailings spill causes impact to environment	Burnt Island	Moderate	Moderate	Sediments left as is. Surface water sampling will monitor this risk.
Leaching of metals from waste rock into nearby wetland/pond	Storm	Moderate	Moderate	Waste rock left as is. Visual observations and surface water sampling will monitor this risk.



**Table 16 Summary of Remediation Legacy Risk Levels**

Risk Scenario	Site	Risk Level		Comments
		Initial	End	
Leaching of metals from waste rock into nearby wetland/pond	Goodrock	Moderate	Moderate	Waste rock left as is. Visual observations and surface water sampling will monitor this risk.
Leaching of metals from waste rock into nearby wetland/pond	Murray Lake	Moderate	Moderate	Waste rock left as is. Visual observations and surface water sampling will monitor this risk.
Leaching of metals from waste rock into nearby wetland/pond	Treacy	Moderate	Closed	Waste rock removed and placed in the TSCA
Acid generation and metal leaching from waste rock leads to environmental impact	West Bay	Moderate	Moderate	Waste rock left as is. Surface water sampling will monitor this risk.
Boater attempts to use dock and dock collapses resulting in injury	Camlaren	Moderate	Closed	Dock removed
Poor condition of dock leads to worker injury	Camlaren	Moderate	Closed	Dock removed; work completed
Cabin might collapse and cause injury or death	Goodrock	Moderate	Closed	Structures demolished
Release of petroleum hydrocarbons from tanks/drums/delivery system into receiving water leads to environmental impact or prosecution/warning under Fisheries Act	Kidney Pond	Moderate	Closed	Fuel tanks removed
Protruding drill rods pose health and safety risks	Kidney Pond	Moderate	Closed	Debris removed
Hydrocarbon contamination near portal may cause environmental damage	Burnt Island	Moderate	Closed	Impacted soil excavated and placed in TSCA
Hydrocarbon contamination near portal may cause environmental damage	Treacy	Moderate	Closed	Impacted soil excavated and placed in TSCA
Hydrocarbon contamination near portal may cause environmental damage	Kidney Pond	Moderate	Closed	Impacted soil excavated and placed in TSCA
Hydrocarbon contamination near portal may cause environmental damage	West Bay	Moderate	Closed	Impacted soil excavated and placed in TSCA
Site visitor walks on top of wooden culvert and it collapses leading to injury	Camlaren	Low	Closed	Structure demolished
Tailings get mobilized by wind or ground water leading to environmental impact	West Bay	Low	Closed	Tailings removed and placed in the TSCA
Hazardous material on site in breach of regulations leads to inspector's order	West Bay	Low	Closed	Hazardous material removed
Site debris creates tripping hazard leading to visitor injury	West Bay	Low	Closed	Debris removed
General site debris causes site visitor to trip and injure themselves	Kidney Pond	Low	Closed	Debris removed



**Table 16 Summary of Remediation Legacy Risk Levels**

Risk Scenario	Site	Risk Level		Comments
		Initial	End	
General site debris causes site visitor to trip and injure themselves	Storm	Low	Closed	Debris removed
General site debris causes site visitor to trip and injure themselves	Goodrock	Low	Closed	Debris removed
General site debris causes site visitor to trip and injure themselves	Murray Lake	Low	Closed	Debris removed
General site debris causes site visitor to trip and injure themselves	Treacy	Low	Closed	Debris removed
General site debris causes site visitor to trip and injure themselves	Try Me	Low	Closed	Debris removed
Drill pipes and other metal debris creates a tripping hazard leading to injury	Burnt Island	Low	Closed	Debris removed
Racks might collapse at any time causing injury	Kidney Pond	Low	Low	Core racks left in place
Falling rock from unstable waste rock piles leads to serious injury	West Bay	Low	Low	Left as is
Person climbing on waste rock might trip and get injured	Kidney Pond	Low	Closed	Waste rock removed
Caribou chased into pit by predator resulting in injury to caribou	West Bay	Low	Closed	Fence erected around open pit
Potential acid rock drainage from trenches causes environmental damage	Burnt Island	Low	Low	Waste rock left as is. Visual observations and surface water sampling will monitor this risk.
Many shallow, wide trenches close to the water may generate acid drainage and create environmental impact	Kidney Pond	Low	Low	Visual observations and surface water sampling will monitor this risk
Many shallow, wide trenches close to the water may generate acid drainage and create environmental impact	Kidney Pond	Low	Closed	Trenches backfilled
Potential acid rock drainage from trenches causes environmental damage	Treacy	Low	Low	Visual observations and surface water sampling will monitor this risk
Person falls into trenches/decline, leading to injury	Try Me	Low	Closed	Mine openings backfilled or sealed
Migration of contaminated material from backfill of stope contaminates environment	Camlaren	Low	Low	Unable to access stope due to worker safety. Surface water sampling will monitor this risk.
High metals from waste rock leaches into nearby lake leading to environmental impact	Camlaren	Low	Closed	High risk waste rock at Camlaren consolidated in TSCA
Metal leaching to receiving environment, creating impact	Burnt Island	Low	Low	Low waste rock left as is. Surface water sampling will monitor this risk.





3.4.2 Operations, Maintenance and Long-Term Monitoring

The following parties are responsible for the GLG Project including:

- CIRNAC: Site Custodian, landowner, WL and LUP holder for the Sites
- PSPC: Project Manager for the Remediation Project, on behalf of CIRNAC
- YKDFN, NWTMN and the NSMA: Asserted traditional rights holders. The GLG mine Sites are also located within the traditional territory of the Tlicho (Môwhì Gogha De Nîitlèè).

3.4.2.1 Monitoring Plans

The Plans (prepared by Stantec) that describe O&M and LTM requirements at the Sites are listed in Table 17 and are discussed in further detail below. The purpose of both plans is to confirm that the selected R/RM measures implemented during the remediation program remain protective of human health and the environment at the Sites.

Table 17 Plans Describing O&M and LTM Requirements

Report Title	Date
FINAL REPORT: Phase I Long-Term Monitoring Plan – Gordon Lake Group of Sites	December 19, 2018
DRAFT REPORT: Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites	March 29, 2019

Phase I LTM Plan

The Phase I LTM Plan was prepared in accordance with FCSAP LTM Planning Guidance and MVLWB requirements. The scope of the Plan includes the following activities:

- Monitoring to confirm the effectiveness of the R/RM strategies
- Performance monitoring of the engineered facility (TSCA)
- Surveillance Network Program (SNP)

The temporal scope for the Phase I LTM Plan will provide sufficient data to characterize post-remediation conditions. Consistent with other northern contaminated sites, this is accomplished with a monitoring program conducted for a period of five years following remediation. At the completion of this phase, results will be evaluated within a Performance Assessment Report to determine if monitoring is concluded (i.e. site closure), or if additional monitoring is required at a reduced frequency. Should monitoring results indicate remedial activities have failed to meet long-term monitoring objectives or monitoring endpoints, additional remedial effort may be required. The current Phase I LTM contains only those requirements of the initial phase of LTM (Year 1-5). The design of the next phase of monitoring, if deemed necessary, will be founded on an adaptive management approach (Stantec, 2018a).

Operations, Maintenance and Surveillance Plan

The OMS plan was developed after the completion of the active remediation phases of the project and incorporates two key monitoring plans:





- 1) Construction and Post Construction Monitoring (CPCM) Plan – Active during construction activities up until final construction demobilization in the winter of 2019.
- 2) Phase I LTM Plan – Active following the completion of construction and incorporates the post-construction phase of the CPCM. Scheduled to be implemented for a period of five years commencing after final construction demobilization in the winter of 2019 (2019-2024). The Phase I LTM Plan may include additional monitoring required based on results/adaptive management.

The OMS Plan is based significantly on the content outlined in the Phase I LTM Plan; surveillance requirements outlined in the Phase I LTM Plan were incorporated with operations and maintenance requirements of the Project to form the OMS Plan. The temporal scale of the OMS Plan is limited from the date of its acceptance until the Phase I LTM exit criteria are achieved (Stantec, 2019a).

The O&M requirements discussed in the OMS Plan focus on the TSCA as it is the primary engineered facility constructed as part of the Project (a description of the TSCA is provided in Section 3.6.2.3 of this report).

3.4.2.2 Operations and Maintenance Activities

Operations

The TSCA is a closed and non-operating facility, with planned long-term performance monitoring (i.e., surveillance) and maintenance (Stantec, 2019a). The facility has no operating components that would require day-to-day operation. Therefore, there are no ongoing and planned activities required for operational purposes. The facility will require only periodic surveillance and maintenance programs as described in Sections 6.3 and 7.0 of the OMS Plan.

There are no other remediation components that require consideration of operational activities as they have been closed and are considered non-operational.

Maintenance

TSCA

The TSCA was designed and constructed with the aim of passive closure in the long-term, where no maintenance is required unless deficiencies are detected during surveillance/monitoring activities. The maintenance plan (Section 6.3 of the OMS Plan) was developed to address the potential failure modes but, in general, the maintenance plan will be driven by the triggers described in Section 7.3 (Establishing Surveillance Decision Rules) of the OMS Plan. A summary of TSCA monitoring activities is included in Table 18, but for further information on TSCA monitoring and maintenance, refer to the OMS Plan (Stantec, 2019a).

Mine Openings

The other main remediation components considered for maintenance requirements are those associated with mine openings (i.e., backfill, cap and barrier). As there are no defined exit criteria for mine openings, it is expected that no maintenance will be required during the active closure phase (i.e. Years 1-5). However, corrective maintenance for all mine opening closure types is expected in the passive closure phase (i.e., Years 10 and 15). For the fence at West Bay, repairs are expected to be required in Year 10





and backfilled and/or capped mine openings are assumed to require corrective maintenance in Year 15. Refer to the OMS Plan for further details (Stantec, 2019a).

3.4.2.3 Long-Term Monitoring Activities

The LTM Plan has been broken up into two phases; Phase I, which covers the first five years after remediation (i.e., 2019-2024) and then reconsideration to develop an LTM Plan which covers activities for year six onward as necessary. Phase I LTM monitoring components for each GLG Site are outlined in Table 18, but can be summarized as follows:

- Backfilled/covered area monitoring
- Mine opening monitoring
- Monitoring of moderate risk waste rock left in place
- Vegetation monitoring
- Performance monitoring of the TSCA
- SNP monitoring
- Surface water sampling at West Bay
- Land use monitoring





Table 18 Long-Term Monitoring Requirements at the GLG Sites

Hazard Category	Hazard Name	Phase I Long Term Monitoring Objectives	Triggers for Adaptive Management	Phase I LTM Frequency / Target Conditions	Phase I LTM Duration		
					Year 1	Year 3	Year 5
Burnt Island							
Tailings	Tailings	Verify cover material is stable with no significant resulting erosion or washout.	Erosion/washout which exposes any tailings and/or rills >10cm.	Biennially / snow-free	X	X	X
Mine Openings	Portal	Verify backfill material is stable with no significant resulting erosion or settlement.	Major subsidence (>0.5m) of backfill is observed and/or structural concerns (e.g. deformation, cracking, etc.).	Quadrennially / frost-free	X		X
	Mine Shaft	For the shaft, also verify the structural stability of the mine opening cap.					
Waste Rock	BUR_WR_01	Verify no visual signs of ARD down-gradient of remaining impacts.	Down-gradient environment indicates signs of ARD (e.g. new loss of vegetation, stressed vegetation, discoloration, etc.).	Quadrennially / summer	X		X
Camlaren							
Metals Impacted Soil	CAM_SO_04 CAM_SO_06 CAM_SO_07 CAM_SO_08* CAM_SO_12 CAM_SO_20 CAM_SO_23*	Verify excavation backfill material is stable with no significant resulting erosion or washout into down-gradient water. *Also visually monitor vegetative health to confirm stable or increasing growth.	Erosion/washout concerns in nearby water and/or rills >10cm. *Vegetative health observed to be decreasing (and potential erosion concerns as detailed above).	Biennially / frost-free	X	X	X
	PHC Impacted Soil	CAM_SO_01 CAM_SO_03 CAM_SO_05 CAM_SO_14	Verify excavation backfill material is stable with no significant resulting erosion or washout into down-gradient water.				
Mine Openings	Shaft	Verify backfill material is stable with no significant resulting erosion or settlement. Verify the structural stability of the mine opening cap.	Major subsidence (>0.5m) of backfill is observed and/or structural concerns (e.g. deformation, cracking, etc.).	Quadrennially / frost-free	X		X
n/a	TSCA	Verify stability of cover material and slopes (includes differential settlement, slope slumping, frost heave, vegetation growth and animal activities) Inspect toe of facility and identify potential seepage. Visually monitor vegetative health to confirm stable or increasing growth.	<u>Differential settlement</u> - Differential settlement >0.5 m. <u>Slope Slumping</u> - Horizontal cracks/movement >0.3 m. <u>Surface Erosion</u> - Slopes or cover erosion >25% loss of material thickness. <u>Frost Heave</u> - Effects >0.2 m. <u>Vegetative Cover</u> - Tree species with roots >0.3 m. <u>Animal activities</u> - Animal activities (such as burrowing) >0.3 m depth. <u>Erosion Control</u> - Coco matting (~5 m) is no longer deemed effective. <u>Ditch Erosion</u> - Exposure of any amount of BGM (i.e. visible liner). <u>Ditch Blockage</u> - Any debris/object that impedes flow or causes ponding. Seepage is identified at the toe of the facility. Vegetative health observed to be decreasing (and potential erosion concerns as detailed above).	Bi-Annually / frost-free period at tail end of spring freshet, and summer	Years 1 to 5		
			Verify TSCA permeability functionality to prevent infiltration.				
		Verify chemical integrity of the TSCA via groundwater and surface water sampling. Refer to SNP Program for sampling details (SNP Stations 2016-7 and 2016-8, respectively).	Groundwater and surface water contaminant concentrations down-gradient of the TSCA show an increasing trend and/or exceed applicable guidelines for three consecutive monitoring events (after having obtained sufficient data to establish a trend).				



Table 18Long-Term Monitoring Requirements at the GLG Sites

Hazard Category	Hazard Name	Phase I Long Term Monitoring Objectives	Triggers for Adaptive Management	Phase I LTM Frequency / Target Conditions	Phase I LTM Duration		
					Year 1	Year 3	Year 5
Goodrock							
Metals Impacted Soil	GOO_HS_01	Verify cover material is stable with no significant resulting erosion or washout.	Erosion/washout which exposes any soil and/or rills >10cm.	Biennially (snow-free)	X	X	X
Mine Openings	South Pit	Verify backfill material is stable with no significant resulting erosion or settlement.	Major subsidence (>0.5m) of backfill is observed and/or structural concerns (e.g. deformation, cracking, etc.).	Quadrennially / frost-free	X		X
	North Mine Shaft	For the shaft, also verify the structural stability of the mine opening cap.					
Waste Rock	GOO_WR_01 GOO_WR_02	Verify no visual signs of ARD down-gradient of remaining impacts.	Down-gradient environment indicates signs of ARD (e.g. new loss of vegetation, stressed vegetation, discoloration, etc.).	Quadrennially / summer	X		X
Kidney Pond							
Co-Mingled Impacted Soil	KID_SO_07 KID_SO_11	Verify excavation backfill material is stable with no significant resulting erosion or washout into down-gradient water.	Erosion/washout concerns in nearby water and/or rills >10cm.	Biennially / frost-free	X	X	X
PHC Impacted Soil	KID_SO_10	Visually monitor vegetative health to confirm stable or increasing growth.					
Waste Rock	KID_WR_01	Verify excavation backfill and large area of regraded material is stable with no significant resulting erosion or washout, especially into down-gradient water. Visually monitor vegetative health to confirm stable or increasing growth.	Vegetative health observed to be decreasing (and potential erosion concerns as detailed above).				
	KID_WR_03 KID_WR_04	Verify no visual signs of ARD down-gradient of remaining impacts.	Down-gradient environment indicates signs of ARD (e.g. new loss of vegetation, stressed vegetation, discoloration, etc.).	Quadrennially / summer	X		X
Mine Openings	Portal	Verify backfill material is stable with no significant resulting erosion or settlement.	Major subsidence (>0.5m) of backfill is observed and/or structural concerns (e.g. deformation, cracking, etc.).	Quadrennially / frost-free	X		X
Murray Lake							
Mine Openings	Main Shaft	Verify backfill material is stable with no significant resulting erosion or settlement.	Major subsidence (>0.5m) of backfill is observed and/or structural concerns (e.g. deformation, cracking, etc.).	Quadrennially / frost-free	X		X
	Deep Trench/Shaft						
Waste Rock	MUR_WR_01 MUR_WR_02	Verify no visual signs of ARD down-gradient of remaining impacts.	Down-gradient environment indicates signs of ARD (e.g. new loss of vegetation, stressed vegetation, discoloration, etc.).	Quadrennially / summer	X		X
Storm Property							
Mine Openings	South Mine Shaft	Verify backfill material is stable with no significant resulting erosion or settlement.	Major subsidence (>0.5m) of backfill is observed and/or structural concerns (e.g. deformation, cracking, etc.).	Quadrennially / frost-free	X		X
	North Mine Shaft						
Waste Rock	STO_WR_01 STO_WR_02	Verify no visual signs of ARD down-gradient of remaining impacts.	Down-gradient environment indicates signs of ARD (e.g. new loss of vegetation, stressed vegetation, discoloration, etc.).	Quadrennially / summer	X		X
Treacy							
Metals Impacted Soil	TRE_SO_01	Verify excavation backfill material is stable with no significant resulting erosion or washout into down-gradient water.	Erosion/washout concerns in nearby water and/or rills >10cm.	Biennially / frost free	X	X	X
PHC Impacted Soil	TRE_SO_02	Visually monitor vegetative health to confirm stable or increasing growth.	Vegetative health observed to be decreasing (and potential erosion concerns as detailed above).				
Trenches	East Trench	Verify backfill material is stable with no significant resulting erosion or settlement.	Major subsidence (>0.5m) of backfill is observed and/or structural concerns (e.g. deformation, cracking, etc.).	Quadrennially / frost free	X		X
	West Trench						





Table 18 Long-Term Monitoring Requirements at the GLG Sites

Hazard Category	Hazard Name	Phase I Long Term Monitoring Objectives	Triggers for Adaptive Management	Phase I LTM Frequency / Target Conditions	Phase I LTM Duration		
					Year 1	Year 3	Year 5
Try Me							
Mine Openings	Shaft	Verify backfill material is stable with no significant resulting erosion or settlement. Verify the structural stability of the mine opening cap.	Major subsidence (>0.5m) of backfill is observed and/or structural concerns (e.g. deformation, cracking, etc.).	Quadrennially / frost-free	X		X
West Bay							
Mine Openings	Open Pit	Verify barrier is structurally sound and remains effective.	Barrier is no longer effective due to deterioration or damage.	Quadrennially / frost free	X		X
Waste Rock	WES_WR_01 WES_WR_02	Verify no visual signs of ARD down-gradient of remaining impacts. Verify chemistry of surrounding water bodies via surface water sampling for metals/general chemistry (sample locations shown on Figure B9.2, Appendix B): <ul style="list-style-type: none">• Runoff from waste rock (if available)• Pit lake (2 locations)• Wetland (2 locations)• Gordon Lake (3 locations) (locations consistent with previous supplemental assessment sample locations)	Down-gradient environment indicates signs of ARD (e.g. new loss of vegetation, stressed vegetation, discoloration, etc.). Surface water contaminant concentrations down-gradient of the waste rock areas show an increasing trend and/or exceed applicable guidelines for three consecutive monitoring events (after having obtained sufficient data to establish a trend).				
Various Sites							
Metals and/or PHC Impacted Soil	BUR_SO_06; CAM_SO_02/13/17/24; GOO_HS_01; KID_SO_08/09/12; MUR_SO_01; STO_HS_01	Verify that land uses do not change or result in greater exposure to contaminants of concern compared to that assumed in the risk management approach (i.e. traditional use duration, food collection, and areas frequented). Land ownership/ approvals should remain unchanged or change to a less restrictive use. Administrative monitoring approach may include contacting local Hunters and Trappers Associations (HTAs), residents, councils, etc.	Land uses change to a more restrictive form (i.e. higher use) which results in inapplicability of the exposure scenarios defined in the risk management approach.	Quinquennially			X
References: Stantec, 2018a; 2019a							





3.5 CROWN ASSETS

The Crown did not provide any major Crown assets (e.g. heavy equipment, camp equipment, scientific equipment, etc.) for the Project, nor did it provide equipment to a contractor.

3.6 POST REMEDIATION SITE CONDITIONS

3.6.1 Property Status

The Annual WL reports for 2017, 2018, and 2019 give an overview of the tasks completed in each calendar year. The remedial program is also summarized in the Post Construction (PC) report for the Project (Stantec, 2019b). The text in the following sections is based on the information in those reports.

3.6.1.1 Burnt Island

One impacted soil area was left in place and the Tailings Impoundment Area was covered for aesthetic purposes with borrow material from the adjacent hillside (Stantec, 2019b). Waste rock was left in place and will be monitored as part of LTM. Mine openings at Burnt Island were sealed; an engineered concrete cap was used to seal the mine shaft and the portal was backfilled (Stantec, 2019b). Former sumps at the Site were regraded.

A summary of the hazard components, objectives and results for Burnt Island is provided in Table 19. Remedial objectives for Burnt Island have been met.

Table 19 Burnt Island - Hazard Components, Objectives and Results

Component	Objectives	Comment / Reference
Co-mingled Impacted Soil	Excavate and consolidate in TSCA	Complete (CIRNAC, 2019; Stantec, 2019b).
PHC Impacted soil	Excavate and consolidate in TSCA	Complete (CIRNAC, 2019; Stantec, 2019b) One area was left in place to be risk managed (Table 9).
Mine Opening / Underground Working – Mine Shaft	Backfill and place an engineered cap	Completed using concrete cap. Area was covered in sand and graded (Stantec, 2019b)
Mine Opening – Portal	Backfill	Complete (Stantec, 2019b)
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA. Regrade sumps.	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).
Waste Rock	Leave in place and monitor	Incorporated into the LTM Plan (Stantec, 2018a and 2019b).
Tailings	Cover and leave in place	Complete (CIRNAC, 2019; Stantec, 2019b).



**Table 19** **Burnt Island - Hazard Components, Objectives and Results**

Component	Objectives	Comment / Reference
Hazardous Waste	Remove from site and dispose of at an approved facility	Complete (CIRNAC, 2018).
Non-Hazardous Waste	Collect, consolidate in TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).

3.6.1.2 Camlaren

Four impacted areas were left in place using a risk management approach. The Zenith shaft was sealed as per the contract specifications using an engineered cap (Stantec, 2019b).

The hazard components, objectives and results for Camlaren are summarized in Table 20. Remedial objectives for Camlaren have been met.

Table 20 **Camlaren - Hazard Components, Objectives and Results**

Component	Objectives	Comment / Reference
Co-mingled Impacted Soil	Excavate and consolidate in TSCA	Complete (CIRNAC, 2019; Stantec, 2019b).
Metals Impacted Soil	Excavate and consolidate in TSCA	Complete (CIRNAC, 2019; Stantec, 2019b). Three locations were left in place to be risk managed (Table 9).
PHC Impacted soil	Excavate and consolidate in TSCA	Complete (CIRNAC, 2019, Stantec, 2019b.). One location was left in place to be risk managed (Table 9).
Mine Opening / Underground Working – Shaft (Zenith)	Backfill and place an engineered cap	Complete (Stantec, 2019b).
Mine Opening – Mine Shaft Cap	Mark prior to remediation	Sign placed to denote location of mine shaft cap and vent raise while work was ongoing, removed when work was complete. No further action required (Stantec, 2019b).
Mine Opening – Crown Pillar	Construct barrier around crown pillar opening	Field investigations and discussions in Summer 2018 resulted in no barrier constructed as dangerous incline would make removal of the stope difficult and could negatively affect the integrity of the barrier (Stantec, 2019b).
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA.	Complete. Hoist and mill pads, concrete divide and stove oven were left in place (Stantec, 2019b).
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).
Waste Rock	Excavate and consolidate in TSCA or incorporate into the TSCA	Complete (CIRNAC, 2019; Stantec, 2019b).
Tailings	Upgrade tailings containment area (TCA) to tailings and soil containment area (TSCA).	Complete (Stantec, 2018g).



**Table 20 Camlaren - Hazard Components, Objectives and Results**

Component	Objectives	Comment / Reference
Hazardous Waste	Remove from site and dispose of at an approved facility	Complete (CIRNAC, 2018).
Non-Hazardous Waste	Collect, consolidate in TSCA	Complete (CIRNAC, 2018 and 2019).

3.6.1.3 Goodrock

One metals-impacted area was left in place, covered and will be monitored as part of LTM. The north mine shaft and south pit were dewatered and sealed in 2018. Two waste rock areas were left in place and will be monitored as part of LTM. No action was required for trenches.

The hazard components, objectives and results for Goodrock are summarized in Table 21. Remedial objectives for Goodrock have been met.

Table 21 Goodrock - Hazard Components, Objectives and Results

Component	Objectives	Comment / Reference
Metals Impacted Soil	Excavate and consolidate in TSCA	Covered and left in place to be risk managed (Table 9, CIRNAC, 2019; Stantec, 2019b).
Mine Opening - South pit	Backfill	Complete (Stantec, 2019b).
Mine Opening - North Shaft	Backfill and place an engineered cap	Complete (Stantec, 2019b).
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).
Waste Rock	Leave in place and monitor	Complete (CIRNAC, 2019). Two scattered waste rock areas were left in place and were incorporated into the LTM Plan
Hazardous Waste (Batteries)	Remove from site and dispose of at an approved facility	Complete (CIRNAC, 2018).
Non-Hazardous Waste	Collect, consolidate in TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).

3.6.1.4 Kidney Pond

Three impacted areas at Kidney Pond were left in place to be risk managed and three waste rock areas are part of the LTM program. The decline at Kidney Pond was backfilled and the portal was sealed as per contract specifications. No remedial work was required for trenches at this Site.

The hazard components, objectives and results for Kidney Pond are summarized in Table 22. Remedial objectives at Kidney Pond have been met.



**Table 23 Murray - Hazard Components, Objectives and Results**

Component	Objectives	Comment / Reference
Waste Rock	Leave in place and monitor	Incorporated into the LTM Plan (Stantec, 2018a).
Non-Hazardous Waste	Collect, consolidate in TSCA	Complete (CIRNAC, 2018 and 2019; Stantec 2019b).

3.6.1.6 Storm Property

The only impacted area identified at Storm (metals-impacted) was left in place. The north and south mine shafts were dewatered and then backfilled. Waste rock was left in place and will be monitored as part of LTM. No remedial action was required for trenches present at this Site.

The hazard components, objectives and results for Storm are summarized in Table 24. Remedial objectives for Storm have been met.

Table 24 Storm - Hazard Components, Objectives and Results

Component	Objectives	Comment / Reference
Metals Impacted Soil	Excavate and consolidate in TSCA	Left in place to be risk managed (Table 9, CIRNAC, 2018; Stantec, 2019b).
Mine Openings – North and South Shafts	Backfill	Complete (Stantec, 2019b).
Waste Rock	Leave in place and monitor	Incorporated into the LTM Plan (Stantec, 2018).
Hazardous Waste (Batteries)	Remove from site and dispose of at an approved facility	Complete (CIRNAC, 2018).
Non-Hazardous Waste	Collect, consolidate in TSCA	Complete (CIRNAC, 2019).

3.6.1.7 Treacy

Tailings were removed from the west trench, and both the east and west trench were backfilled.

The hazard components, objectives and results for Treacy are summarized in Table 25. Remedial objectives for Treacy have been met.

Table 25 Treacy - Hazard Components, Objectives and Results

Component	Objectives	Comment / Reference
Metals Impacted Soil	Excavate and consolidate in TSCA	Complete (CIRNAC, 2019; Stantec, 2019b).
PHC Impacted soil	Excavate and consolidate in TSCA	Complete (CIRNAC, 2019; Stantec, 2019b).
Trenches	East trench - backfill; West trench - remove tailings and backfill	Complete. Backfilled with sand and covered with vegetation (Stantec, 2019b).
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).
Waste Rock	Excavate and consolidate in TSCA	Complete (CIRNAC, 2019; Stantec, 2019b).
Tailings	Excavate and consolidate in TSCA	Complete (CIRNAC, 2019; Stantec 2019b).



**Table 25 Treacy - Hazard Components, Objectives and Results**

Component	Objectives	Comment / Reference
Hazardous Waste (Lead Paint)	Remove from site and dispose of at an approved facility	Complete (CIRNAC, 2018).
Non-Hazardous Waste	Collect, consolidate in TSCA	Complete (CIRNAC, 2018 and 2019; Stantec 2019b).

3.6.1.8 Try Me

The mine shaft was sealed in August 2018, as per the contract specifications. Trenches were left as is.

Remedial objectives for Try Me have been met. A summary of remedial work completed is presented in Table 26.

Table 26 Try Me - Hazard Components, Objectives and Results

Component	Objectives	Comment / Reference
Mine Opening - Shaft	Backfill and place an engineered cap	Complete (Stantec 2019b). Note: cap was not placed – a foam plug was used.
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA	Complete (CIRNAC, 2019; Stantec 2019b).
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA	Complete (CIRNAC 2019; Stantec 2019b).
Hazardous Waste (Batteries)	Remove from site and dispose of at an approved facility	Complete (CIRNAC, 2018).
Non-Hazardous Waste	Collect, consolidate in TSCA	Complete (CIRNAC, 2019; Stantec 2019b).

3.6.1.9 West Bay

Two large waste rock piles at West Bay were left in place and will be monitored as part of LTM. A chain link fence was installed around the open pit.

A summary of remedial work completed at West Bay is presented in Table 27. Remedial objectives for West Bay have been met.

Table 27 West Bay - Hazard Components, Objectives and Results

Component	Objectives	Comment / Reference
Co-mingled Impacted Soil	Excavate and consolidate in TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).
Metals Impacted Soil	Excavate and consolidate in TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).
PHC Impacted soil	Excavate and consolidate in TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).



**Table 27 West Bay - Hazard Components, Objectives and Results**

Component	Objectives	Comment / Reference
Mine Opening – Open Pit	Place a barrier around pit	Complete; chain link fence was installed (Stantec, 2019b).
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b). Note: Core racks were left in place.
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).
Waste Rock	Monitor in place	Further assessments were completed on the waste rock at West Bay following recommendations in the RAP. This waste rock was left in place and has been incorporated into the LTM Plan (Stantec, 2018).
Tailings	Excavate and consolidate in TSCA	Complete (CIRNAC, 2018; Stantec, 2019b).
Hazardous Waste (Battery)	Remove from site	Complete (CIRNAC, 2018).
Non-Hazardous Waste	Collect, consolidate in TSCA	Complete (CIRNAC, 2018 and 2019; Stantec, 2019b).

3.6.2 Protection of Crown Investments

Several features remained in place upon completion of the remediation program. These include Camp structures, seals over mine openings, the TSCA, and instrumentation installed to monitor the TSCA.

3.6.2.1 Camp

As described in Section 3.3.2.2, a Camp was established at Zenith Island to support remediation work at the GLG Sites. Following final demobilization, the wooden structures that had formed the Camp were emptied, cleaned and left on-site. The Camp structures were transferred to the YKDFN following demobilization. These structures are no longer considered Crown assets.

3.6.2.2 Mine Opening Remediation

During the remediation program, mine openings were sealed as per the contract specifications (Stantec, 2019b). Table 28 provides details on the remediation of each mine opening. DNV obtained approval from the WSCC for closures, as required. Mine openings listed in this table are part of the Phase I LTM plan and will be monitored in Years 1 and 5 (2019 and 2024). For further details, refer to the Phase I LTM Report and Year 1 LTM results report (Stantec, 2018a and 2020).



**Table 28** **Summary of Mine Opening Remediation**

Site	Area	Figure in Appendix B	Specification Details	Description of Work Completed
Burnt Island	Mine Shaft	Figure B1.3	Backfill and engineered cap	The shaft was closed with a polyurethane foam plug, reinforced concrete cap and covered with granular fill.
	Portal	Figure B1.4	Backfill	The portal opening and mine tunnel were closed with granular fill.
Camlaren (Zenith)	Mine Shaft	Figure B2.5	Backfill and engineered cap	The shaft was closed with granular fill, capped with reinforced pre-cast concrete panels and covered with granular fill.
Goodrock	North Mine Shaft	Figure B3.3	Backfill and engineered cap	The shaft was closed with a polyurethane foam plug and covered with granular fill.
	South Pit (& adjacent trench)	Figure B3.3	Backfill	The pit was closed with a polyurethane foam plug and covered with granular fill.
Kidney Pond	Portal	Figure B4.5	Backfill and engineered cap	The portal opening and mine tunnel were closed with granular fill.
Murray Lake	Main Shaft	Figure B5.3	Backfill	The shaft was closed with a polyurethane foam plug and covered with granular fill.
	Deep Trench/Shaft	Figure B5.3	Backfill	The trench/shaft was closed with a polyurethane foam plug and covered with local material.
Storm	North Mine Shaft	Figure B6.2	Backfill	The shaft was closed with a polyurethane foam plug and covered with granular fill.
	South Mine Shaft	Figure B6.2	Backfill	The shaft was closed with a polyurethane foam plug and covered with granular fill.
Try Me	Mine Shaft	Figure B8.2	Backfill and engineered cap	The shaft was closed with a polyurethane foam plug and covered with granular fill.
West Bay	Open Pit	Figure B9.2	Install barrier	The pit was barricaded with a perimeter fence (chain link).
Reference: Stantec 2019b				

Mine Opening Monitoring

As part of the Phase I LTM plan, each mine opening remediated through backfilling and/or capping, or through installation of a barrier, will be visually inspected for backfill settlement and structural stability of the engineered cap / barrier (Stantec, 2018a).

If quadrennial inspections indicate that the backfill material has not settled more than a total of 0.5 m (from the original elevation) and the cap is structurally stable (e.g. no deformation or cracking observed), the action levels will be considered met (i.e., no further action required). Otherwise, the action levels will not be considered met and this will constitute a trigger for action, and review and/or modification of the remedial design components will be required (Stantec, 2018a).

As stated in the Phase I LTM plan for the Project, there are no exit criteria associated with mine openings unless otherwise authorized by AHJs.



3.6.2.3 TSCA

The pre-existing TCA at Camlaren was upgraded to a TSCA and was designed to incorporate impacted material (soil, tailings, waste rock) and non-hazardous debris (metal, wood, etc.) from the Sites. Impacted material and non-hazardous debris was consolidated at the TCA in 2017 and 2018. Construction of the TSCA began in July 2018 and was completed in September 2018.

Stantec conducted a post-construction inspection of the TSCA on October 2, 2018 and prepared a report with TSCA observations, photos, and recommendations (Stantec 2018i). Furthermore, DNV conducted a survey to produce As-Built drawings following the completion of the TSCA construction. Stantec prepared an As-Built Construction report summarizing the design details, deviations, and Stantec's interpretation of the As-Built drawings (Stantec 2018g).

As described in the As-Built report, the TSCA was constructed by placing an engineered cover over approximately 23,400 m³ of mine waste (Stantec 2018g). The following activities were performed during construction:

- The slopes were stabilized by regrading the perimeter embankments and regrading slopes.
- Bituminous Geomembrane (BGM) was placed to prevent infiltration from entering the waste. The composite BGM cover was placed on sand bedding, and 0.5 m of sand cover was placed over the BGM. The composite BGM cover was placed over the entire TSCA and slopes.
- Erosion protection was implemented by placing vegetation (willow branches/cuttings) on the top and coarse sand with rockfill on the slopes, which were also protected with semi-circle shaped coco-mats.
- Lined surface runoff ditches were constructed on the northwest and south perimeters to control drainage away from the TSCA and prevent pooling against the embankment.
- Toe drains were incorporated into low-lying areas to the northeast and southeast.

The TSCA is oval in shape, about 200 m (south to north) by 130 m (east to west) covering an area of approximately 2.5 hectares (ha). The top of the TSCA is cone shaped with slopes of approximately 4% shedding the surface runoff toward the perimeters. The embankments on average are about 2 to 4 m high and up to 5 m high at the highest section on the north.

The composite BGM cover was placed over the entire TSCA and slopes. In the embankment toe areas, the BGM was placed on the prepared bedrock foundation and covered with sand/bentonite mixture. In naturally low topography areas, the BGM liner was not secured to bedrock but instead rockfill toe drains were constructed to relieve pore pressures, if they were to develop within the TSCA at any point in time.

Perimeter ditches were constructed on the northwest perimeter – Northern Ditch (Ditch 1 on the design drawings issued as part of the DBR) and on the south perimeter – Southern Ditch (Ditch 2 on the design drawings issued as part of the DBR). The ditches were lined with the BGM and covered with riprap. The BGM extended from the slopes into the ditches as one unit, to prevent water backflow into the TSCA.

General characteristics of the TSCA are presented in Table 29, and general characteristics of the TSCA dams are presented in Table 30.

**Table 29 TSCA General Characteristics**

TSCA General Properties	TSCA Characteristics
TSCA Area	2.5 ha
TSCA Peak Elevation	300.5 m
TSCA Slope	3 - 4%
Berm Composition	Sand filled dam with BGM composite cover
Composite BGM Cover	BGM liner placed on sand bedding and covered with 0.5m of sand cover
Discharge Facilities	Perimeter ditches, Northern Ditch - Ditch 1 and Southern Ditch – Ditch 2
Reference: Stantec 2018g	

Table 30 TSCA Dams Characteristics

Dam Name	North Embankment	East Embankment	South Embankment
Dam (Embankment) Composition	Sand filled dam with BGM Composite Cover	Sand filled dam with BGM Composite Cover	Sand filled dam with BGM Composite Cover
Embankment Purpose	Main tailings containment dam converted into solid mine waste containment embankment	East tailings containment dam converted into solid mine waste containment embankment	South tailings containment dam converted into solid mine waste containment embankment
Nominal Height (m)	5 m	4-4.5 m	2 m
Berm Crest Elevation	297.75 m	297.5-297.75 m	297.75 m
Nominal Length (m)	160 m	160 m	60 m
Downstream Slope (H:1V)	3	3	3
Chainages (m)	0 - 160	0+160 - 0+330	0+330 - 0+390
Reference: Stantec 2018g			

3.6.2.4 Instrumentation

Instrumentation was installed within the TSCA, and around it, to evaluate the long-term performance of the facility. Instrumentation in the TSCA includes two thermistors (VT), three locations for vibrating wire piezometers (VB) with double-nested vibrating wire sensors, and two standpipe monitoring wells (MW; Stantec, 2018a). Four monitoring wells were installed outside of the TSCA footprint as part of the TSCA perimeter monitoring for the SNP sampling. Table 31 provides a general overview of instrumentation.

Table 31 Overview of Instrumentation

ID	Type of Installation	Northing	Easting
VT1	Thermistor String	6986005	388351
VT2	Thermistor String	6986055	388352
VB1	Vibrating Wire Piezometers	6985957	388335
VB2	Vibrating Wire Piezometers	6986026	388381
VB3	Vibrating Wire Piezometers	6986079	388353



**Table 31 Overview of Instrumentation**

ID	Type of Installation	Northing	Easting
MW1	Monitoring Well	6986005	388356
MW2	Monitoring Well	6986051	388352
MW3*	Monitoring Well	6986073	388393
MW4*	Monitoring Well	6985962	388376
MW5*	Monitoring Well	6985922	388236
MW6*	Monitoring Well	6986066	388238
*Monitoring well outside of the TSCA footprint and part of the SNP sampling Reference: Stantec, 2018a			

3.6.3 Land Management Approach

The GLG Sites were included as federal land exclusions due to their status as Waste Sites under the Devolution Agreement. Access to the Sites are through GNWT Public Lands. CIRNAC currently holds a Type "A" LUP which expires in December 2021 (refer to Section 3.7.1). CIRNAC will likely apply to extend the permit to 2023.

3.6.4 Post Remediation Site Use Restrictions

As of the date of this report, there are no restrictions to site use related to environmental site conditions following completion of remediation at the GLG Sites. Because CIRNAC holds a LUP for the GLG Sites, any third party planning to conduct an activity triggering a LUP from the MVLWB must consult with CIRNAC. It is recommended that land users in the area avoid the site for the protection of remedial landforms.

3.7 REGULATORY AUTHORIZATIONS

3.7.1 Water Licence and Land Use Permit

The MVLWB regulates the use of land and water in NT through the issuance of LUPs and WLs as per the *Mackenzie Valley Resource Management Act (MVRMA)*, the *Waters Act* and Regulations, and the *Mackenzie Valley Land Use Regulations (MVLUR)*.

Based on the nature of activities that were planned during the GLG Project, CIRNAC was required to obtain a LUP and a WL from the MVLWB (Table 32). Included within the LUP and WL were terms and conditions to be adhered to during the planning, construction, operation, and closure of the Project.





Table 32 Water Licence and Land Use Permit

Document	Issued By	Number	Date Issued	Date of Expiry
Type A Land Use Permit	MVLWB	MV2016X0021	December 19, 2016	December 18, 2021*
Type B Water Licence	MVLWB	MV2016L8-0006	February 16, 2017	December 18, 2023

*CIRNAC will likely apply to extend this permit to 2023

3.7.2 Quarry Permits

Quarry Permits (QPs) were issued for use of borrow sources GD-37 and GD-45 (Table 33). As a requirement of the QPs, monthly reports were issued to document the quantity of material quarried.

Table 33 Quarry Permits

Document	Issued By	Number	Date Issued	Notes
Quarry Permit (Federal)	CIRNAC	2018QP0001	Jan 2, 2018	This permit was superseded
Quarry Permit (Federal)	CIRNAC	2018QP0002	Feb 9, 2018	Permit was closed
Quarry Permit (Territorial)	Government of Northwest Territories	2017QP0004	Feb 24, 2018	Permit was closed

3.7.3 Burn Permits

Burning of wood waste required Burn Permits from the ENR and were obtained by DNV as required. Water was withdrawn for fire suppression in areas where controlled burns were conducted (i.e., in the months of August and October [2017], and June and July [2018]). Further details can be found in Section 5.2.2.6 of the Post Construction report and in the monthly SNP reports.





4.0 Evaluating the Project

4.1 SCOPE AND SCHEDULE VARIANCE

Overall, the Project was completed within the planned timeframe. Some delays in regulatory submissions occurred due to a compensation claim submitted by the owner of a fishing lodge located north of the GLG Sites. Despite this, on-site work was completed in 2019 and the remediation contract was closed in 2020. Scope and schedule variances are presented in Table 34.

Table 34 Scope and Schedule Variances

Task (and sub-task)	Task Complete?	Year Planned	Year Completed	Comment
Task 1 – Care and Maintenance				
1.1 Post warning signs at site and make hazards more visible	Yes	2014	2014	
Task 2 – Regulatory				
2.1 Obtain Land Use Permit	Yes	2016	2017	Delay in permitting resulted in 1-year project delay
2.2 Obtain Water Licence	Yes	2016	2018	Delay in permitting resulted in 1-year project delay
2.3 Obtain Quarry Permit	Yes	2015	2017	Multiple quarry permits applied for based on need for material
2.4 Arctic Research Institute Research Licence	Yes	2015	2015	Complete
2.5 Archaeological permit/assessment	Yes	2015	2015	Additional archeological assessment was completed in 2017
Task 3 – Consultation				
3.1 Community Consultation / Engagement	Yes	2020	2020	Ongoing throughout project. Will continue into LTM.
3.2 Third Party Issues	Yes	2015	2015	Engagement with Mine Heritage Society and Mineral Interests
3.3 Site Tours	Yes	2015-2019	2015-2019	Annual site visits with YKDFN
3.4 Communications	Yes	2020	2020	Ongoing throughout project. Will continue into LTM.
Task 4 – Investigation				
4.1 Environmental Site Assessment	Yes	2010-2017	2017	Environmental Site Assessments, Gap Analysis, Borrow Source Investigation, Archaeological Impact Assessment, Winter Road Route Evaluation
4.2 Human Health and Ecological Risk Assessment	Yes	2014	2014	



**Table 34** **Scope and Schedule Variances**

Task (and sub-task)	Task Complete?	Year Planned	Year Completed	Comment
Task 5 – Remediation				
5.1 Remediation Plan	Yes	2016	2016	Final RAP and Class C Cost Estimate
5.2 Specifications Development	Yes	2016	2016	Final specifications complete
5.3 Cost Estimate	Yes	2016	2016	Final Cost Estimate
5.4 Procurement	Yes	2017	2017	Remediation and Prime Consultant contract awarded
5.5 Remediation Contract	Yes	2020	2020	Work completed in 2019. Contract closed in 2020.
5.6 Prime Consultant Contract	Yes	2020	--	Contract extended into year 2 of LTM
5.7 H&S Audit and/or Inspection	Yes	2020	2020	Remediation and Prime Consultant Contract complete
5.8 Training Program	Yes	2020	2020	Ongoing throughout project. Will continue into LTM.
Task 6 – Monitoring				
6.1 Construction and Post-Construction Monitoring	Yes	2020	2020	Completed with end of remediation
6.2 Short-term Monitoring	N/A	2023	N/A	Phase I LTM is being conducted now that program is in monitoring phase
6.3 Monitoring Performance Assessment Report and Phase II LTMP	N/A	N/A	N/A	Performance Assessment Review (PAR) will be conducted at the end of Phase I LTM
6.4 Lodestar	Yes	2020	2020	Ongoing throughout project. Will continue into LTM.

4.1.1 Scope

Remediation of the GLG Sites was completed with some variance to the original scope of work described in the RAP. This variance was a result of necessary design changes following additional field work. The most notable changes were the removal of the Landfarm and the WRSCA from the Project scope, a redesign of the TSCA to accommodate waste originally planned for these facilities, and the use of a risk management approach for some of the impacted soil areas. Refer to Section 3.3.2.1 for further details. The remediation and achievement of overall project objectives were not significantly impacted by the changes to original Project scope.

4.1.2 Schedule

Upon contract award, the Prime Contractor's remediation schedule involved two years of remediation commencing in February 2017 and concluding in March 2019 with a full year of contingency planned for the 2019/20 fiscal year. Initially, the remediation project was pushed back by one year due to delays in





the issuance of key regulatory authorizations negating the Prime Contractor's ability to fully mobilize in 2017. Schedule efficiencies during the 2018 winter and summer construction season allowed for the completion of the project on schedule with final demobilization occurring in March 2019.

4.2 COST VARIANCE

Financial information for each fiscal year is provided in Table 35. The table presents estimated costs from the Detailed Work Plans (DWPs) for fiscal years 2009/10 through 2019/20 for the total cost to complete the project as well as the estimated remaining cost to complete the project from the fiscal year in question. These estimates were prepared at the beginning of each fiscal year and were revised on an annual basis considering work that had been completed in previous years. The budget and actual cost information is also presented for each fiscal year. The comments section is used to provide an explanation for variances between budgeted and actual costs.

Table 36 provides an overview of the construction costs. The construction was funded under the Federal Contaminated Sites Action Plan (FCSAP), Phase III.





Table 35 Total Project Cost, Year-over-year

Fiscal Year	Description of Major Categories	Budget	Actual	Variance	Comment
2009/10 2010/11	<ul style="list-style-type: none"> Investigations cost of \$1,140,968 in 2009/10/11, which included twelve Phase I / II ESAs and two Phase III ESAs. 		\$1,140,968		No DWP's produced for these years.
2011/12		\$0	\$0		No work conducted this year (according to 2012/13 DWP)
2012/13	<ul style="list-style-type: none"> Site Investigation & Assessment - \$839,269 Project Management - \$56,723 	\$962,333	\$895,992	\$66,341	<p>In Change Request #1 (Sept. 4, 2012), there was an increase in O&M Budget by \$184,192 from the total budget of \$962,333 to the new forecast of \$1,146,525. This increase was to cover additional costs for the assessment of the sites (consultant budget was higher than original amount allotted for assessment), HHERAs if time permitted at the end of the fiscal year, and to cover PWGSC project management costs. PWGSC was not originally scheduled to work on the Gordon Lake sites since CIRNAC capacity was sufficient during the planning stages of the project. Staff departures and work force adjustment affecting the CIRNAC procurement group led to this modification of the procurement approach.</p> <p>In Change Request #2 (Oct. 24, 2012), the budget was decreased \$240,453 from \$1,146,525 to \$906,072. The decrease was due to salaries and program tax not being required by CARD programs due to reduced capacity, and a decision that there would not be sufficient time to complete the HHERAs.</p>





Table 35 Total Project Cost, Year-over-year

Fiscal Year	Description of Major Categories	Budget	Actual	Variance	Comment
2013/14	<ul style="list-style-type: none"> Regulatory - \$12,036 Consultation - \$12,456 Site Investigation & Assessment - \$1,016,552 Site Remediation - \$80,248 Project Management - \$232,343 	\$1,385,434	\$1,353,926	\$31,508	<p>In Change Request #1 (September 16, 2013), there was an increase in O&M budget by \$475,557 which brought the total budget up to \$1,404,215. This increase was required as the proposed risk assessment activities were more costly than initially estimated. (CDMS - #586097)</p> <p>In Change Request #2 (October 13, 2013), there was an increase in O&M Budget bringing the project to the current operating budget of \$1,434,300. This change request also reallocated funds within the project to accommodate minor changes within the assessment work completed (i.e. weather days, etc) and lowering the G&C allocation to match the updated consultation scope for 2013/14. (CDMS - #589956)</p>
2014/15	<ul style="list-style-type: none"> Site Investigation & Assessment - \$141,853 Site Remediation - \$81,362 Project Management - \$160,817 	\$475 000	\$384,032	\$90,968	<p>In Change Request #1 (July 8, 2014), there was a reallocation of \$25,000 from the assessment funding to cover the non-FCSAP eligible sites within the Gordon Lake project. (CIDM # 657872)</p> <p>In Change Request #2 (October 28, 2014), there was a decrease in budget by \$32,721 which brought the total budget down to \$442,279. This decrease was a reduction in G&Cs due to delays in the overall project progress, change in plans due to the 2014 forest fires and to update remedial options developed by SLR and refined by Stantec (CIDM#670230).</p> <p>The variance between current budget and the current year end forecast is a surplus of ~\$73k (\$37k in O&M and \$35k in G&C) as a result of project delays and the attention that other high priority projects have taken away from the Gordon Lake Group project (such as Tundra Mine), limiting the ability to move the project forward, as well as cancelling steering committee meetings for this project due to its delays.</p>
2015/16	<ul style="list-style-type: none"> Finalization of RAP 	\$1,342,705	\$1,242,705	\$100,000	***unable to find 15/16 Q4





Table 35 Total Project Cost, Year-over-year

Fiscal Year	Description of Major Categories	Budget	Actual	Variance	Comment
2016/17	<ul style="list-style-type: none"> Regulatory - \$47,148 Consultation - \$16,294 Site Investigation & Assessment - \$425,211 Site Remediation - \$1,412,587 Monitoring - \$47,794 Project Management - \$340,377 	\$2,727,554	\$2,559,109	\$168,435	\$168,435 was surplused at year-end relating to funds PSPC held onto within the project Standing Supply Arrangement and additional surplus identified within the project budget at year end.
2017/18	<ul style="list-style-type: none"> Majority of budget was spent on remediation (\$9.1M) with the remaining spent on project management (\$454k), regulatory (\$330k) and consultation (\$150k) 	\$9,361,917	\$11,061,792	(\$1,699,875)	Multiple change orders in response to additional costs associated with the remediation contract and regulatory delays. Increase in project management costs due to higher level of effort by PSPC required to manage high risk Prime Contract.
2018/19	<ul style="list-style-type: none"> Majority of budget was spent on remediation (\$8.75M) with remaining costs in consultation (\$10k), monitoring (\$40k) and project management (\$431k) and O&M (\$865k) 	\$10,990,753	\$10,571,781	\$418,972	Multiple change orders in response to additional costs associated with the remediation contract and regulatory delays. Increase in project management costs due to higher level of effort by PSPC required to manage high risk Prime Contract.
2019/20	<ul style="list-style-type: none"> Monitoring (\$185k), project management (\$168k), remediation (\$126k), regulatory (\$22k), consultation (\$6k) 	\$945,130	\$884,166	\$60,964	Completion of remediation and first year of monitoring
TOTAL		28,190,826	\$30,094,471		





Table 36 Construction Cost by FCSI, AEC, Work Package

Construction		Class A	Bid	Actual	Comment
FCSI	Work Package				
Class 1: SM320 – Burnt Island SM205 – Camlaren SM466 – Goodrock SM474 – Kidney Pond SM302 – West Bay Class 2: SM490 – Murray Lake SM483 – Storm Property SM475 – Treacy SM488 – Try Me	Gordon Lake Group Remediation	\$36,030,825	\$12,489,805.87	\$18,595,921.08	<ul style="list-style-type: none"> The costs provided include both direct and indirect costs associated with the delivery of the remediation project. They do not include the Resident Engineer costs. Variance between Class A cost estimate and bid price associated with changes in proposed schedule and methodology. Variance between bid price and actual cost is associated with project delays due to timing of regulatory permits, and the scope and methodology changed significantly over the course of the project.
Total Project Remediation Costs		\$36,030,825	\$12,489,805.87	\$18,595,921.08	





The variance between the Class A cost estimate and the bid price was attributed to the differences in methodology and schedule. The Class A cost estimate assumed that the remediation would take 3 years to complete and that the majority of work would be conducted in the summer construction seasons. The successful bid assumed that the work could be completed in 2 years. Given the significant discrepancy between the bid price and the Class A estimate, an assessment of the bid price was completed by a third party to determine if there was a fatal flaw in the bid pricing. It was determined that based on the information provided by the bidder that none of the individual cost items were unreasonable, given the proposed methodology.

The variance between the Class A cost estimate and the bid price was significant. An evaluation of the bid and confirmation from the bidder determined that there was not a fatal flaw in the bid price and that based on the scheduling and methodology proposed, the Project could be completed at the bid price. There is also a significant variance between the bid price and the final contract value. This variance is based on delays in receiving regulatory permits impacting the contractor's ability to proceed with project activities as planned and changes to the magnitude of impacted soils to be excavated, which led to changes in proposed methodology to limit unnecessary environmental impacts created by the remediation. Despite the increased cost of the bid, the final cost was still less than the Class A estimate and lower than the second-place bid cost of \$28,000,000. Ultimately the project objectives were met at the lowest cost to the Crown and in an environmentally sustainable fashion.

5.0 FCSAP Reporting

Table 37 provides a summary of how FCSAP funding has been spent on the GLG sites.

Table 37 FCSAP Reporting Summary

Site	Fiscal Year	Status (10-Step Process)	Major Expenditures	Estimated Liability at the end of fiscal year
Burnt Island	2009/10	Step 1	\$156,174.00	\$1,469,600.00
Burnt Island	2010/11	Step 2	\$0	\$1,518,097.00
Burnt Island	2011/12	Step 3	\$0	\$2,440,071.00
Burnt Island	2012/13	Step 4 Step 5 Step 6	\$153,378.38	\$2,016,721.00
Burnt Island	2013/14	Step 7	\$0	\$2,016,721.00
Burnt Island	2014/15	Step 7	\$21,287.40	\$1,482,599.00
Burnt Island	2015/16	Step 7	\$47,741.95	\$1,869,093.00
Burnt Island	2016/17	Step 8	\$111,492.80	\$1,097,085.00
Burnt Island	2017/18	Step 8	\$475,917.55	\$731,278.00
Burnt Island	2018/19	Step 8	\$433,932.65	\$152,492.00
Burnt Island	2019/20	Step 8	Not recorded at time of publication	Not recorded at time of publication



**Table 37 FCSAP Reporting Summary**

Site	Fiscal Year	Status (10-Step Process)	Major Expenditures	Estimated Liability at the end of fiscal year
Camlaren	2008/09	Step 1	\$16,625.21	\$0
Camlaren	2009/10	Step 1	\$156,174.00	\$2,331,510.00
Camlaren	2010/11	Step 2	\$0	\$2,408,450.00
Camlaren	2011/12	Step 2	\$0	\$3,892,247.00
Camlaren	2012/13	Step 3 Step 4	\$219,703.16	\$4,169,860.00
Camlaren	2013/14	Step 5 Step 6 Step 7	\$0	\$3,288,749.00
Camlaren	2014/15	Step 7	\$127,722.70	\$8,895,592.00
Camlaren	2015/16	Step 7	\$286,454.25	\$10,979,706.00
Camlaren	2016/17	Step 8	\$891,939.85	\$8,578,626.00
Camlaren	2017/18	Step 8	\$3,807,341.25	\$5,747,373.00
Camlaren	2018/19	Step 8	\$3,471,464.60	\$1,461,522.00
Camlaren	2019/20	Step 8	Not recorded at time of publication	Not recorded at time of publication
Goodrock	2005/06	Step 1	\$0	N/A
Goodrock	2006/07	Step 2	\$0	N/A
Goodrock	2007/08	Step 2	\$0	N/A
Goodrock	2008/09	Step 2	\$0	N/A
Goodrock	2009/10	Step 3	\$156,174.00	\$837,500.00
Goodrock	2010/11	Step 3		\$865,138.00
Goodrock	2011/12	Step 4		\$1,364,815.00
Goodrock	2012/13	Step 4 Step 5 Step 6	\$125,203.44	\$1,321,764.00
Goodrock	2013/14	Step 7	\$81,559.20	\$1,042,469.00
Goodrock	2014/15	Step 7	\$21,287.40	\$1,482,599.00
Goodrock	2015/16	Step 7	\$47,741.95	\$1,829,951.00
Goodrock	2016/17	Step 8	\$111,492.80	\$1,072,328.00
Goodrock	2017/18	Step 8	\$475,917.55	\$718,422.00
Goodrock	2018/19	Step 8	\$433,932.65	\$146,152.00
Goodrock	2019/20	Step 8	Not recorded at time of publication	Not recorded at time of publication
Kidney Pond	2005/06	Step 1	\$0	N/A
Kidney Pond	2006/07	Step 2	\$0	N/A
Kidney Pond	2007/08	Step 2	\$0	N/A



**Table 37 FCSAP Reporting Summary**

Site	Fiscal Year	Status (10-Step Process)	Major Expenditures	Estimated Liability at the end of fiscal year
Kidney Pond	2008/09	Step 3	\$0	N/A
Kidney Pond	2009/10	Step 3	\$156,174.00	\$2,546,920.00
Kidney Pond	2010/11	Step 4		\$2,630,968.00
Kidney Pond	2011/12	Step 4		\$4,252,628.00
Kidney Pond	2012/13	Step 5	\$173,325.86	\$4,558,324.00
Kidney Pond	2013/14	Step 5 Step 6	\$281,270.95	\$3,595,129.00
Kidney Pond	2014/15	Step 7	\$85,148.75	\$5,930,394.00
Kidney Pond	2015/16	Step 7	\$190,968.65	\$7,319,804.00
Kidney Pond	2016/17	Step 7	\$668,954.25	\$6,433,970.00
Kidney Pond	2017/18	Step 8	\$2,855,505.30	\$4,310,530.00
Kidney Pond	2018/19	Step 8	\$2,603,599.30	\$584,609.00
Kidney Pond	2019/20	Step 8	Not recorded at time of publication	Not recorded at time of publication
Murray Lake	2011/12	Step 1	\$6,206.34	N/A
Murray Lake	2012/13	Step 2	\$24,562.43	\$2,000,000.00
Murray Lake	2013/14	Step 3 Step 4	\$0	\$718,014.00
Murray Lake	2014/15	Step 5	\$0	\$1,482,599.00
Murray Lake	2015/16	Step 5 Step 6	\$69,073.33	\$1,829,951.00
Murray Lake	2016/17	Step 7	\$0	\$274,271.00
Murray Lake	2017/18	Step 8	\$0	\$182,819.00
Murray Lake	2018/19	Step 8	\$0	\$38,123.00
Murray Lake	2019/20	Step 8	Not recorded at time of publication	Not recorded at time of publication
Storm Property	2010/11	Step 1	\$0	\$768,955.00
Storm Property	2011/12	Step 4	\$0	\$1,215,623.00
Storm Property	2012/13	Step 4	\$0	\$1,190,991.00
Storm Property	2013/14	Step 5 Step 6	\$69,169.60	\$939,359.00
Storm Property	2014/15	Step 7	\$0	\$1,482,599.00
Storm Property	2015/16	Step 7	\$63,317.22	\$1,829,951.00
Storm Property	2016/17	Step 7	\$0	\$268,082.00
Storm Property	2017/18	Step 8	\$0	\$179,605.00
Storm Property	2018/19	Step 8	\$0	\$36,538.00



**Table 37 FCSAP Reporting Summary**

Site	Fiscal Year	Status (10-Step Process)	Major Expenditures	Estimated Liability at the end of fiscal year
Storm Property	2019/20	Step 8	Not recorded at time of publication	Not recorded at time of publication
Treacy	2004/05	Step 1	\$0	N/A
Treacy	2005/06	Step 2	\$0	N/A
Treacy	2006/07	Step 2	\$0	N/A
Treacy	2007/08	Step 2	\$0	N/A
Treacy	2008/09	Step 4	\$0	N/A
Treacy	2009/10	Step 4	\$156,174.00	N/A
Treacy	2010/11	Step 4	\$0	\$826,400.00
Treacy	2011/12	Step 4	\$0	\$1,310,721.00
Treacy	2012/13	Step 5	\$156,174.00	\$1,297,414.00
Treacy	2013/14	Step 5 Step 6	\$0	\$1,023,264.00
Treacy	2014/15	Step 7	\$0	\$1,482,599.00
Treacy	2015/16	Step 7	\$0	\$1,829,951.00
Treacy	2016/17	Step 7	\$0	\$268,082.00
Treacy	2017/18	Step 8	\$0	\$179,605.00
Treacy	2018/19	Step 8	\$0	\$36,538.00
Treacy	2019/20	Step 8	Not recorded at time of publication	Not recorded at time of publication
Try Me	2010/11	Step 1	\$0	N/A
Try Me	2011/12	Step 2	\$6,206.34	N/A
Try Me	2012/13	Step 2 Step 3 Step 4	\$33,869.87	\$1,000,000.00
Try Me	2013/14	Step 7	\$27,140.00	\$368,580.00
Try Me	2014/15	Step 7	\$0	\$1,482,599.00
Try Me	2015/16	Step 7	\$69,073.33	\$1,829,951.00
Try Me	2016/17	Step 7	\$0	\$274,271.00
Try Me	2017/18	Step 8	\$0	\$182,819.00
Try Me	2018/19	Step 8	\$0	\$38,123.00
Try Me	2019/20	Step 8	Not recorded at time of publication	Not recorded at time of publication
West Bay	2006/07	Step 2	\$26,761.00	\$1,124,045.00
West Bay	2007/08	Step 2	\$0	\$1,971,200.00
West Bay	2008/09	Step 3 Step 4	\$115,339.28	\$341,744.00



**Table 37 FCSAP Reporting Summary**

Site	Fiscal Year	Status (10-Step Process)	Major Expenditures	Estimated Liability at the end of fiscal year
West Bay	2009/10	Step 5 Step 6	\$156,174.00	\$2,034,500.00
West Bay	2010/11	Step 7	\$0	\$2,101,639.00
West Bay	2011/12	Step 7	\$0	\$2,265,724.00
West Bay	2012/13	Step 7	\$0	\$2,182,486.00
West Bay	2013/14	Step 7	\$0	\$1,721,316.00
West Bay	2014/15	Step 7	\$85,148.75	\$5,930,394.00
West Bay	2015/16	Step 7	\$190,969.50	\$7,319,803.00
West Bay	2016/17	Step 7	\$334,477.55	\$3,216,984.00
West Bay	2017/18	Step 8	\$1,427,752.65	\$2,155,265.00
West Bay	2018/19	Step 8	\$1,301,798.80	\$438,456.00
West Bay	2019/20	Step 8	Not recorded at time of publication	Not recorded at time of publication

6.0 Best Practices, Lessons Learned, and Use of Innovative Technologies

6.1 BEST PRACTICES

Best practices were implemented throughout the planning, remediation and monitoring phases of the GLG Project. In the planning Phase, every attempt was made to submit regulatory applications early and respond promptly to regulatory-related correspondence. CIRNAC engaged qualified consultants to support the development of regulatory applications and complete regulatory submittals on time.

In the remediation phase, waste was consolidated at one location (the TSCA), rather than having multiple waste consolidation locations. During construction of the TSCA, ongoing communication between the EOR and the Contractor was critical for successful completion of the facility.

Monitoring of the TSCA and other remedial components on Site will adhere to best practices and results will be reviewed by a qualified professional.

6.2 LESSONS LEARNED

Lessons learned were discussed amongst the Project Team following completion of the Project and are summarized in Table 38.





Table 38 Summary of Lessons Learned

Lesson Learned	Recommended Action for Improvement	Background
If final site activities are taking place in a time crunch, the DR should be present until they are complete to ensure things are not missed and are completed to the specified standard.	The DR must be present for final inspections of site. If equipment and materials are going to be left on-site between the end of construction and demobilization, the DR needs to ensure they are left in regulatory compliance. If during final inspections the DR notes any failures or changes to remediation features, this needs to be communicated to CIRNAC in a timely manner.	Deficiencies were noted after the Contractor had left site after the summer field season. Drums were left with pumps loosely screwed in, spill trays were missing, and a waste oil tank was left open. At West Bay, the fence around the open pit was not secured to the posts properly and the top bar was not properly installed. The reasoning for the top bar mis-installation was a health and safety concern which was not communicated to CIRNAC.
If excavation is completed in the winter, additional care needs to be taken to ensure proper confirmatory sampling is completed, additional documentation is taken, and proper communication lines are followed.	Winter excavations need to be documented much more thoroughly due to frozen soil conditions - pictures and sign-off sheets should be detailed. Proper communication lines should be established early in the project and followed so when issues come up there is not a delay in the flow of information.	Inappropriate samples were taken after the excavation at Kidney Pond due to frozen conditions at site and confusion between the native soil and fill. Insufficient quantity of pictures taken, and sign-off sheets lacked details. This led to the belief there was residual contamination on-site, however, further investigation proved there was not. In addition, there were not clear lines of communication followed and CIRNAC was not made aware of the issue in a timely manner.
Lack of finalized design of TSCA led to changes in material needed and resulted in unnecessary money spent on material.	Design should be finalized as early as possible before construction begins. The available on-site material types and quantities should be assessed as soon as possible once construction begins. Updates to design details and material types should be limited by the engineer of record and followed by the contractor.	Material was believed to be needed for the TSCA construction but wasn't available on-site. Due to the restrictions of transporting materials on winter roads only, this material was brought to the site in the winter. When design was finalized after this, the material wasn't needed and is now going to be placed under the cover of the TSCA.
If decisions get made during remediation that vary from the original plan, good documentation needs to be kept to avoid information gaps and confusion later in the project.	Maintain good documentation of decisions made by DR on-site and confirm with the Contractor while on-site so that understandings are aligned.	Due to staff turnover and multiple site activities (without DR necessarily being present) there was confusion and extra correspondence to confirm completed work. If proper documentation was kept on decisions by the DR and confirmed with the Contractor, and then communication to the project management teams, then the confusion and extra correspondence would have been reduced.
If information is provided by DRs or Contractor, information should be communicated to project management team and reviewed as soon as possible.	Review any information as quickly as possible once provided by DR or Contractor to confirm it aligns with the project objectives and any potential issues can be addressed while on-site.	Information such as on-site data, decisions, or survey information were not reviewed and communicated in a timely manner to address item as effectively as possible while on-site.





Table 38 Summary of Lessons Learned

Lesson Learned	Recommended Action for Improvement	Background
If construction activities are being conducted, DR should be on-site to record details and confirm that controls are in place for operational breaks.	DR presence to be maintained up to the last day of activity at site prior to any operational breaks; periodic site checks during extended operational breaks to be undertaken by Contractor and/or DR. See specific example below.	Multiple inspector non-conformances, incidents or information gaps were identified, in some cases during which the site was unoccupied.
If design failures or potential failures are identified a contingency plan should be developed so that mitigation actions, roles and responsibilities are clear in the event that the problem persists. If problems arise towards the end of the project cycle then there will be added pressure and urgency for the teams to solve the problem.	Immediately and systematically, develop a contingency plan outlining possible mitigation actions as soon as design failures or potential failures are identified. The plan should be agreed on by all relevant parties (e.g. PSPC, CIRNAC, contractors) and consist of the following: <ul style="list-style-type: none"> • Possible mitigation actions (engineering solutions) • Roles of each party • Responsibilities and liabilities 	Slumping of the backfilled area covering the portal entrance at Kidney Pond was first observed during the summer of 2018. The area was re-graded but contingency planning did not occur. The problem persisted and the magnitude of the slumping increased (observed and documented during Crown Site Visit (CSV) in May and July 2019). With the remediation project nearing completion there is now limited time to solve the issue and identify roles and responsibility before contracts end.
If equipment is left on-site unused for periods of time, it should be left in an appropriate state to avoid wildlife issues such as birds nesting on arms of the equipment.	Contractor should be directed to wrap arms of excavators or other large equipment when it is left on-site unused for long periods of time. DR should make note of this as well.	Contractor had no presence on remote site between winter and summer field season. Ravens nested on two of the large pieces of equipment that were left on-site. When the contractor returned to site the young birds had not yet fledged and the nests could not legally be moved or destroyed until the birds fledged. The equipment was not able to be used until the birds left the nest and it therefore sat idle at site for a few weeks when it could have been being used.
Fast tracking of project schedule to meet FCSAP 2020 deadline results in increased project risk.	Consider more advanced planning for future projects.	Risk of project not delivering value to the Crown based on tight time lines.
Extreme low dollar value bid along with concurrent award of multiple projects to Prime Contractor resulted in multiple change orders, concerns over capacity and quality of work.	Ability to flag extreme low dollar value bid and schedule conflicts with other CIRNAC projects during bid evaluation process.	Concerns with the Prime Contractor's capacity based on low value bid and concurrent award of Tundra Mine Remediation Project.
Lack of documentation of stakeholder engagement in early stages of project resulted in lack of clarity on how YKDFN were chosen as primary stakeholder for the Project.	Abide by MVLWB Engagement Guidelines process for stakeholder determination and ensure it is documented.	Stakeholder groups involved in the Project and level of engagement are inconsistent with other projects in the area, namely Bullmoose Ruth.



**Table 38** **Summary of Lessons Learned**

Lesson Learned	Recommended Action for Improvement	Background
Compensation claim from Sandy Point Lodge resulted in delay in Water Licence issuance which caused a project delay	Recognize the importance of early-on engagement with third party users	Sandy Point lodge filed a compensation claim with the MVLWB for the Project's impact on its fishing lodge. The compensation claim was denied.
Communication between Prime Contractor and Inspector was overcomplicated by having CIRNAC as a middleman. Resulted in increased risk for CIRNAC.	Future correspondence should be directly between Prime Contractor and Inspectors with CIRNAC copied. In doing so CIRNAC does not wear the responsibility should there be disagreement or miscommunication between the two parties.	There was miscommunication between Contractor and territorial Inspector on approval for camp location. This resulted in the need to build new a camp which increased scope and project costs.
Reference: Stantec, 2019b		

6.3 USE OF INNOVATIVE TECHNOLOGIES

Various innovative technologies were implemented throughout the GLG Project. In the planning phase, Stantec proposed collecting samples of a benthic invertebrate (*Hyaella*) as an alternative to triad sampling recommended by SLR in its HHERA (SLR, 2014). *Hyaella azteca* are small amphipods that are present in freshwaters throughout North America (Environment Canada, 2015b). They can be collected and processed using simple methods and have been found to be good animals for biomonitoring (Couillard *et al.*, 2008; Environment Canada, 2015b). Several studies have demonstrated that *Hyaella azteca* are a suitable model organism for determining the bio accessibility of metals in the aquatic environment. The methods and results of this sampling were detailed in the Additional Assessment Report prepared by Stantec dated February 7, 2017 (Stantec, 2017b). The results supported the conclusion that remediation of the aquatic environments was not required.

A risk management evaluation was completed at several of the Sites which resulted in some impacted areas being left in place rather than being excavated. This resulted in reduced disturbance during remediation and construction activities (refer to Section 3.3.2.1). Additionally, a risk-based approach was used to classify waste rock areas as low, moderate, or high risk based on volume, area, proximity to water body, and evidence of impacts in downgradient soil, surface water, and/or sediment (refer to Section 3.3.2.3). This exercise resulted in some waste rock being left in place, saving time and effort with removing waste rock that did not pose a significant risk.

Stantec used iPads to track daily activities on-site and to collect spatial data. Using software on the iPads, Stantec was able to prepare Daily DR Reports outlining the site activities completed, which were submitted to PSPC and CIRNAC for review and comment the following day. The daily report summarized any non-compliances or non-conformances, health and safety issues or incidents, DNV site activities, Stantec's activities, confirmation of quantities (based on the Contract Basis of Payment), personnel present and any samples collected. The reports featured photographs of key daily activities completed. The use of iPads and the software for the daily reports allowed DRs to efficiently tabulate important project information that could quickly be transferred to office support staff, and then to PSPC and CIRNAC.





7.0 Indigenous Involvement and Benefits

As discussed in Section 2.1, the GLG Sites are within the YKDFN asserted Drygeese Territory and within the Akaitcho Dene First Nations Primary Use Area as set out in an overlap agreement between the Tłıchq First Nation and the Akaitcho Dene First Nations (INAC, 2017). The Sites are also within the boundary of the Mòwhì Gogha De Nìtlèè (as defined by the Tłıchq Agreement). The area is asserted as a traditional use area for Métis people of the Great Slave Lake area.

The following Indigenous groups were engaged during the Project:

- Yellowknives Dene First Nation (YKDFN)
- Northwest Territory Métis Nation (NWTMN)
- North Slave Métis Alliance (NSMA)
- Tłıchq Government

Engagement for the planning phase of the project began in 2013 with the YKDFN holding a Traditional Knowledge (TK) workshop and completing an initial Homiiti (Gordon Lake) Traditional Knowledge Research Report. A TK workshop was held in 2014. Public update meetings on CIRNAC-CARD projects, including GLG, were held in 2015 (in N'dilo and Fort Resolution) and in 2016 (in Behchokq). Extensive engagement with the YKDFN occurred in 2015 with a site tour, updated TK report and a Remedial Options Analysis Workshop, the results of which were used to finalize the RAP/Risk Management Plan.

Written project updates and information about site activities were provided to the NWTMN, the NSMA, and the Tłıchq Government. Project updates were presented during semi-annual meetings to the Waste Sites Management Committee (WSMC), whose membership includes Tłıchq Government, NWTMN and Deninu K'ue First Nation (Fort Resolution).

During the remediation phase of the Project, written project updates, project update meetings, and participation in WSMC meetings continued. In addition, site tours were offered to interested parties. Refer to Section 10.1 for a detailed list of communication/engagement with Indigenous and stakeholder groups.

In addition to engagement efforts, CIRNAC considered comments submitted to the MVLWB and recognizes this process as a fundamental means for the Crown to consult on potential impacts of the remediation project with respect to established and asserted rights under Section 35 of the Constitution Act (1982).

During on-site construction, Indigenous Labour Person hours totaled 43.3%. This fell short of the Prime Contractor's proposed amount of 74% which was part of the bid and a penalty of \$36,368.75 was incurred as result. Indigenous training hours amounted to 746 hours which exceeded the proposed amount of 480 hours. The proposed percentage of Indigenous sub-contracting and suppliers met the proposed amount of 89%.





Additional capacity development in the form of Building Environmental Aboriginal Human Resources (BEAHR) training sessions for YKDFN members in was funded in part by the Project.

Socio-economic statistics for the Project are summarized in Table 39.

Table 39 Summary of Socio-Economic Statistics

		Fiscal Year				Totals
Socio-Economic Statistics		16/17	17/18	18/19	19/20	
Employment						
Total Employment	Number of persons	80	80	173	54	387
	p-hrs	6,205	44,187	28,704	3295	82391
Employment – Northern	Number of persons	12	29	50	17	108
	p-hrs	613	21,332	10,249	1225	33419
Employment – Indigenous	Number of persons	8	29	29	4	70
	p-hrs	392	10,057	7,937	382	18768
Employment – AOC	Number of persons	8	28	27	4	67
	p-hrs	392	10,023	7,881	382	18678
Employment – Women	Number of persons	30	31	45	23	129
	p-hrs	2,274	3,288	6,291	1314	13167
Workforce Training (through use of AOCs in contracting or contribution agreements directly with communities)						
Total Training	Number of persons	3	82	14	3	102
	p-hrs	14	264	56	11	345
Training – Northern	Number of persons	3	49	2	2	56
	p-hrs	14	166	8	7	195
Training – Indigenous	Number of persons	3	27	2	2	34
	p-hrs	14	86	8	7	115
Training – Women	Number of persons	3	6	2	0	11
	p-hrs	14	15	8	0	48
Purchase of Goods and Services						
Total Suppliers	Number of suppliers	63	120	166	31	380
	Value (\$)	1,786,622	6,424,276	9,960,539	395,721	18,567,158
Suppliers – Northern	Number of suppliers	38	79	107	16	240
	Value (\$)	1,145,228	5,459,782	7,580,032	165,005	14,350,047
Suppliers – Indigenous	Number of suppliers	8	13	19	9	49
	Value (\$)	944,615	4,430,224	6,763,859	23,601	12,162,299
Notes: p-hrs = person-hours						

As described in Section 3.3.2.2, a Camp was established at Zenith Island for use during the Project. Following completion of the Project, certain features of the Camp were demobilized. Electrical cables





were removed, camp stoves were removed from the cabins, and the aboveground storage tanks were removed. The greywater discharge pipe was removed, and the sump was filled in. The YKDFN expressed interest in making use of the Camp once the remediation program was completed, therefore, the empty wooden structures were left in place.

8.0 Environment, Health and Safety

The Contractor was responsible for developing a Site-Specific Health and Safety Plan (SSHSP) for the remediation phase of the Project. The SSHSP was used as a training tool, reference source and policy document for the Project, developed for use by DNV employees, supervisors, field staff and management, as well as sub-contractors and Authorized Personnel performing work during the Project (Delta Nahanni, 2018).

A Spill Contingency Plan (SCP) was developed to meet the requirements of the Type A Land Use Permit and Type B Water Licence. DNV and Stantec supported the development of the SCP, which was submitted to the MVLWB by CIRNAC (the most recent revision is dated April 20, 2018). The SCP provided a plan of action for unforeseeable spill events at the Project Sites during implementation of the remediation program and defined responsibilities of key response personnel and outlined the course of action that would be implemented in order to minimize or prevent any possible effects to the environment (INAC, 2018).

Environment, Health and Safety (EHS) incidents and activities documented throughout the course of the Project are summarized in Table 40, by fiscal year (FY). These include any safety incidents (including near misses), environmental incidents (i.e. spills), AHJ inspections, and EHS training.

Table 40 Summary of EHS Project Statistics

		Fiscal Year				Totals
EHS Performance		16/17	17/18	18/19	19/20	
Safety						
Major Incident¹	Number	0	0	0	0	0
Moderate Incident²	Number	0	0	0	0	0
Minor Incident³	Number	0	16	2	0	18
Near misses⁴	Number	0	5	2	0	7
Environment						
Environmental Incidents	Number	0	10	0	0	10
	Volume released (litres)	0	33	0	0	33
Inspections and Audits						
Inspections / Audits (external)⁵	Number performed	5	4	7	0	16
Inspections / Audits (internal)⁶	Number performed	2	8	8	0	18
	Number of non-compliances	4	2	23	0	29



**Table 40 Summary of EHS Project Statistics**

		Fiscal Year				Totals
EHS Performance		16/17	17/18	18/19	19/20	
EHS Training (p-hrs) and Corrective Actions						
Awareness Training	EHS policy & procedures	3	72	14	0	89
H&S Training	HAZWOPER ⁵	0	0	0	0	0
	WHMIS ⁶	0	36	7	0	43
	First Aid	0	0	7	0	7
	Wildlife safety	2	40	7	0	47
	Water safety	0	0	0	0	0
	Fire response	2	36	7	0	43
	Other	3	21	0	0	21
Environmental Training	Spills Response	2	36	7	0	43
	Other	0	0	0	0	0
Other Corrective Actions	New procedures	0	1	0	0	1
	Other initiatives	0	0	0	0	0
Notes: p-hrs = person-hours ¹ Major Incident – An incident resulting from activities performed at the project site that results in a severe and irreversible disability, impairment, injury, illness or fatality to an individual or individuals. ² Moderate Incident – An incident resulting from activities performed at the project site that results in a reversible disability, impairment, injury or illness that temporarily alters the lives of an individual or individuals. ³ Minor Incident – An incident resulting from activities performed at the project site that results in injury or illness that inconveniences an individual or individuals. ⁴ Near Miss – An unplanned incident resulting from activities performed at the project site, which did not result in any disability, impairment, injury, illness or fatality, but had the potential to do so. ⁵ An EHS site inspection or audit performed by a third-party expert (e.g. a representative of an authority that has jurisdiction over the site or a consultant hired by CIRNAC). ⁶ An EHS site inspection or audit performed by CIRNAC staff. ⁷ HAZWOPER – Hazardous Waste Operations and Emergency Response. ⁸ WHMIS – Workplace Hazardous Materials Information System.						

No major or moderate incidents were reported during the Project. The incidents that were reported were classified as either minor or near misses, and all reported incidents occurred in 2018.

AHJs completed several site inspections during the Project. Results of the inspections were documented and communicated to DNV and Stantec. Following AHJ inspections, any non-compliances were addressed by DNV and confirmed by Stantec (as DR).

Training activities included training on the EHS policy and procedures developed for the Project, general H&S training (first aid, water safety, etc.), environmental training (i.e., spill training) and one training event related to new procedures.





Several environmental incidents (i.e., spills) were recorded during the Project. A summary of the spills and activities completed to mitigate environmental impacts are outlined in Table 41. Spill reports are included as Appendix L of the Post Construction Report (Stantec, 2019b).

Table 41 Summary of Spill Response Activities Completed by DNV

Date of Incident	Incident Report Number	Location ¹	Incident Description	Corrective Action
16-Feb-18	GLIR 008	East of Kidney Pond/Ice	A hydraulic line on an end dump broke east of Kidney just before the intersection at the JV road.	Scraped up the hydraulic oil with shovels and put in a plastic bag for disposal.
25-Feb-18	GLSR 001	Camlaren/Land	A damaged fitting on a piece of equipment caused approximately 0.5 L of hydraulic oil to leak.	Cleaned up the spill and placed spill tray under cylinder.
9-Mar-18	GLSR 001	Camlaren/Ice	A frozen equalization valve resulted in approximately 15 L of P50 diesel fuel being spilled onto the ice 100 m from the shoreline at the north entrance to Camlaren.	Used spill absorbent, shovels, and 45-gallon drum. Scraped contaminated area and placed in 45-gallon drum to send back to Yellowknife. NT-NU notified March 19, given report # 18-094.
18-Mar-18	GLSR 002	Kidney West/Ice	A faulty oil filter resulted in approximately 1 L of oil spilling onto the ice 2 metres from the shore at Kidney West. There were multiple small spill locations.	Used spill pads, scraped oil off the ice and put in hazardous waste material bags.
18-Mar-18	GLSR 003	Kidney Pond/Ice	A faulty hose resulted in approximately 1 L of oil spilling onto the ice 5-10 metres from the shoreline at the entrance to Kidney Pond. There were multiple small spill locations.	Used spill pads, scraped oil off the ice and put in hazardous waste material bags.
18-Mar-18	GLSR 004	Kidney Pond/Ice	A faulty check valve seal resulted in release of approximately 10 L of hydraulic oil on the ice 15 metres from the shoreline.	Used spill pads, scraped up contaminated ice and put in hazardous waste material bags.
21-Mar-18	GLSR 05	West Bay/Land	Approximately 3 L of hydraulic oil was spilled when the hydraulic hose to the joystick leaked.	Spill was cleaned up, pictures taken.
21-Mar-18	GLSR 06	Zenith Camp/Land	Approximately 1 L of diesel fuel was spilled in the Camp parking lot from the water truck. This was due to a faulty seal on gas tank filler cap - when parked on an angle some fuel leaked out.	Spill was cleaned up with shovel and spill pads and disposed of properly.
22-Mar-18	GLSR 07	Zenith Camp/Ice	An oil cooler leak resulted in approximately 0.4 L of engine oil being spilled onto the ice from a tractor.	Spill was cleaned up, pictures taken. NT-NU notified same day, given report # 18-103.



**Table 41** Summary of Spill Response Activities Completed by DNV

Date of Incident	Incident Report Number	Location ¹	Incident Description	Corrective Action
29-Mar-18	GLSR 09	Camlaren/Land	A piece of equipment ran over a tree branch resulting in damage to a hydraulic fitting. Approximately 1.5 L of hydraulic oil was spilled near the CAM_SO_15/16 worksite.	Spill was immediately reported to supervisor and snow was cleaned up. New part was ordered to repair the hydraulic line. All contaminated materials disposed of properly.
Notes: ¹ Land-based or Ice-based Reference: Stantec, 2019b				

9.0 Information Management

Key documents and information sources related to the GLG Project are summarized in Table 42, in chronological order.

Table 42 GLG Documents and Information Sources

Date	CIDM#	GCDocs#	Author	Title
1993	499942		Thurber	Review and Summary of Assessment & Remediation Options for Abandoned Mine Sites, NWT, Volume II.
2006	548830		DIAND	Abandoned Mines in the Yellowknife Area 2004 Report, (Beaulieu, Burnt Island, Camlaren, Hidden, Ruth, Thompson/Lundmark and West Bay Mines)
2009	341319		R. Silke	An Operational History of Mines in the Northwest Territories
2011	548728		R. Silke	Historical Records Review of Murray Lake Mine, Akaitcho Region, Northwest
2015	Private		YKDFN	Yellowknives Dene First Nation Land and Environment. Homiiti (Gordon Lake) Traditional Knowledge and Current Use Report
Mar-07	502329	7476422	Dillon	Phase I Environmental Site Assessment West Bay/Black Ridge Gold Mine SM 211 & SM 302
Apr-09	502331	7587041	EBA	Phase II Environmental Site Assessment for West Bay/Blackridge Mine SM 302
Mar-10	510411	8017974	WESA	Phase II Environmental Site Assessment SM220 - Burnt Island
Mar-10	514760	8150182	WESA	Phase II Environmental Site Assessment SM205 - Camlaren Mine
Mar-10	509931	7579795	WESA	Phase II Environmental Site Assessment SM466 - Goodrock Mine
Mar-10	509903	8017962	WESA	Phase II Environmental Site Assessment SM474 - Kidney Pond/Knight Bay
Mar-10	514799	8019103	WESA	Phase II Environmental Site Assessment SM471 - Storm Property
Mar-10	514772	8150649	WESA	Phase II Environmental Site Assessment SM475 - Treacy Mine
31-Mar-10	516203	7919772	AECOM	Phase III Environmental Site Assessment, West Bay Mine, Gordon Lake, Northwest Territories



**Table 42 GLG Documents and Information Sources**

Date	CIDM#	GCDocs#	Author	Title
Mar-13	557335	7503757	Columbia	Phase I/II Environmental Site Assessment Murray Lake Property SM490
Mar-13	557757	7920199	Columbia	Phase I/II Environmental Site Assessment, Try Me Property (SM488)
Mar-13	571261	8576977	SLR	Burnt Island Mine Phase III Environmental Site Assessment
Mar-13	559249	7504227	SLR	Camlaren Mine Phase III Environmental Site Assessment
Mar-13	572459	7592134	SLR	Goodrock Mine Phase III Environmental Site Assessment
Mar-13	572504	7920307	SLR	Kidney Pond Mine Phase III Environmental Site Assessment
Mar-13	559251	7504228	SLR	Treacy Mine Phase III Environmental Site Assessment
Mar-14	620719	7404562	SLR	Human Health and Ecological Risk Assessment (HHERA), Gordon Lake Mine Sites
Mar-14			SLR	Status Memo, Gordon Lake Mine
7-Mar-14	630141	7525143	Stantec	Final Report – Technical Review of HHERA for Nine Former Mine Sites, Gordon Lake, Northwest Territories
31-Mar-14	644399	7421897	Stantec	Final Report – Review of SSRTs, Summary, and Conclusions of the HHERA for Nine Former Mine Sites, Gordon Lake, Northwest Territories
31-Mar-14	645110	7525962	Stantec	Basis of Estimate and Cost Estimate – Remediation of Nine Former Mine Sites, Gordon Lake, Northwest Territories
31-Mar-14		7525964	Stantec	Remedial Options Analysis Gordon Lake Mines, Northwest Territories
15-Dec-14	684950	7912222	Stantec	Supplemental Assessment of Site-Specific Remedial Targets for Nine Former Mine Sites, Gordon Lake, Northwest Territories
28-Jan-15	684927	7457226	Stantec	Gordon Lake Mine Site Borrow Assessment
27-Feb-15	682754	7409971	Stantec	Final Report – Gordon Lake Gap Analysis
31-Mar-15	684948	7413577	Stantec	Supplemental Assessment of Site-Specific Remedial Targets for Nine Former Mine Sites, Gordon Lake, Northwest Territories
31-Mar-15	789946	8196600	Stantec	Preliminary Remedial Action Plan for Gordon Lake Mine Sites, Gordon Lake, Northwest Territories
31-Mar-15	684932 / 686326	7413576	Stantec	Draft Report – Basis of Estimate and Cost Estimate – Remediation of Nine Former Mine Sites, Gordon Lake, Northwest Territories
24-Jun-15		8550347	Stantec	Final Report: Gordon Lake Group - Revised Detailed Work Plan
17-Jul-15		8198299	Stantec	Final Report: Gordon Lake Group - Revised Gap Analysis
12-Feb-16		7434105	Points West	Archaeology Assessment Draft Report
16-Mar-16		7460287	Stantec	Final Report: Gordon Lake Group Gap Assessment Report
22-Mar-16		44799490	Stantec	Gordon Lake Group Mine Site Remediation - Evaluation of West Bay Waste Rock Acid Rock Drainage
31-Mar-16	808581		Stantec	Final Report - Site Wide Hazard Assessment
31-Mar-16	846210		Stantec	Final Report - Basis of Estimate and Cost Estimate - Gordon Lake Group Sites



**Table 42** **GLG Documents and Information Sources**

Date	CIDM#	GCDocs#	Author	Title
31-Mar-16	817107	7444680	Stantec	Final Report: Gordon Lake Group Remedial Action Plan
16-May-16			IPRP	Technical Review – Elements of the Gordon Lakes Group Remediation
2-Aug-16		44795668	Stantec	Final Report: Gordon Lake Group - Additional Assessment Plan
1-Nov-16	860434		Stantec	Revised Draft Report: Long Term Monitoring Plan - Gordon Lake Group of Sites
19-Dec-16		9934985	MVLWB	Land Use Permit – MV2016X0021
7-Feb-17		44795066	Stantec	Final Report: Gordon Lake Group Additional Assessment Report
7-Feb-17	846207	7482819	Stantec	Final Report: Gordon Lake Group Design Basis
16-Feb-17		9963570	MVLWB	Water Licence – MV2016L8-0006
20-Jun-17		9638734	INAC	Engagement Plan
25-Sep-17		31913752	Stantec	Surveillance Network Program Monthly Report for August 2017
14-Nov-17		7507402	Stantec	Final Report: Surveillance Network Program Monthly Report for September 2017
14-Nov-17		7507421	Stantec	FINAL REPORT: Surveillance Network Program Monthly Report for October 2017
Dec-17	805353		Stantec	Archaeological Impact Assessment - Gordon Lake and Bullmoose Area Mines Remediation
Dec-17	851969		Stantec	Public Works and Government Services Canada: Issued for Tender Specifications for the Environmental Site Remediation at Gordon Lake, Northwest Territories
8-Feb-18		44790212	Stantec	Design Volume Refinement Program Summary
9-Feb-18		8587074	INAC	INAC Quarry Permit – 2018QP0002
22-Feb-18		44795060	Stantec	Redesign of the Tailings and Soil Containment Area (TSCA)
23-Feb-18		27881312	Stantec	Surveillance Network Program Monthly Report for January 2018
24-Feb-18		9962711	GNWT	GNWT Quarry Permit – 2017QP0004
20-Mar-18		10804210	Stantec	Surveillance Network Program Monthly Report for February 2018
21-Mar-18		8912626	Stantec	Final Report: Cover Design Plan
28-Mar-18		44728834	Stantec	TSCA Investigation and Design Path Forward
20-Apr-18		41663419	Stantec	Updated Report: Construction and Post Construction Monitoring Plan
20-Apr-18		57562839	CIRNAC	Annual Water Licence Report, January 2017 - December 2017
2-May-18		13202478	Stantec	Surveillance Network Program Monthly Report for March 2018
18-May-18		14058777	Stantec	Surveillance Network Program Monthly Report for April 2018
30-May-18		15834099	Stantec	Risk Evaluation for Soil Hotspots
7-Jun-18		17289580	Stantec	Surveillance Network Program Monthly Report for May 2018
11-Jun-18		44729728	Stantec	Revised Summary of Excavation Status
17-Aug-18		29480320	Stantec	Kidney Pond Former Waste Rock Area Summary
17-Aug-18		27881312	Stantec	Surveillance Network Program Monthly Report for June 2018



**Table 42 GLG Documents and Information Sources**

Date	CIDM#	GCDocs#	Author	Title
17-Aug-18		29336962	Stantec	Surveillance Network Program Monthly Report for July 2018
11-Sep-18		44728184	Stantec	Updated Report: Gordon Lake Group Design Basis
17-Sep-18		31913752	Stantec	Surveillance Network Program Monthly Report for August 2018
24-Oct-18		33141674	Stantec	Surveillance Network Program Monthly Report for September 2018
11-Dec-18		36683219	Stantec	2018 Post Construction Inspection - Camlaren TSCA
19-Dec-18		36652208	Stantec	Final Report: Phase I Long-Term Monitoring Plan - Gordon Lake Group of Sites
21-Dec-18		36441278	Stantec	Final Report: 2018 As-Built Construction – Camlaren TSCA
29-Mar-19		12905877	CIRNAC	Annual Water Licence Report, January 2018 - December 2018
29-Mar-19		44539821	Stantec	Final Report: Post Construction Report, Gordon Lake Group of Sites
23-Sep-19		54176310	Stantec	Surveillance Network Program Monthly Report for July 2019
15-Nov-19		65605071	Stantec	Surveillance Network Program Monthly Report for September 2019

10.0 Communications

10.1 COMMUNICATION

This section summarizes efforts undertaken to communicate with Indigenous groups and stakeholders who had an interest in the Project.

Engagement Plans were developed to guide the communication process with the identified groups through different stages of the Project. As outlined in these Plans, the engagement objectives were to:

- Increase community understanding and awareness of the GLG Remediation Project;
- Facilitate community awareness and input on site remediation and monitoring processes;
- Facilitate the exchange of technical information and Traditional Knowledge regarding the GLG Project;
- Provide project updates and communication channels for stakeholder feedback and concerns;
- Engage with other site users or interested parties to ensure site activities do not conflict with current and planned future land uses.

Indigenous groups and stakeholders with an interest in the Project were identified during Project planning. A history of engagement with Indigenous groups is provided in Section 7.0.

Public update meetings on CIRNAC-CARD projects, including GLG, were held in 2015 and 2016. Written project updates and information about site activities were provided to the NWTMN, the NSMA, the Tłıchǫ Government, the mineral rights holders, recreational lease holders and Sandy Point Lodge. Meetings and/or site visit engagement were completed with the Prince of Wales Heritage Museum staff and the NWT Mine Heritage Society. Project updates were presented during semi-annual meetings to the WSMC.





Table 43 **Communication / Engagement Activities Conducted**

Event	Date (dd-mmm-yy)	Participant(s)	# of attendees	Regulators involved (Yes/No)	CIRNAC involved (Yes/No)	PSPC involved (Yes/No)	Consultant involved (Yes/No)	Key Issues	CIDM / GC Docs #
TK Workshop	28-Mar-14	YKDFN	9	No	Yes	No	No	Discussion of Traditional Knowledge in Gordon Lake area	
TK Report	31-Mar-14	YKDFN	0	No	Yes	No	No	Traditional Knowledge Research Preliminary Report	
WSMC Bi-Annual Meeting	27-Jan-15	Signatories to the NWT Devolution Agreement (including NWTMN, Tłı̨ch̨ Gov. and Deninu Kue FN)							683396
Community Update Meeting	12-Mar-15	YKDFN		No	Yes	No	No	Site Tour and archaeological study were requested. CIRNAC committed to have YKDFN involved in TK study in summer 2015.	683570
Community Update Meeting	19-Mar-15	DKFN, FRMC		No	Yes	No	No	Project Update. No issues raised.	
WSMC Bi-Annual Meeting	27-May-15	Signatories to the NWT Devolution Agreement (including NWTMN, Tłı̨ch̨ Gov. and Deninu Kue FN)							689611
Site Visit/TK Work	5-Aug-15	YKDFN	6	No	Yes	No	No	Site visits, information about the sites and TK information	774850
WSMC Bi-Annual Meeting	18-Nov-15	Signatories to the NWT Devolution Agreement (including NWTMN, Tłı̨ch̨ Gov. and Deninu Kue FN)							779517
RAP Workout	2/3-Feb-16	YKDFN	15	No	Yes	Yes	Yes	Workshop objectives were to: <ul style="list-style-type: none">• Review site history, status and environmental / health risks for each site• Discuss proposed technical remedial options for each environmental / health risk• Select consensus remedial options for each site• Use the results for remediation planning and permit applications	805490
Project Update	7-Mar-16	Tłı̨ch̨						Project update – all CARD projects including Gordon	
WSMC Bi-Annual Meeting	7-Jun-16	Signatories to the NWT Devolution Agreement (including NWTMN, Tłı̨ch̨ Gov. and Deninu Kue FN)							845486
Written Notifications	10-Jun-16	NSMA, NTMN, Mineral lease/claim holders	N/A	No	Yes	No	No	Written notifications (letters) – Project Update and Notification of upcoming permit applications	847023
Written Notification	27-Jun-16	YKDFN	N/A	No	Yes	No	No	Written notification (letter) – Project Update and Notification of upcoming permit applications	847021
Written Notifications	5-Jul-16	Sandy Point Lodge and Recreational Lease Holder	N/A	No	Yes	No	No	Written notifications (letters) – Project Update and Notification of upcoming permit applications	850746
Written Notification	28-Jul-16	Tłı̨ch̨ Government	N/A	No	Yes	No	No	Written notification (letter) – Project Update and Notification of upcoming permit applications	
Written Notification	29-Jul-16	YKDFN	N/A	No	Yes	No	No	Written notification (letter) – Project Update and Notification of upcoming permit applications	846769
Written Notification	12-Aug-16	Tłı̨ch̨ Government	N/A	No	Yes	No	No	Written notification (letter) – Project posted on Buyandsell.ca	
Written Notification	15-Aug-16	YKDFN	N/A	No	Yes	No	No	Written notification (letter) – Project posted on Buyandsell.ca	
Project Update Meeting	23-Feb-17	NSMA		No	Yes	No	No	<ul style="list-style-type: none">• NSMA asked for an update on the Gordon Lake Project in conjunction with a BMR update meeting• NSMA asked for joint update meetings with BMR and Gordon Lake and to be included on-site tours• Brief update on Gordon Lake was provided.• INAC-CARD will provide to NSMA: community updates, letters, site tours as per Engagement Plan.	presentation: 875627 minutes: 875756





Table 43 **Communication / Engagement Activities Conducted**

Event	Date (dd-mmm-yy)	Participant(s)	# of attendees	Regulators involved (Yes/No)	CIRNAC involved (Yes/No)	PSPC involved (Yes/No)	Consultant involved (Yes/No)	Key Issues	CIDM / GC Docs #
Project Update Meeting	27-Jun-17	YKDFN	30	No	Yes	Yes	No	Both INAC-CARD and DNV gave presentations on the Gordon Lake and Tundra Remediation Projects. Concerns that were raised during the meeting relative to Gordon Project: YKDFN want more involvement on monitoring oversight and inspections, training opportunities, communication plan for future generations, involvement in restoration plan. Response: INAC-CARD will continue to fund training initiatives for YKDFN. Will coordinate opportunities for project oversight during summer field season. YKDFN will be involved in the drafting of the Long-Term Monitoring Plan.	887658
Written Notifications	26-Jul-17	NSMA, Tłı̨chǫ Government, NWTMN, mineral lease holders, Joe McBryan, Sandy Point Lodge	N/A	No	Yes	No	No	Project Update Letters	See CARD Master Consultation Log for GC Docs #
Site Visit	31-Aug-17	YKDFN	4	No	Yes	No	No	Winter road ground-truthing in conjunction with BMR project	906925
Site Visit	7-Sept-17	NSMA	8	No	Yes	No	No	Annual site visit. No concerns or comments from NSMA.	916976
Site Visit	8-Sep-17	YKDFN	10	No	Yes	No	No	Annual site visit. Commitments made include: <ul style="list-style-type: none">• Site tours during summers of remediation phase of project• YKDFN participation in Gordon AIA• Hazard signs installed at major hazard locations• Involvement in Long Term Monitoring Plan	917125
Site Visit/TK Work	7-Oct-17 8-Oct-17	YKDFN	4	No	Yes	No	No	Two-day field program with Stantec archaeologists working in conjunction with YKDFN Elders to investigate Gordon borrow areas GD-18, GD-37 and GD-45	929381
Written Notification	15-Dec-17	YKDFN, NSMA	N/A	No	Yes	No	No	Project Update Letter	932647 932770
Written Notification	8-Feb-18	YKDFN	N/A	No	Yes	No	No	Project Update Letter Request to have site tour during winter construction. Site tour was provided on March 27, 2018.	886268
Site Tour	27-Mar-18	YKDFN	4	No	Yes	No	No	Winter site tour with Chief Sangris and YKDFN staff Dayna Drygeese. Chief Drygeese requested the emergency shelters remain on-site for use of hunters and trappers in the area. Concerns regarding concrete barrier at Camlaren - letter sent to YKDFN Chief with information on how the remedial option to leave the concrete barrier was selected.	11223666
Contractor-led public Project Update Meeting	18-Apr-18	DNV, PSPC, CIRNAC, Stantec, an interpreter, and members of the public	20	No	Yes	Yes	Yes	Public Update Meeting – refer to meeting minutes for details.	12905885
Site Tour	24-Sep-18	YKDFN	8	No	Yes	No	No	Site cut short due to weather – only visited Camlaren site	32004511
Site Tour	28-Sep-18	NSMA	5	No	Yes	No	No	Site Tour – see site visit report for details	32511496
Chief and Council Update Meeting	7-Feb-19	YKDFN	12	No	Yes	No	No	Provided project update to Chief and Council. See meeting record for details. Questions regarding depth of mine opening - Unable to provide exact depth. Provided during Community Update Meeting on March 27, 2019.	41402448
Community Update Meeting	26-Mar-19	NSMA	17	No	Yes	Yes	No	Provided project update. Refer to meeting minutes for details. Questions raised concerning wildlife management on site – questions were addressed at the meeting.	44578917





Table 43 Communication / Engagement Activities Conducted

Event	Date (dd-mmm-yy)	Participant(s)	# of attendees	Regulators involved (Yes/No)	CIRNAC involved (Yes/No)	PSPC involved (Yes/No)	Consultant involved (Yes/No)	Key Issues	CIDM / GC Docs #
YKDFN Project Update Meeting	27-Mar-19	CIRNAC, DXB Projects, DNV, YKDFN	20	No	Yes	Yes	No	Provided project update. Refer to meeting minutes for details. Concerns about the long-term functioning of air vents of capped areas – concerns addressed at the meeting.	44629387
Written Notification	17-Apr-19	Sandy Point Lodge	N/A	No	Yes	No	No	Project Update Letter	44939575
Written Notification	17-Apr-19	Tłı̨chǫ Government	N/A	No	Yes	No	No	Project Update Letter	48858716
Written Notification	17-Apr-19	NWTMN	N/A	No	Yes	No	No	Project Update Letter	44938051
Written Notification	18-Apr-19	Golden Pursuit Resources	N/A	No	Yes	No	No	Project Update Letter	44937395
Written Notification	18-Apr-19	Joe McBryan	N/A	No	Yes	No	No	Project Update Letter	44940376
Written Notification	18-Apr-19	Lakeland Resources	N/A	No	Yes	No	No	Project Update Letter	44937847
Site Closure Celebration	21-Aug-19	CIRNAC, YKDFN, NSMA, DNV, DXB Projects		No	Yes	Yes	No	Closure of remediation.	52936972





11.0 Ongoing Activities

CIRNAC will continue to be responsible for public and stakeholder communication. This includes maintaining site signage, community and public update meetings and communicating with third party users as required.

Regulatory authorizations will continue to be held for the GLG Sites until 2023 (refer to Section 3.7). These authorizations will be reevaluated closer to their expiry date in cooperation with the MVLWB.

LTM and O&M activities (described in Section 3.4.2) are currently ongoing, as described in the Phase I LTM Plan and the OMS Plan (Table 17).

Funding for LTM and O&M will continue to be secured through the Regional Director General (RDG) in collaboration with the NCSP director in HQ. Costs for 25 years of monitoring have been projected and will continue to be reported on through annual DWPs.

A summary of ongoing activities is provided in Table 44.

Table 44 Ongoing Activities




Ongoing Activity	Responsible Organization	Expected Duration, Life Expectancy and/or Frequency	Comments
Long Term Monitoring (LTM)	CIRNAC	Phase I LTM – 5 years following remediation (i.e., 2019-2024). Potential for LTM in Year 6 and beyond (refer to Section 3.4.2).	The current Phase I LTM contains only those requirements of the initial phase of LTM (Years 1-5). The next phase of monitoring, if deemed necessary, will be based on an adaptive management approach, covering activities for Year 6 onward as required.
Operations, Maintenance and Surveillance (OMS)	CIRNAC	The temporal scale of the OMS Plan is limited from the date of its acceptance until the Phase I LTM exit criteria are achieved (refer to Section 3.4.2)	Surveillance requirements outlined in the Phase I LTM Plan were incorporated with operations and maintenance requirements of the Project to form the OMS Plan.
Communication and Engagement	CIRNAC	Communication and engagement with the public and stakeholders will continue throughout LTM	Engagement with stakeholders will continue as per Engagement Plan.
Land Use Permit	CIRNAC	Expires in 2021 with option to extend to 2023	Issued by the MVLWB
Water Licence	CIRNAC	Expires in 2023	Issued by the MVLWB
Funding	CIRNAC	Duration of LTM	O&M funding will continue to be secured through NCSP for the duration of LTM. Costs are expected to decrease as frequency and intensity of monitoring decreases with time.





12.0 Approval and Distribution of Project Closure Report

Table 45 Approval of Project Closure Report

<i>The undersigned hereby approve the Contaminated Site Remediation Project Closure Report (internal) and the Record of Post Remediation Site Conditions (public):</i>				
Approval Authority	Focus of Approval	Name (Print)	Signature	Date
Project Manager	<ul style="list-style-type: none"> • Recommends the appropriate individuals to whom key responsibilities will be transferred • Signs off on project closure report (internal and public versions) 	Amy Allan		6/17/2021
CIRNAC-Regional Director	<ul style="list-style-type: none"> • Reviews and endorses project closure report (internal and public versions) 	Rasel Hossain		6/22/2021
CIRNAC-Regional Director General	<ul style="list-style-type: none"> • Reviews and approves the project closure report (internal and public) • Confirms that CIRNAC NCSP Management accepts that the site has been remediated to the standards specified, the project objectives have been met and the proposed transfer of ongoing responsibilities is accepted 	N/A	N/A	N/A
CIRNAC-HQ Director	<ul style="list-style-type: none"> • Reviews and accepts the project closure report (internal and public) • Confirms that the report meets the closure requirements of the program and FCSAP 	Lou Spagnuolo		09-14-2021





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Glossary of Terms

Abandoned or Orphaned Site – A site where the person or corporation that created the contaminated site is unknown or out of business and the site is on federal crown land or Canada Lands (e.g. reserve land).

Indigenous Opportunities Consideration (AOC) – Point-rated evaluation criteria used within a competitive solicitation process which evaluates Bidders on the basis of the type and extent of commitments made to maximizing Indigenous participation within the resulting contract work. Bidders are required to submit an Indigenous Opportunities Consideration proposal demonstrating their proposed approach to implementing this component. Upon Award, the successful Bidder's proposed Indigenous Opportunities Consideration target becomes a firm commitment under the contract.

Adaptive Management – The modification of management actions in response to changing conditions.

Alteration – Any component of a site, including any construction, work or substance added to or deposited on a site and any alteration of the natural condition of a site, resulting from authorized or unauthorized human activities.

Background Concentration – The concentration of a chemical substance occurring in media removed from the influence of industrial activity at a specific site and in an area considered to be relatively unaffected by industrial activity.

Claim – A mining right that grants a holder the exclusive right to search and develop any mineral substance within a given area.

Contaminant – Any physical, chemical, biological or radiological substances in air, soil or water that has an adverse effect. Any chemical substance whose concentration exceeds background concentrations or which is not naturally occurring in the environment.

Contamination – The introduction into soil, air or water of a chemical, organic or radioactive material or live organism that will adversely affect the quality of that medium.

Contaminated Site – A site at which substances occur at concentrations: (1) above background levels and pose or are likely to pose an immediate or long-term hazard to human health and the environment or (2) exceed levels specified in policies and regulations.

Crown Assets – Includes mobile capital assets (e.g. heavy equipment, camp equipment, scientific equipment, and so on) used for the purposes of the remediation construction, and monitoring and assessment.





Crown Investment – Captures newly constructed engineered structures and/or assets (e.g. landfills, tailings caps, diversions, water treatment plants, etc.), and/or improvements to ancillary facilities (e.g. borrow sources, airstrips, access routes and points, etc.), either pre-existing or built during remediation, that require protection to ensure their integrity and accessibility are not compromised through new developments.

Devolution Agreement – The final Northwest Territories Lands and Resources Devolution Agreement.

FCSAP – The Federal Contaminated Sites Action Plan (FCSAP) is a \$3.5 billion cost-sharing program that helps federal custodians to address contaminated sites for which they are responsible (the term ‘site’ refers to the area of land associated with a specific Federal Contaminated Sites Inventory (FCSI) number).

Hazard Component – The hazard components present at the GLG Sites included impacted soil, physical hazards (such as mine openings, underground workings, and trenches), waste rock, tailings, hazardous and non-hazardous waste, sediment, and impacted water.

Hazardous Waste – Material that, given its quantity, concentration and composition or its corrosive, inflammable, reactive, toxic, infectious or radioactive characteristics, presents a real or potential danger to human health, safety and public well-being or poses a danger to the environment if it is not stored, treated, transported, eliminated, used or otherwise managed.

IDEA – Interdepartmental Data Exchange Application (IDEA) is a secure website providing departments with a single point of access for the exchange of FCSAP-related information.

Impact – A hazard to the environment, human health or safety, that has resulted from an alteration.

Inspections/Audits (external) – An environmental, health and safety site inspection or audit performed by a third-party expert (e.g. a representative of an authority that has jurisdiction over the site or a consultant hired by CIRNAC).

Inspections/Audits (internal) – An environmental, health and safety site inspection or audit performed by CIRNAC staff.

Major Incident – An incident resulting from activities performed at the project site that results in a severe and irreversible disability, impairment, injury, illness or fatality to an individual or individuals.

Moderate Incident – An incident resulting from activities performed at the project site that results in a reversible disability, impairment, injury or illness that temporarily alters the lives of an individual or individuals.

Minor Incident – An incident resulting from activities performed at the project site that results in injury or illness that inconveniences an individual or individuals.





Near Miss – An unplanned incident resulting from activities performed at the project site, which did not result in any disability, impairment, injury, illness or fatality, but had the potential to do so.

Project – A project is a set of activities required to produce certain defined outputs, or to accomplish specific goals or objectives, within a defined schedule and resource budget.

Remediation - The removal, reduction or neutralization of substances, wastes or hazardous material from a site to prevent or minimize adverse effects on the environment or public safety.

Risk Assessment – The scientific examination of the nature and magnitude of risk to define the effects on both human and other receptors of the exposure to contaminant(s).

Risk-Based Approach – An approach based on a detailed evaluation of hazard and exposure potential at a particular site. Risk assessment is an important tool to use where, for example, national criteria do not exist for a contaminant, where clean-up to guideline-based criteria is not feasible for the targeted land use, where guideline based objectives do not seem appropriate given the site specific conditions, where significant or sensitive receptors of concern have been identified or where there is significant public concern, as determined by the lead agency.

Risk Management – The selection and implementation of a strategy of control of risk, followed by monitoring and evaluation of the effectiveness of that strategy. Risk management may include direct remedial actions or other strategies that reduce the probability, intensity, frequency or duration of the exposure to contamination. The latter may include institutional controls such as zoning designations, land use restrictions, or orders. The decision to select a particular strategy may involve considering the information obtained from a risk assessment. Implementation typically involves a commitment of resources and communication with affected parties. Monitoring and evaluation may include environmental sampling, post-remedial surveillance, protective epidemiology, and analysis of new health risk information, as well as ensuring compliance.

Site – Any property (piece of land), typically designated with an FCSI number, which was remediated and/or received funding for remediation. A closure report must be prepared for all such “sites”. *[Note: Waste Sites in the Yukon region do not have a FCSI number.]*

Site-Specific Remediation Objectives – The process of applying environmental quality guidelines at the site level to establish remediation or clean-up targets for the site. Site-specific remediation objectives may be adopted from existing guidelines (generic criteria), modified from existing guidelines, or developed using a risk assessment approach.

Waste Site – A site where an impact exists and there is no person legally responsible, other than as set out under the Devolution Agreement, for the care and maintenance or Remediation of that site.





Acronyms

AANDC	Aboriginal Affairs and Northern Development Canada
ACGR	Associate Committee on Geotechnical Research
ACM	Asbestos-Containing Materials
AEC	Area(s) of Environmental Concern
AIA	Archaeological Impact Assessment
ARD	Acid rock drainage
BGM	Bituminous Geomembrane
CCME	Canadian Council of Ministers of the Environment
CEPA	Canadian Environmental Protection Act
CEQGs	Canadian Environmental Quality Guidelines
CIDMS	Comprehensive Integrated Document Management System
CIRNAC	Crown Indigenous Relations and Northern Affairs Canada
COCs	Contaminants of Concern
CPCM	Construction and Post Construction Monitoring Plan
CSV	Crown Site Visit
DBR	Design Basis Report
DMF	Decision-Making Framework
DNV	Delta Nahanni Joint Venture
DR	Departmental Representative
DWP	Detailed Work Plan
ECG	Ecosystem Classification Group
EHS	Environment, Health and Safety
ENR	Department of Environment and Natural Resources
EOR	Engineer of Record
ESA(s)	Environmental Site Assessment(s)
FAL	Freshwater Aquatic Life
FCSAP	Federal Contaminated Sites Action Plan
FCSI	Federal Contaminated Sites Inventory
FIGQGs	Federal Interim Groundwater Quality Guidelines
FRTR	Federal Remediation Technologies Roundtable
FWL	Freshwater Life
GARD	Global Acid Rock Drainage Guide
GLG	Gordon Lake Group
GNWT	Government of the Northwest Territories
HHERA	Human Health and Environmental Risk Assessment
IDEA	Interdepartmental Data Exchange Application
IEMS	Integrated Environmental Management System
INAC	Indigenous and Northern Affairs Canada (now CIRNAC)
JV	Joint Venture
LTM	Long-Term Monitoring
LUP(s)	Land Use Permit(s)





MEND	Mine Environment Neutral Drainage
ML/ARD	metal leaching/acid rock drainage
MMER	Metal Mining Effluent Regulations
MVLUR	Mackenzie Valley Land Use Regulations
MVLWB	Mackenzie Valley Land and Water Board
MVRMA	<i>Mackenzie Valley Resource Management Act</i>
NCSCS	National Classification System for Contaminated Sites
NCSP	Northern Contaminated Sites Program
NSMA	North Slave Métis Alliance
NT	Northwest Territories
NWT	Northwest Territories
NWTMN	Northwest Territory Métis Nation
O&M	Operations and Maintenance
OMS	Operations, Maintenance and Surveillance
PAR	Performance Assessment Review
PC	Post Construction
PHCs	Petroleum Hydrocarbons
PSPC	Public Services and Procurement Canada
PVC	Polyvinyl chloride
QP	Quarry Permit
RDG	Regional Director General
R/RM	Remediation/Risk Management
RAP	Remedial Action Plan
SNP	Surveillance Network Program
SQG	Sediment Quality Guidelines
SSRTs	Site Specific Remedial Targets
SWHA	Site-Wide Hazard Assessment
TCA	Tailings Containment Area
TK	Traditional Knowledge
TSA	Temporary Storage Area
TSCA	Tailings and Soil Containment Area
WSCC	Workers' Safety and Compensation Commission
WL(s)	Water Licences
WRSCA	Waste Rock Soil Containment Area
YKDFN	Yellowknives Dene First Nation





Appendix A – Project Managers Project Closure Checklist

Instructions: Project Managers are to complete the following checklist throughout the project closure process and append it to the project closure report. If any activities are NOT completed, indicate the rationale in the Details/Notes column, and list the measures put in place to resolve.

Project Closure Activities	Completed?	Details / Notes
Long-term Monitoring (3.4.2.3)		
<input type="checkbox"/> Define Long-term Monitoring (LTM) requirements, where necessary	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Phase I Long Term Monitoring Plan (Years 1-5) has been finalized.
Protection of Crown Investments (3.6.2)		
<input type="checkbox"/> Communicate closed site conditions and restrictions to third-party interests / users, where needed	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Closure Celebration with YKDFN and NSMA was held in August 2019. Annual Community Updates on progress of Monitoring Program are held with both communities. The Post Remediation Site Conditions Report will be finalized along with this report.
<input type="checkbox"/> Define requirements for future maintenance or replacement of 'permanent' site features , if necessary (e.g. monitoring, access to resources agreement, etc.)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Operations, Maintenance and Surveillance Plan is currently being drafted.
Land Management Approach (3.6.3)		
<input type="checkbox"/> Finalize site ownership / responsibility (e.g. lease, reserve, transfer, devolution, etc.)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Federal land reserves have been established on all 9 site footprints. Goal is to eventually have the land transferred to the GNWT as with all CARD sites. Discussions on this matter are on-going.
<input type="checkbox"/> Notification of other administrators (e.g. Lands, O&G exploration, mining, forest) regarding final land management approach (e.g. notation on file)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	YKDFN plan to establish a cultural lodge on site of former work camp. CIRNAC Lands currently working with them on Land Use Permit.
<input type="checkbox"/> Establish Memoranda of Understanding (MOUs) , where needed	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Not applicable.





Project Closure Activities	Completed?	Details / Notes
Regulatory Authorizations (3.7)		
<input type="checkbox"/> Close all regulatory authorizations , as needed (e.g. water licences, land use permits, quarry permits, etc.)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Water Licence and Land Use Permit with the MVLWB are still in place. Land Use Permit expires in 2021 with the option for a two-year extension. The Water Licence expires in 2023. Federal and territorial quarry permits were closed.
<input type="checkbox"/> Complete other regulatory notices (e.g. NavCanada re: abandoned airstrips)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Not applicable
<input type="checkbox"/> Respond to other regulatory directions (e.g. Environment Canada, Department of Fisheries and Oceans, Land and Water Boards, etc.)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	No regulatory directions from Environment and Climate Change Canada, Department of Fisheries and Oceans or other federal regulatory body. No regulatory directions.
Indigenous Involvement and Benefits (7)		
<input type="checkbox"/> Remove reserve from affected land and release land to claimant group	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Not applicable
<input type="checkbox"/> Communicate site results through Record of Post Remediation Site Conditions to affected land claimant and/or Indigenous groups	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Record of Post Remediation Site Conditions will be finalized along with this document and shared with Indigenous partners.
<input type="checkbox"/> Invite representatives from the affected land claimant and/or Indigenous groups to participate in final inspection	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Closure Tour and Ceremony occurred in August 2019.
<input type="checkbox"/> Invite representatives from the affected land claimant and/or Indigenous groups to participate in a ceremony to acknowledge completion of project	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Closure Tour and Ceremony occurred in August 2019.
<input type="checkbox"/> Modify access agreements for future use of the site (e.g. for CIRNAC's access to monitor and maintain the site, if required)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Not applicable





Project Closure Activities	Completed?	Details / Notes
Information Management (9)		
<input type="checkbox"/> Apply CIRNAC's Information Management Policy and directives to ensure authenticity and integrity of project information	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Complete
<input type="checkbox"/> Save all documents in CIDMS (see More Guidance for more information)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Complete
<input type="checkbox"/> Reference project closure records in IEMS	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Complete
<input type="checkbox"/> Create a document that lists all project deliverable documents (may also be appended as Table 24 to the project closure report)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Complete
<input type="checkbox"/> Confirm that site information has been updated in IEMS	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Complete
<input type="checkbox"/> Confirm that site information has been updated in the FCSP databases: FCSI and IDEA	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Complete
<input type="checkbox"/> Ensure that measures for managing (storing, archiving, etc.) the project documentation have been taken	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Complete
Communications (10)		
Immediate Communication Requirements		
<input type="checkbox"/> Undertake community consultation as needed (e.g. participation by community representatives in final inspection; presentation to leadership and/or Elders in community, etc.)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Ongoing
<input type="checkbox"/> Extend invitation to relevant parties (e.g. CLCA claimant, other Indigenous organizations, third parties, regulatory inspectors, other regulators) to participate in final site visit / project closure meeting , as required	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Site Closure Tour and Ceremony occurred in August 2019.





Project Closure Activities	Completed?	Details / Notes
<input type="checkbox"/> Provide Record of Post Remediation Site Conditions to affected land claimant organization and/or Indigenous groups	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Record of Post Remediation Site Conditions will be finalized along with this document and provided to Indigenous stakeholders.
<input type="checkbox"/> Provide Record of Post Remediation Site Conditions to affected communities	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Record of Post Remediation Site Conditions will be finalized along with this document and provided to Indigenous stakeholders.
<input type="checkbox"/> Provide Record of Post Remediation Site Conditions to relevant regulatory bodies (e.g. land administrator, regulatory board, and other relevant local, territorial or federal body)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Will be provided to MVLWB.
<input type="checkbox"/> Identify immediate EHS public notices that are required	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Not applicable
<input type="checkbox"/> Define current reporting obligations (e.g. Project Closure Report; transfer for LTM, etc.)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Defined in Water Licence and Phase I Long Term Monitoring Report.
<input type="checkbox"/> Define future reporting obligations (e.g. sharing monitoring results with community, regulators, etc.)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Defined in Water Licence and Phase I Long Term Monitoring Report.
Future Communication Requirements		
<input type="checkbox"/> Identify ongoing EHS public notices that must be monitored and maintained, and assign responsibility for ensuring this occurs	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> Identify long-term monitoring results that must be communicated, and assign responsibility for ensuring this occurs. Include identification of audience who must receive this information	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> Ensure that appropriate bodies are notified about site restrictions (e.g. site owners/users, municipality, local community, land management agency, and so on)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	





Project Closure Activities	Completed?	Details / Notes
Approval and Distribution of Project Closure Report (12)		
Approval of Project Closure Report (12.1)		
<input type="checkbox"/> Ensure that both the internal and public versions of the project closure report receive approval from the following authorities: <ul style="list-style-type: none"> <input type="checkbox"/> Project Manager <input type="checkbox"/> CIRNAC-Regional Director <input type="checkbox"/> CIRNAC-Regional Director General <input type="checkbox"/> CIRNAC-HQ Director 	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Distribution of Project Closure Report (Internal)		
<input type="checkbox"/> Ensure that the following stakeholders receive an electronic copy of the internal project closure report: <ul style="list-style-type: none"> <input type="checkbox"/> FCSAP Secretariat <input type="checkbox"/> CIRNAC Regional Monitoring Program Manager <input type="checkbox"/> Land Administrator <input type="checkbox"/> Regional Mine Recorder <input type="checkbox"/> Regional Operations Director / Inspectors <input type="checkbox"/> Land and Water Board <input type="checkbox"/> Other: _____ <input type="checkbox"/> Request a confirmation email upon receipt of report from each stakeholder	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Distribution of Record of Post Remediation Site Conditions (Public)		
<input type="checkbox"/> Ensure that the following stakeholders receive an electronic copy of the Record of Post Remediation Site Conditions (public project closure report). <ul style="list-style-type: none"> <input type="checkbox"/> Indigenous Organizations <input type="checkbox"/> Territorial Government <input type="checkbox"/> Inspectors <input type="checkbox"/> Human Resources and Skills Development Canada (HRSDC) <input type="checkbox"/> Workers' Safety & Compensation Commission (WSCC) of the Northwest Territories & Nunavut <input type="checkbox"/> Yukon Workers' Compensation Health And Safety Board (YWCHSB) <input type="checkbox"/> Engineer of Record <input type="checkbox"/> Private sector (e.g. Chamber of Mines, GeoScience, PDAC) <input type="checkbox"/> Request a confirmation email upon receipt of report from each stakeholder	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	



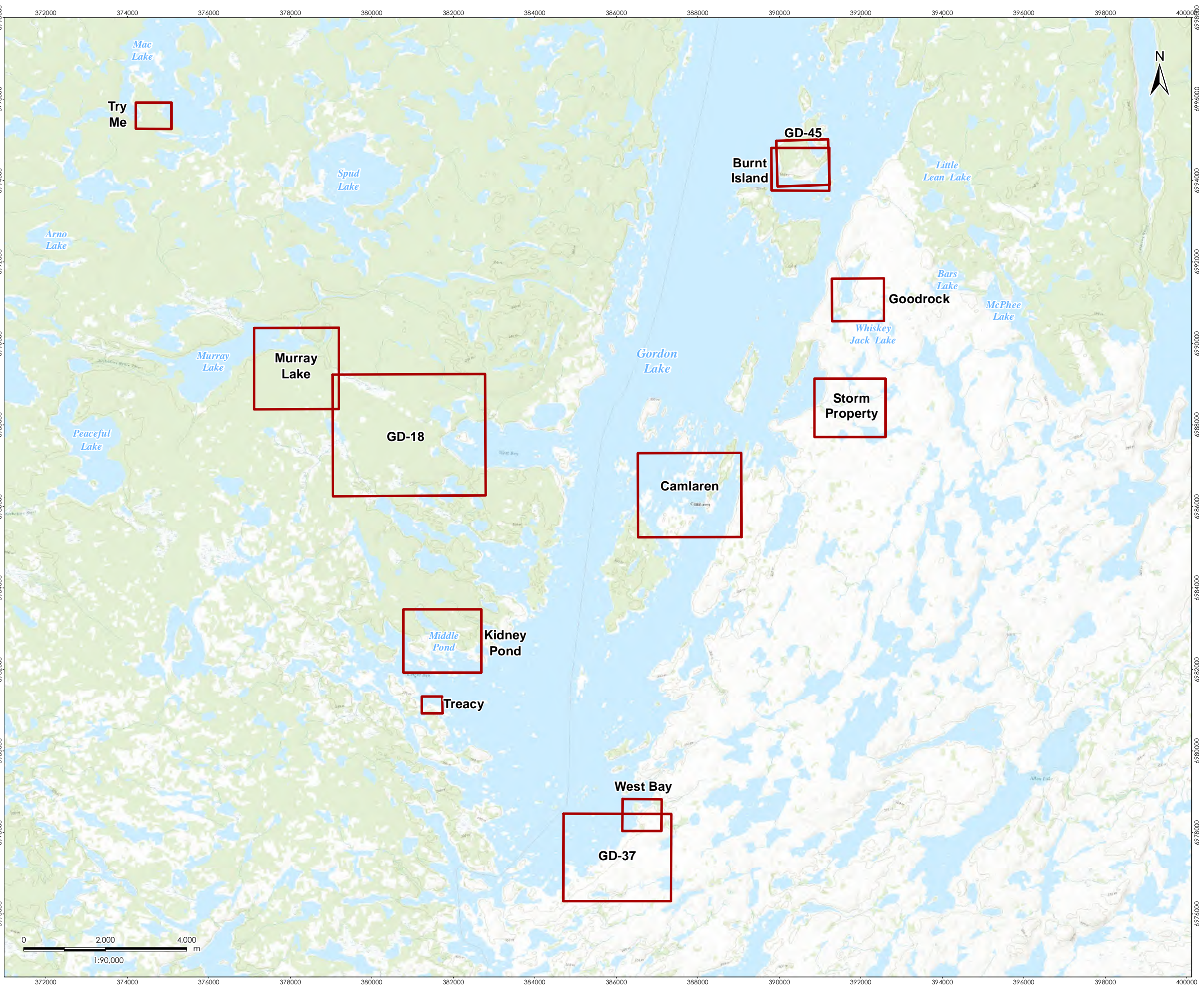


Appendix B – Figures

- B1 Gordon Lake Group - Site Locations
- B1.1 Burnt Island Site Overview
- B1.2 Burnt Island - Knutsen Camp Remedial Components
- B1.3 Burnt Island - Shaft Area Remedial Components
- B1.4 Burnt Island - Waste Rock Area Remedial Components
- B1.5 Burnt Island - Old Saw Mill Area Remedial Components
- B1.6 Burnt Island - Old Mill Area Remedial Components
- B1.7 Burnt Island - Tailings Impoundment Area Remedial Components
- B2.1 Camlaren Site Overview
- B2.2 Camlaren - Mine Area North Remedial Components
- B2.3 Camlaren - Mine Area South Remedial Components
- B2.4 Camlaren - North Cabin Remedial Components
- B2.5 Camlaren - Zenith Island Remedial Components
- B3.1 Goodrock Site Overview
- B3.2 Goodrock Mine - Camp Area Remedial Components
- B3.3 Goodrock Mine - Mill Area Remedial Components
- B4.1 Kidney Pond Site Overview
- B4.2 Kidney Pond - 1983 Camp Remedial Components
- B4.3 Kidney Pond - Exploration Camp Remedial Components
- B4.4 Kidney Pond - 1939 Camp Remedial Components
- B4.5 Kidney Pond - Portal Area Remedial Components
- B4.6 Kidney Pond - Kidney Pond Area Remedial Components
- B5.1 Murray Lake Site Overview
- B5.2 Murray Lake - 1938/2008 Camp Remedial Components
- B5.3 Murray Lake - Trench Area Remedial Components
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- B6.3 Storm Property - Camp Area Remedial Components
- B7.1 Treacy Site Overview
- B7.2 Treacy - Mill Area Remedial Components
- B7.3 Treacy - Camp Area Remedial Components
- B8.1 Try Me Site Overview
- B8.2 Try Me - Main Camp Area Remedial Components
- B8.3 Try Me - Western Camp Remedial Components
- B9.1 West Bay Site Overview
- B9.2 West Bay - South Area Remedial Components



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Stantec

Legend

 Site Location



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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Client/Project

Crown-Indigenous Relations and Northern Affairs Canada

Project Closure Report – Gordon Lake Group of Sites

September 2020
121414585

Figure No.

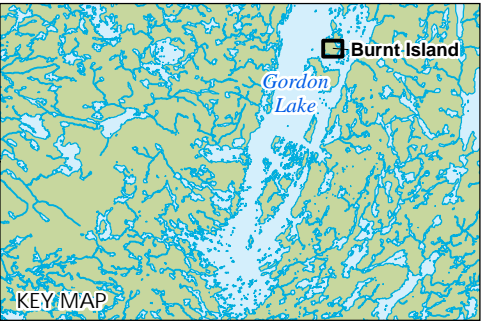
B1

Title

Gordon Lake Group - Site Locations



- Legend
- ▲ Surface Water Sample Location - SNP
 - Watercourse
 - Waterbody
 - Map Extent



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Figure No.
B1.1

Title

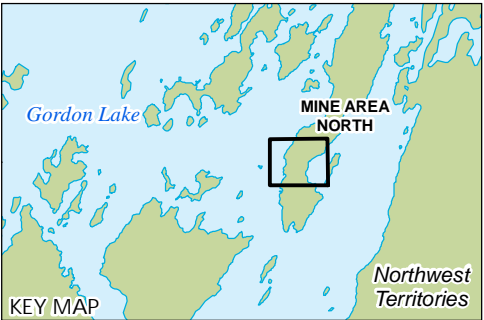
Burnt Island
Site Overview

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- Legend
- ★ Approximate Discharge Location
 - ▲ Surface Water Sample Location - SNP
 - Excavated Waste Rock
 - Tailings and Soil Containment Area (TSCA)
 - Scattered Surficial Debris Area (Cleaned)
 - Backfilled Remedial Excavation
 - Remedial Excavation
 - Risk Managed Soil Location
 - Wet Area
 - Waterbody



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Figure No.
B2.2

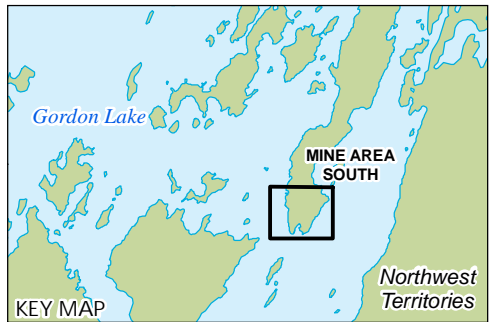
Title
Camlaren - Mine Area North
Remedial Components

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Sources: MapMart Orthomagey (2011), GeoBase, CANVEC



- Legend
- Groundwater Sample Location
 - TSCA Monitoring Well
 - TSCA Thermistor
 - TSCA Vibrating Wire Piezometer
 - Approximate Discharge Location
 - Surface Water Sample Location - SNP
 - Observed Feature (Point Location)
 - Excavated Waste Rock
 - Tailings and Soil Containment Area (TSCA)
 - Scattered Surficial Debris Area (Cleaned)
 - Observed Feature
 - Backfilled Remedial Excavation
 - Remedial Excavation
 - Risk Managed Soil Location
 - Waterbody



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Figure No.
B2.3

Title
Camlaren - Mine Area South
Remedial Components

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Sources: MapMart Orthomage (2011), GeoBase, CANVEC

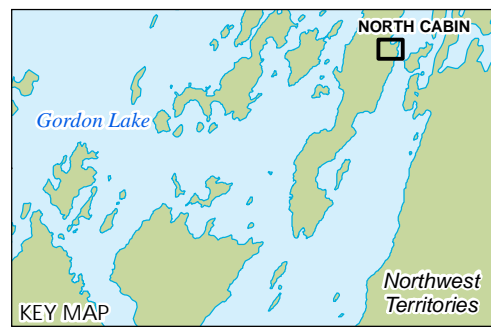


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Sources: MapMart Orthomageary (2011), GeoBase, CANVEC



- Legend
- Scattered Surficial Debris Area (Cleaned)
 - Remedial Excavation
 - Waterbody



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Figure No.
B2.4

Title
Camlaren - North Cabin
Remedial Components

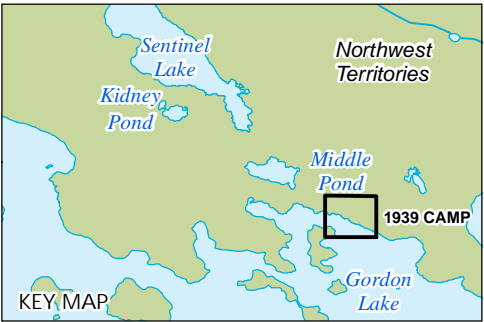


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Sources: MapMart Orthomagey (2011), GeoBase, CANVEC



- Legend
- Scattered Surficial Debris Area (Cleaned)
 - Waterbody

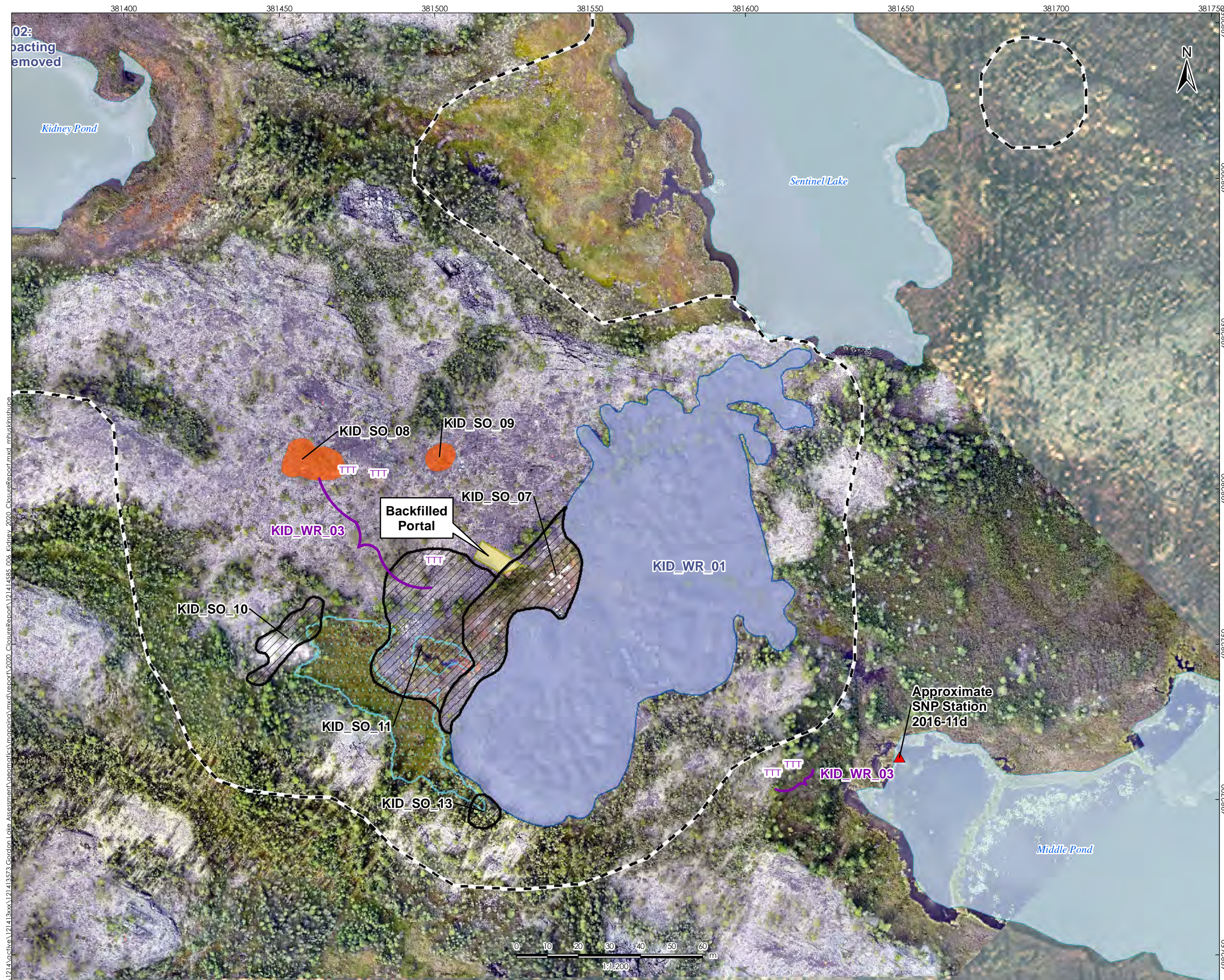


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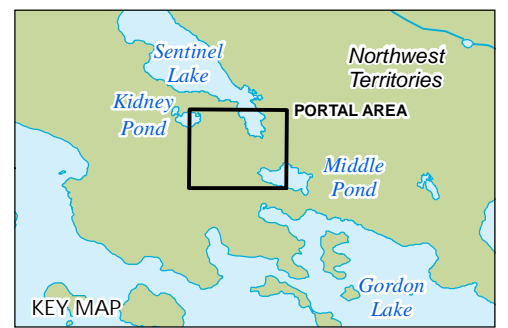
Client/Project
Crown-Indigenous Relations and
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Project Closure Report – Gordon Lake Group of Sites

Figure No.
B4.4

Title
Kidney Pond - 1939 Camp
Remedial Components



- Legend
- ▲ Surface Water Sample Location - SNP
 - TTT Moderately Risked Waste Rock Trench
 - Moderate Risk Impacting Material
 - Excavated and Covered Waste Rock
 - Mine Opening
 - Scattered Surficial Debris Area (Cleaned)
 - Backfilled Remedial Excavation
 - Risk Managed Soil Location
 - Wet Area
 - Waterbody



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Figure No.
B4.5

Title
Kidney Pond - Portal Area
Remedial Components

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Sources: MapMart Orthomagey (2011), GeoBase, CANVEC



- Legend
- ▲ Surface Water Sample Location - SNP
 - Watercourse
 - Waterbody
 - Map Extent



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Northern Affairs Canada
Project Closure Report – Gordon Lake Group of Sites

Figure No.
B7.1

Title
Treacy
Site Overview

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Sources: Mapbox, Orthomage (2011), GeoBase, CANVEC

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Sources: MapMart Orthomage (2011), GeoBase, CANVEC



Legend

- ▲ Surface Water Sample Location - SNP
- ⬢ Observed Feature (Point Location)
- Excavated Waste Rock
- Mine Opening
- Tailings Excavation
- ⬢ Scattered Surficial Debris Area (Cleaned)
- ▨ Backfilled Remedial Excavation
- Waterbody

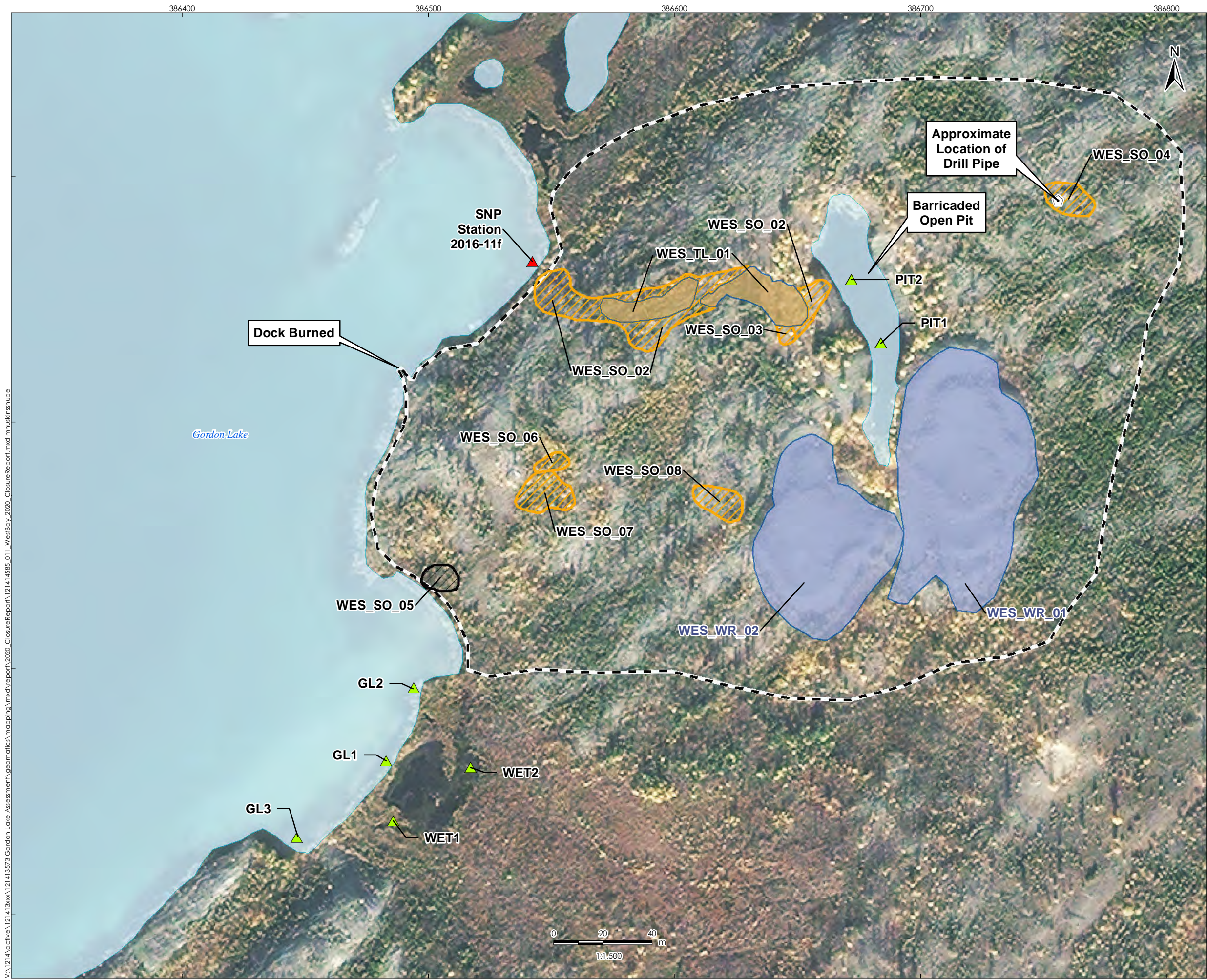


NAD 1983 UTM Zone 12N September 2020
121414585

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Project Closure Report – Gordon Lake Group of Sites

Figure No.
B7.2

Title
Treacy - Mill Area
Remedial Components



- Legend
- ▲ Surface Water Sample Location - SNP
 - ▲ Surface Water Sample Location - Phase 1 Long Term Monitoring
 - ⬢ Observed Feature (Point Location)
 - Moderate Risk Waste Rock
 - Tailings Excavation
 - - - Scattered Surficial Debris Area (Cleaned)
 - ▨ Backfilled Remedial Excavation
 - ▨ Remedial Excavation
 - Waterbody



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Northern Affairs Canada
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Figure No.
B9.2

Title

West Bay - South Area
Remedial Components

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Sources: MapMart Orthomageary (2011), GeoBase, CANVEC



Appendix C – Records of Post-Remediation Site Conditions

Burnt Island
Camlaren
Goodrock
Kidney Pond
Murray Lake
Storm Property
Treacy
Try Me
West Bay





Burnt Island – Gordon Lake Group of Sites Record of Post Remediation Site Conditions

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Part 1: Property Ownership and Administration

Project Number:	
Exact Site Name (as listed in IDEA):	Burnt Island Mine Site
Integrated Environmental Management System (IEMS) Number:	SM220
NWT Contaminated Site Database Number	220
FCSI Number:	23547
Contaminated Site Manager:	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) - Contaminants and Remediation Division (CARD), Yellowknife, NT
Phone Number:	1-867-669-2500
Project Location:	Gordon Lake Group of Sites, Gordon Lake, NT
Co- or Joint Property Owner:	Crown
NTS Map Sheet Numbers:	085P03 (Gordon Lake)

Description of Project Activities and Scope:

The Gordon Lake Remediation Project involved the remediation of nine former mine and advanced exploration sites located approximately 80 kilometres north of Yellowknife, NT. The nine sites, referred to collectively as the Gordon Lake Group (GLG) of Sites, are located on Crown Land on or near Gordon Lake. Remedial work at the GLG Sites occurred between 2017 and 2019.

Remedial activities completed at **Burnt Island** are listed below:

- Six impacted soil areas were excavated in 2018. Material was disposed of in the Tailings and Soil Containment Area (TSCA) constructed at Camlaren (another GLG Site).
- Two mine openings were sealed. A shaft was backfilled, closed with a polyurethane foam plug, covered with an engineered concrete cap, and covered in sand. A portal was backfilled.
- Brake-pads on a drill rig were removed by a hazardous materials specialist and taken to an appropriate facility for disposal.
- Abandoned infrastructure items (e.g. dock, drill rig) were removed from site and taken to the TSCA for disposal. Former sumps were regraded.
- Abandoned cabins were demolished and burned, or debris was placed in the TSCA.
- A tailings area was covered with borrow material from an adjacent hillside.
- Non-hazardous waste (scattered surficial debris) was collected by hand, consolidated, and taken to the TSCA for disposal.

Remediation Project Start Date:

2017

Remediation Project End Date:

2019 (Long-Term Monitoring is ongoing)





Name and Address of All Stakeholders:

Stakeholder	Name	Address
<i>Contaminated Site Remediation Project Manager</i>	Public Services and Procurement Canada (PSPC) on behalf of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	CIRNAC - PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Site Professional / Environmental Consultant / Departmental Representative (DR)</i>	Stantec Consulting Ltd. (Stantec)	102-40 Highfield Park Drive Dartmouth, NS B3A 0A3
<i>Prime Remediation Contractor</i>	Delta Nahanni Joint Venture (DNV)	100 Nahanni Drive Yellowknife, NT, X1A 2P6
<i>Regional Director - NCSP</i>	Joel Gowman (A/Senior Manager)	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Regional Director General</i>	Matthew Spence	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Land and Water Board</i>	Mackenzie Valley Land and Water Board (MVLWB)	PO Box 2130 4922 - 48th Street 7th Floor YK Centre Mall Yellowknife, NT. X1A 2P6
<i>Aboriginal Organization(s)</i>	Yellowknives Dene First Nation (YKDFN)	PO Box 2514 Yellowknife, NT X1A 2P8
	North Slave Métis Alliance (NSMA)	32 Melville Drive, Box 2301, Yellowknife, NT, X1A 2P7
<i>Director - HQ</i>	Jeff Mackey (A/NCSP Executive Director)	

Part 2: List of Reports

Key report documentation related to the property cited in Part 1 are listed below:

- Updated Report: Construction and Post Construction Monitoring Plan – Gordon Lake Group Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated April 20, 2018
- Final Report: Phase I Long-Term Monitoring Plan, report prepared by Stantec for PSPC, dated December 19, 2018
- Final Report: Post Construction Report, Gordon Lake Group of Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated March 29, 2019
- Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites, report prepared by Stantec Consulting Ltd. for PSPC and AANDC, dated March 29, 2019

For other reports please refer to the Mackenzie Valley Land and Water Board public registry (<https://mvlwb.com/registry>) under Authorization Number MV2016L8-0006 (Water Licence)





Part 3: Summary of Remediation/Risk Management Plan Close Out

- a) Describe the objectives and elements of the Remediation/Risk Management Plan implemented at the property.

The following objectives were established when determining the remedial options for Burnt Island:

Component	Objective
Co-mingled Impacted Soil	Excavate and consolidate in the TSCA
PHC Impacted Soil	Excavate and consolidate in the TSCA ¹
Mine Opening – Mine Shaft	Backfill and place an engineered cap
Mine Opening – Portal	Backfill
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA. Regrade sumps.
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA
Waste Rock	Leave in place and monitor
Tailings	Cover and leave in place
Hazardous Waste	Remove from site and dispose of at an approved facility
Non-Hazardous Waste	Collect and consolidate in the TSCA
¹ One area was left in place to be risk managed	

- b) List and describe the risk management control measures that were implemented at the property.

Risks to human health and the environment were mitigated through implementation of the remediation program that included activities described in Part 1. Site Specific Remedial Targets (SSRTs) for soil were developed for contaminants of concern (COCs) identified at the GLG Sites and are listed below:

Contaminants of Concern	SSRT (mg/kg)
Arsenic	69
Cobalt	130
Lead	332
Mercury, inorganic	13
Petroleum Hydrocarbon Fraction 1 (F1)	700
Petroleum Hydrocarbon Fraction 2 (F2)	1,000
Petroleum Hydrocarbon Fraction 3 (F3)	2,910

- c) List any active or passive site monitoring that was completed at the property.

Monitoring outlined in the Construction and Post-Construction Monitoring Plan (CPCM Plan) was completed during the remediation program. Phase I of Long-Term Monitoring (LTM) started in Year 1 post-construction (2019) and will be conducted yearly until Year 5 post-construction (2024). Results of





Phase I LTM will be evaluated and ongoing LTM (i.e. Year 6 and beyond) will be considered if deemed necessary.

Monitoring Program for Burnt Island

Monitoring Component	Responsible Organisation	Task Summary
Confirmatory soil samples	DNV, Stantec	Remedial excavations were advanced as per the contract specifications until confirmatory samples indicated concentrations of COCs in soil were below the SSRTs, or until bedrock was encountered. Stantec, as DR, collected the confirmatory samples as outlined in the CPCM plan.
Backfilled excavations	CIRNAC-CARD	Some excavations were backfilled to prevent ponding and so that the excavations did not pose physical hazards. Backfilled excavations were visually monitored for erosion and settlement following remediation activities.
Surface water monitoring	CIRNAC-CARD	As part of the Surveillance Network Program (SNP) surface water monitoring was conducted during construction and post-construction activities in accordance with the Water Licence issued for the Project. Surface water monitoring stations were established to monitor for potential effects to surface water resources downgradient of significant excavation areas; the station at Burnt Island is 2016-11a. As per the Phase I LTM Plan, surface water monitoring stations that were part of the SNP will be monitored during Phase I LTM.
Mine opening seals	CIRNAC-CARD	The backfill material placed at mine openings was visually assessed during post-construction inspections to confirm that material was stable with no significant resulting erosion or settlement. Seals over mine openings will be visually monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024) to confirm that backfill material is stable with no significant resulting erosion or settlement and to confirm structural stability of the mine opening cap.
Waste rock (BUR_WR_01)	CIRNAC-CARD	In Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), this area will be monitored to verify no visual signs of acid rock drainage (ARD) down-gradient of remaining impacts. Signs of ARD impacts could include new loss of vegetation, stressed vegetation, discoloration, etc.
Tailings cover	CIRNAC-CARD	Cover placed over the tailings area was visually assessed during post-construction inspections to confirm that material was stable with no significant resulting erosion or washout. This area will be visually monitored in Years 1, 3 and 5 of Phase I LTM (i.e., 2019, 2021 and 2024), to confirm that cover material is stable with no significant resulting erosion or washout.

- d) Describe the results of the site monitoring that verify the effectiveness of the control measures and the Remediation/Risk Management Plan.

Excavation Areas:

- As per results of confirmatory samples collected following remedial excavations at Burnt Island, remedial objectives have been met for impacted soil areas.
- No concerns were noted following post-construction inspections of backfilled areas.





Surface Water:

- Post-construction surface water samples from Burnt Island were collected in July and September 2019. Laboratory results from samples collected indicated no exceedances of the applied guidelines.

Mine Openings:

- Post-construction inspections were completed in 2018. No concerns were noted.
- Sealed mine openings at Burnt Island were visually assessed in 2019 (i.e., Year 1 of Phase I LTM). No concerns were noted.

Waste Rock

- The waste rock area at Burnt Island was visually assessed in 2019 (i.e., Year 1 of Phase I LTM) for signs of ARD down-gradient of remaining impacts. No signs of ARD-related impacts were identified.

Tailings Cover:

- Post-construction inspections were completed in 2018. No concerns were noted.
- The tailings area at Burnt Island was visually assessed in 2019 (i.e., Year 1 of Phase I LTM) to verify cover material was stable with no significant erosion or washout. No concerns were noted.

e) The monitoring requirements were terminated based on the following criteria.

Construction Monitoring concluded upon construction completion. Phase I LTM will continue until 2024.

Part 4: Property Status

Based on the work completed and the results of the Remediation/Risk Management Plan, the property cited in Part 1 is suitable for the following land use(s):

a) For which use(s) is the site now suitable?

- Residential/Parkland
SSRTs were derived considering a First Nations Site Visitor (sub-chronic exposure i.e., 24 hours/day, 7 days/week, 4 weeks per year)
- Industrial/Commercial
SSRTS were derived considering an on-site Construction/Remediation Worker (24 hours/day, 7 days/week, 12 weeks per year).

b) Is the groundwater on site Potable or Non-Potable?

- Non-Potable
There is no groundwater used for drinking water at site.
- Impacts to nearby surface water resources
No impacts were identified in samples collected in July and September 2019 (refer to Section 3d).

c) Are there any Crown investments constructed during remediation that will remain and require protection/maintenance?





Mine Opening Seals:

- A shaft at Burnt Island was backfilled, closed with a polyurethane foam plug, covered with an engineered concrete cap, covered in sand and then graded. A portal was backfilled. These seals will be monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024).

Tailings Cover:

- The cover material placed over the tailings area at Burnt Island will be visually monitored in Years 1, 3 and 5 of Phase I LTM (i.e., 2019, 2021 and 2024).

d) Are there any site use restrictions?

At the time of writing, there are proposed restrictions to site use related to environmental site conditions following completion of the remediation project. These include (but are not limited to):

- Mine opening seals – The cover and surrounding area should not be compromised by disturbance (e.g. excavation activities, rutting, blocking of drainage), or by excessive weight on the surface of the cover from heavy equipment that could lead to deterioration of the cover.
- Management of land use – Confirm over time that the land uses defined in the risk assessment are maintained.

Part 5: Inspector's Summary

Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Type A Land Use Permit Issued by the MVLWB		MV2016X0021	MV2016X0021	Dec 19, 2016 / Dec 18, 2021	
Type B Water Licence Issued by the MVLWB		MV2016L8-0006	MV2016L8-0006	Feb 16, 2017 / Dec 18, 2023	
DFO Authorization No.					
Quarry Permit (Federal) Issued by CIRNAC		2018QP0002		Feb 9, 2018	Permit was closed
Quarry Permit (Territorial) Issued by the Government of NT		2017QP0004		Feb 24, 2018	Permit was closed
Archaeological Permit No.		2015-011 (Class 2 Permit)			





Part 6: Summary Statement of the Site Professional

The statements must be checked by the Site Professional (e.g., Engineer of Record, Departmental Representative, the author of the Closure Report, etc.). The signature of the Site Professional indicates the fulfillment of the requirements of all the checked statements.

Please check appropriate statements:

- ☒ All work on which this Record of Post Remediation Site Conditions is based was prepared, overseen and/or reviewed by the Site Professional.
- ☒ The site was managed in accordance with the current CIRNAC and CCME contaminated site best practices and procedures.
- ☒ All reports cited in Part 2 and other related documents that have been prepared by the Site Professional have been delivered to the Contaminated Site Manager.
- ☒ The remediation/risk management criteria and objectives as defined by the Site Professional and cited in Part 3 have been achieved for the current or reasonably foreseeable future activities as cited in Part 4.
- ☒ The Remediation/Risk Management Plan was peer reviewed by a qualified independent Site Professional.
- ☐ Based on the results of the site monitoring activities, remedial action and/or any ongoing site management is not required for the current or reasonably foreseeable future site activities.

Site Professional

Name: _____

Signature: _____

Date: _____

Professional Affiliation: _____

Membership No.: _____

Company: _____

Address: _____

Telephone: _____

E-mail: _____





Camlaren – Gordon Lake Group of Sites Record of Post Remediation Site Conditions

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Part 1: Property Ownership and Administration

Project Number:	
Exact Site Name (as listed in IDEA):	Camlaren Mine
Integrated Environmental Management System (IEMS) Number:	SM205
NWT Contaminated Site Database Number	205
FCSI Number:	162
Contaminated Site Manager:	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) - Contaminants and Remediation Division (CARD), Yellowknife, NT
Phone Number:	1-867-669-2500
Project Location:	Gordon Lake Group of Sites, Gordon Lake, NT
Co- or Joint Property Owner:	Crown
NTS Map Sheet Numbers:	Camlaren - 085114 (Zenith Island)

Description of Project Activities and Scope:

The Gordon Lake Remediation Project involved the remediation of nine former mine and advanced exploration sites located approximately 80 kilometres north of Yellowknife, NT. The nine sites, referred to collectively as the Gordon Lake Group (GLG) of Sites, are located on Crown Land on or near Gordon Lake. Remedial work at the GLG Sites occurred between 2017 and 2019.

The Camlaren Site consists of an area on Muir Island as well as the northern tip of Zenith Island. An existing Tailings Containment Area (TCA) at Muir Island was upgraded to a Tailings and Soil Containment Area (TSCA) which was constructed as part of the Project. The TSCA was used for disposal of impacted material (soil, tailings, waste rock) and non-hazardous debris (metal, wood, etc.) from the GLG Sites.

Remedial activities completed at **Camlaren** are listed below:

- Twenty-three impacted soil areas were excavated in 2018 and material was disposed of in the TSCA.
- The shaft at Zenith Island was backfilled and sealed using an engineered cap.
- Abandoned buildings and other materials were demolished and either burned on-site during controlled burns or taken to the TSCA for disposal.
- Waste rock from five main areas was excavated and consolidated in the TSCA.
- Seven lead-acid batteries were removed by a hazardous materials specialist and taken to an appropriate facility for disposal.
- Non-hazardous waste (scattered surficial debris) was collected by hand, consolidated, and taken to the TSCA for disposal.





Remediation Project Start Date: 2017
Remediation Project End Date: 2019 (Long-Term Monitoring is ongoing)

Name and Address of All Stakeholders

Stakeholder	Name	Address
<i>Contaminated Site Remediation Project Manager</i>	Public Services and Procurement Canada (PSPC) on behalf of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	CIRNAC - PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Site Professional / Environmental Consultant / Departmental Representative (DR)</i>	Stantec Consulting Ltd. (Stantec)	102-40 Highfield Park Drive Dartmouth, NS B3A 0A3
<i>Prime Remediation Contractor</i>	Delta Nahanni Joint Venture (DNV)	100 Nahanni Drive Yellowknife, NT, X1A 2P6
<i>Regional Director - NCSP</i>	Joel Gowman (A/Senior Manager)	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Regional Director General</i>	Matthew Spence	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Land and Water Board</i>	Mackenzie Valley Land and Water Board (MVLWB)	PO Box 2130 4922 - 48th Street 7th Floor YK Centre Mall Yellowknife, NT. X1A 2P6
<i>Aboriginal Organization(s)</i>	Yellowknives Dene First Nation (YKDFN)	PO Box 2514 Yellowknife, NT X1A 2P8
	North Slave Métis Alliance (NSMA)	32 Melville Drive, Box 2301, Yellowknife, NT, X1A 2P7
<i>Director - HQ</i>	Jeff Mackey (A/NCSP Executive Director)	

Part 2: List of Reports

Key report documentation related to the property cited in Part 1 are listed below:

- Updated Report: Construction and Post Construction Monitoring Plan – Gordon Lake Group Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated April 20, 2018
- Final Report: Phase I Long-Term Monitoring Plan, report prepared by Stantec for PSPC, dated December 19, 2018
- Final Report: Post Construction Report, Gordon Lake Group of Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated March 29, 2019
- Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites, report prepared by Stantec Consulting Ltd. for PSPC and AANDC, dated March 29, 2019





For other reports please refer to the Mackenzie Valley Land and Water Board public registry (<https://mvlwb.com/registry>) under Authorization Number MV2016L8-0006 (Water Licence).

Part 3: Summary of Remediation/Risk Management Plan Close Out

- a) Describe the objectives and elements of the Remediation/Risk Management Plan implemented at the property.

The following objectives were established when determining the remedial options for Camlaren:

Component	Objective
Co-mingled Impacted Soil	Excavate and consolidate in the TSCA
Metals Impacted Soil	Excavate and consolidate in the TSCA ¹
PHC Impacted Soil	Excavate and consolidate in the TSCA ²
Mine Opening – Shaft (Zenith)	Backfill and place an engineered cap
Mine Opening – Mine Shaft Cap	Mark prior to remediation
Mine Opening – Crown Pillar	Construct barrier around crown pillar opening ³
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA. Regrade sumps.
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA
Waste Rock	Excavate and consolidate in TSCA, or incorporate into the TSCA
Tailings	Upgrade Tailings Containment Area (TCA) to Tailings and Soil Containment area (TSCA).
Hazardous Waste	Remove from site and dispose of at an approved facility
Non-Hazardous Waste	Collect and consolidate in the TSCA
¹ Three areas were left in place to be risk managed ² One area was left in place to be risk managed ³ Field investigations and discussions in Summer 2018 resulted in no barrier constructed as dangerous incline would make removal of the stope difficult and could negatively affect the integrity of the barrier.	

- b) List and describe the risk management control measures that were implemented at the property.

Risks to human health and the environment were mitigated through implementation of the remediation program that included activities described in Part 1. Site Specific Remedial Targets (SSRTs) for soil were developed for contaminants of concern (COCs) identified at the GLG Sites and are listed below:





Contaminants of Concern	SSRT (mg/kg)
Arsenic	69
Cobalt	130
Lead	332
Mercury, inorganic	13
Petroleum Hydrocarbon Fraction 1 (F1)	700
Petroleum Hydrocarbon Fraction 2 (F2)	1,000
Petroleum Hydrocarbon Fraction 3 (F3)	2,910

c) List any active or passive site monitoring that was completed at the property.

Monitoring outlined in the Construction and Post-Construction Monitoring Plan (CPCM Plan) was completed during the remediation program. Monitoring associated with the Surveillance Network Program (SNP) was also conducted in accordance with the Water Licence issued for the Project. Surface water monitoring stations were established to monitor for potential effects to surface water resources downgradient of significant excavation areas, and to monitor any discharge from the TSCA. Following construction of the TSCA in September 2018, instrumentation was installed to provide means for future monitoring of the facility. Within the TSCA, the instrumentation includes two thermistors, two standpipe monitoring wells (MWs), and three locations for vibrating wire piezometers with double nested vibrating wire sensors. In addition, four MWs were installed outside of the TSCA as part of perimeter monitoring for the SNP.

Phase I of Long-Term Monitoring (LTM) started in Year 1 post-construction (2019) and will be conducted yearly until Year 5 post-construction (2024). Monitoring associated with the SNP has been carried forward into LTM. Results of Phase I LTM will be evaluated and ongoing LTM (i.e. Year 6 and beyond) will be considered if deemed necessary.

Monitoring Program for Camlaren

Monitoring Component	Responsible Organisation	Task Summary
Confirmatory soil samples	DNV, Stantec	Remedial excavations were advanced as per the contract specifications until confirmatory samples indicated concentrations of COCs in soil were below the SSRTs, or until bedrock was encountered. Stantec, as DR, collected the confirmatory samples as outlined in the CPCM plan.
Backfilled excavations	CIRNAC-CARD	Some excavations were backfilled to prevent ponding and so that the excavations did not pose physical hazards. Backfilled excavations were visually monitored for erosion and settlement following remediation activities. Backfilled areas will be visually monitored as part of Phase I LTM to verify that backfill material is stable with no significant resulting erosion or washout into down-gradient water. For some areas, vegetative health will also be visually monitored to confirm stable or increasing growth.





Monitoring Program for Camlaren

Monitoring Component	Responsible Organisation	Task Summary
Mine opening seals	CIRNAC-CARD	<p>The backfill material placed at mine openings was visually assessed during post-construction inspections to confirm that material was stable with no significant resulting erosion or settlement.</p> <p>Seals over mine openings will be visually monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), to confirm that backfill material is stable with no significant resulting erosion or settlement and to confirm structural stability of the mine opening cap.</p>
Performance monitoring of the TSCA (incl. instrumentation)	CIRNAC-CARD	<p>As part of LTM, the TSCA will be monitored bi-annually in Years 1 through 5 (i.e., 2019-2024). Visual inspections of the TSCA top cover, slopes, toes, ditches and instrumentation will be completed to identify potential signs of erosion, settlement, seepage and/or structural failure. Revegetation efforts will also be assessed through visual inspections. Monitoring of the TSCA also includes review of data from installed instrumentation by Engineer of Record (EOR). Instrumentation data is downloaded and analyzed annually as part of the OMS Plan.</p>
Groundwater monitoring (elevations and contaminant concentrations)	CIRNAC-CARD	<p>Six monitoring wells (MWs) were installed in and around the TSCA (2 MWs within the TSCA and 4 MWs around the perimeter). The MWs inside the TSCA are part of LTM and those around the perimeter are part of the SNP and LTM. Groundwater stations at Camlaren include</p> <ul style="list-style-type: none"> • MWs in the TSCA: MW1 and MW2 • MWs around the perimeter of the TSCA: MWs 3, 4, 5, 6 (SNP stations 2016-7a, 2016-7b, 2016-7c, 2016-7d, respectively)
Surface water monitoring	CIRNAC-CARD	<p>Surface water monitoring stations that were part of the SNP will be monitored during Phase I LTM. Surface water stations at Camlaren include:</p> <ul style="list-style-type: none"> • Discharge stations at the TSCA: SNP stations 2016-8a, 2016-8b, 2016-8c (active only when water is present) • Surface water sample locations: SNP stations 2016-11b1, 2016-11b2, 2016-11b3, 2016-11b4 and 2016-11c

- d) Describe the results of the site monitoring that verify the effectiveness of the control measures and the Remediation/Risk Management Plan.

Excavation Areas:

- As per results of confirmatory samples collected following remedial excavations at Camlaren, remedial objectives have been met for impacted soil areas.
- No major concerns were noted following post-construction inspections of backfilled areas.

Mine Openings:

- Post-construction inspections were completed in 2018; minor concerns were subsequently addressed.
- The sealed mine opening at Zenith Island was visually assessed in 2019 (i.e., Year 1 of Phase I LTM) to verify stability of the cap and that backfill material was stable with no significant erosion or settlement. No concerns were noted.





Performance Monitoring of the TSCA

- No major deficiencies were observed during the 2019 site visits (i.e., Year 1 of Phase I LTM).

Groundwater Monitoring:

- Groundwater samples were collected in September 2018, and July and September 2019; results are reported in monthly SNP reports.

Surface Water:

- Post-construction surface water samples from four locations at Camlaren were collected in July and September 2019; results are reported in monthly SNP reports.

e) The monitoring requirements were terminated based on the following criteria.

Construction Monitoring concluded upon construction completion. Phase I LTM will continue until 2024.

Part 4: Property Status

Based on the work completed and the results of the Remediation/Risk Management Plan, the property cited in Part 1 is suitable for the following land use(s):

a) For which use(s) is the site now suitable?

1. Residential/Parkland
SSRTs were derived considering a First Nations Site Visitor (sub-chronic exposure i.e., 24 hours/day, 7 days/week, 4 weeks per year)
2. Industrial/Commercial
SSRTs were derived considering an on-site Construction/Remediation Worker (24 hours/day, 7 days/week, 12 weeks per year).

b) Is the groundwater on site Potable or Non-Potable?

1. Non-Potable
There is no groundwater used for drinking water at site. Intermittent groundwater seeps and monitoring wells in and around the Tailings and Soil Containment Area (TSCA) should not be considered potable.
2. Impacts to nearby surface water resources
Marginal exceedances of the referenced guideline(s) were identified in samples collected from two locations.

c) Are there any Crown investments constructed during remediation that will remain and require protection/maintenance?

Mine Opening Seals:

- A shaft at Zenith Island was backfilled, capped with reinforced pre-cast concrete panels and covered with granular fill. This seal will be monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024).





Tailings and Soil Containment Area (TSCA):

- The TSCA was designed and constructed with the aim of passive closure in the long-term, where no maintenance is required unless deficiencies are detected during routine monitoring (refer to Part 3c). Routine monitoring at the TSCA includes visual inspections, surface/groundwater monitoring, and interpretation of data from instrumentation installed in the facility. For further details, refer to the Phase I LTM Plan (available on the MVLWB registry - see Part 2) and the OMS Plan.

d) Are there any site use restrictions?

At the time of writing, there are proposed restrictions to site use related to environmental site conditions following completion of the remediation project. These include (but are not limited to):

- Mine opening seal – The cover and surrounding area should not be compromised by disturbance (e.g. excavation activities, rutting, blocking of drainage), or by excessive weight on the surface of the cover from heavy equipment that could lead to deterioration of the cover.
- Management of land use – Confirm over time that the land uses defined in the risk assessment are maintained.

Part 5: Inspector's Summary

Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Type A Land Use Permit Issued by the MVLWB		MV2016X0021	MV2016X0021	Dec 19, 2016 / Dec 18, 2021	
Type B Water Licence Issued by the MVLWB		MV2016L8-0006	MV2016L8-0006	Feb 16, 2017 / Dec 18, 2023	
DFO Authorization No.					
Quarry Permit (Federal) Issued by CIRNAC		2018QP0002		Feb 9, 2018	Permit was closed
Quarry Permit (Territorial) Issued by the Government of NT		2017QP0004		Feb 24, 2018	Permit was closed
Archaeological Permit No.		2015-011 (Class 2 Permit)			





Part 6: Summary Statement of the Site Professional

The statements must be checked by the Site Professional (e.g., Engineer of Record, Departmental Representative, the author of the Closure Report, etc.). The signature of the Site Professional indicates the fulfillment of the requirements of all the checked statements.

Please check appropriate statements:

- ☒ All work on which this Record of Post Remediation Site Conditions is based was prepared, overseen and/or reviewed by the Site Professional.
- ☒ The site was managed in accordance with the current CIRNAC and CCME contaminated site best practices and procedures.
- ☒ All reports cited in Part 2 and other related documents that have been prepared by the Site Professional have been delivered to the Contaminated Site Manager.
- ☒ The remediation/risk management criteria and objectives as defined by the Site Professional and cited in Part 3 have been achieved for the current or reasonably foreseeable future activities as cited in Part 4.
- ☒ The Remediation/Risk Management Plan was peer reviewed by a qualified independent Site Professional.
- ☐ Based on the results of the site monitoring activities, remedial action and/or any ongoing site management is not required for the current or reasonably foreseeable future site activities.

Site Professional

Name: _____

Signature: _____

Date: _____

Professional Affiliation: _____

Membership No.: _____

Company: _____

Address: _____

Telephone: _____

E-mail: _____





Goodrock – Gordon Lake Group of Sites Record of Post Remediation Site Conditions

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Part 1: Property Ownership and Administration

Project Number:	
Exact Site Name (as listed in IDEA):	Goodrock Mine
Integrated Environmental Management System (IEMS) Number:	SM466
NWT Contaminated Site Database Number	466
FCSI Number:	351
Contaminated Site Manager:	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) - Contaminants and Remediation Division (CARD), Yellowknife, NT
Phone Number:	1-867-669-2500
Project Location:	Gordon Lake Group of Sites, Gordon Lake, NT
Co- or Joint Property Owner:	Crown
NTS Map Sheet Numbers:	085P03 (Gordon Lake)

Description of Project Activities and Scope:

The Gordon Lake Remediation Project involved the remediation of nine former mine and advanced exploration sites located approximately 80 kilometres north of Yellowknife, NT. The nine sites, referred to collectively as the Gordon Lake Group (GLG) of Sites, are located on Crown Land on or near Gordon Lake. Remedial work at the GLG Sites occurred between 2017 and 2019.

Remedial activities completed at **Goodrock** are listed below:

- A metals-impacted area was covered with granular fill.
- Two mine openings were sealed. The North Mine Shaft and South Pit were closed with polyurethane foam plugs and covered with granular fill.
- Abandoned infrastructure items were dismantled and transported to the Tailings and Soil Containment Area (TSCA) constructed at Camlaren (another GLG Site).
- A lead-acid battery was removed from site by a hazardous materials specialist in 2017.
- Non-hazardous waste (scattered surficial debris) was collected by hand, consolidated, and taken to the TSCA for disposal.

Remediation Project Start Date: 2017

Remediation Project End Date: 2019 (Long-Term Monitoring is ongoing)





Name and Address of All Stakeholders

Stakeholder	Name	Address
<i>Contaminated Site Remediation Project Manager</i>	Public Services and Procurement Canada (PSPC) on behalf of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	CIRNAC - PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Site Professional / Environmental Consultant / Departmental Representative (DR)</i>	Stantec Consulting Ltd. (Stantec)	102-40 Highfield Park Drive Dartmouth, NS B3A 0A3
<i>Prime Remediation Contractor</i>	Delta Nahanni Joint Venture (DNV)	100 Nahanni Drive Yellowknife, NT, X1A 2P6
<i>Regional Director - NCSP</i>	Joel Gowman (A/Senior Manager)	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Regional Director General</i>	Matthew Spence	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Land and Water Board</i>	Mackenzie Valley Land and Water Board (MVLWB)	PO Box 2130 4922 - 48th Street 7th Floor YK Centre Mall Yellowknife, NT. X1A 2P6
<i>Aboriginal Organization(s)</i>	Yellowknives Dene First Nation (YKDFN)	PO Box 2514 Yellowknife, NT X1A 2P8
	North Slave Métis Alliance (NSMA)	32 Melville Drive, Box 2301, Yellowknife, NT, X1A 2P7
<i>Director - HQ</i>	Jeff Mackey (A/NCSP Executive Director)	

Part 2: List of Reports

Key report documentation related to the property cited in Part 1 are listed below:

- Updated Report: Construction and Post Construction Monitoring Plan – Gordon Lake Group Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated April 20, 2018
- Final Report: Phase I Long-Term Monitoring Plan, report prepared by Stantec for PSPC, dated December 19, 2018
- Final Report: Post Construction Report, Gordon Lake Group of Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated March 29, 2019
- Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites, report prepared by Stantec Consulting Ltd. for PSPC and AANDC, dated March 29, 2019

For other reports please refer to the Mackenzie Valley Land and Water Board public registry (<https://mvlwb.com/registry>) under Authorization Number MV2016L8-0006 (Water Licence)





Part 3: Summary of Remediation/Risk Management Plan Close Out

- a) Describe the objectives and elements of the Remediation/Risk Management Plan implemented at the property.

The following objectives were established when determining the remedial options for Goodrock:

Component	Objective
Metals Impacted Soil	Excavate and consolidate in the TSCA ¹
Mine Opening – South Pit	Backfill
Mine Opening – North Shaft	Backfill and place an engineered cap
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA.
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA
Waste Rock	Leave in place and monitor
Hazardous Waste (battery)	Remove from site and dispose of at an approved facility
Non-Hazardous Waste	Collect and consolidate in the TSCA
¹ Following a risk management evaluation, it was determined that this area would be left in place and covered	

- b) List and describe the risk management control measures that were implemented at the property.

Risks to human health and the environment were mitigated through implementation of the remediation program that included activities described in Part 1. Site Specific Remedial Targets (SSRTs) for soil were developed for contaminants of concern (COCs) identified at the GLG Sites and are listed below:

Contaminants of Concern	SSRT (mg/kg)
Arsenic	69
Cobalt	130
Lead	332
Mercury, inorganic	13
Petroleum Hydrocarbon Fraction 1 (F1)	700
Petroleum Hydrocarbon Fraction 2 (F2)	1,000
Petroleum Hydrocarbon Fraction 3 (F3)	2,910

- c) List any active or passive site monitoring that was completed at the property.

Monitoring outlined in the Construction and Post-Construction Monitoring Plan (CPCM Plan) was completed during the remediation program. Phase I of Long-Term Monitoring (LTM) started in Year 1 post-construction (2019) and will be conducted yearly until Year 5 post-construction (2024). Results of Phase I LTM will be evaluated and ongoing LTM (i.e., Year 6 and beyond) will be considered if deemed necessary.





Monitoring Program for Goodrock

Monitoring Component	Responsible Organisation	Task Summary
Cover material placed over GOO_HS_01	CIRNAC-CARD	Cover placed over this area was monitored following completion of remedial work at the Site and will be visually monitored in Years 1, 3, and 5 of Phase I LTM (i.e., 2019, 2021, and 2024) to confirm that cover material is stable with no significant resulting erosion or washout.
Mine opening seals	CIRNAC-CARD	The backfill material placed at mine openings was visually assessed during post-construction inspections to confirm that material was stable with no significant resulting erosion or settlement. Seals over mine openings will be visually monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), to confirm that backfill material is stable with no significant resulting erosion or settlement and to confirm structural stability of the mine opening cap.
Waste rock	CIRNAC-CARD	In Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), waste rock areas will be monitored to verify no visual signs of acid rock drainage (ARD) down-gradient of remaining impacts. Signs of ARD impacts could include new loss of vegetation, stressed vegetation, discoloration, etc.

- d) Describe the results of the site monitoring that verify the effectiveness of the control measures and the Remediation/Risk Management Plan.

Covered Area:

- No concerns were noted in 2019 (i.e. Phase I of LTM).

Mine Openings:

- Post-construction inspections were completed in 2018. No concerns were noted.
- Sealed mine openings at Goodrock were visually assessed in 2019 (i.e., Year 1 of Phase I LTM) to verify backfill material was stable with no significant erosion or settlement. No concerns were noted.

Waste Rock

- A waste rock area at Goodrock was visually assessed in 2019 (i.e., Year 1 of Phase I LTM) for signs of ARD down-gradient of remaining impacts. No signs of ARD-related impacts were identified.

- e) The monitoring requirements were terminated based on the following criteria.

Construction Monitoring concluded upon construction completion. Phase I LTM will continue until 2024.

Part 4: Property Status

Based on the work completed and the results of the Remediation/Risk Management Plan, the property cited in Part 1 is suitable for the following land use(s):

- a) For which use(s) is the site now suitable?

1. Residential/Parkland
SSRTs were derived considering a First Nations Site Visitor (sub-chronic exposure i.e., 24 hours/day, 7 days/week, 4 weeks per year)





2. Industrial/Commercial

SSRTS were derived considering an on-site Construction/Remediation Worker (24 hours/day, 7 days/week, 12 weeks per year).

b) Is the groundwater on site Potable or Non-Potable?

1. Non-Potable

There is no groundwater used for drinking water at site.

2. Impacts to nearby surface water resources

Surface water sampling is not required at this Site.

c) Are there any Crown investments constructed during remediation that will remain and require protection/maintenance?

Cover Material:

- The material placed over GOO_HS_01 will be visually monitored in Years 1, 3, and 5 of Phase I LTM (i.e., 2019, 2021, and 2024).

Mine Opening Seals:

- Two mine openings at Goodrock were closed with polyurethane foam plugs and covered with granular fill. These seals will be monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024).

d) Are there any site use restrictions?

At the time of writing, there are proposed restrictions to site use related to environmental site conditions following completion of the remediation project. These include (but are not limited to):

- Mine opening seals – The cover and surrounding area should not be compromised by disturbance (e.g. excavation activities, rutting, blocking of drainage), or by excessive weight on the surface of the cover from heavy equipment that could lead to deterioration of the cover.
- Management of land use – Confirm over time that the land uses defined in the risk assessment are maintained.

Part 5: Inspector's Summary

Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Type A Land Use Permit Issued by the MVLWB		MV2016X0021	MV2016X0021	Dec 19, 2016 / Dec 18, 2021	
Type B Water Licence Issued by the MVLWB		MV2016L8-0006	MV2016L8-0006	Feb 16, 2017 / Dec 18, 2023	
DFO Authorization No.					
Quarry Permit (Federal) Issued by CIRNAC		2018QP0002		Feb 9, 2018	Permit was closed





Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Quarry Permit (Territorial) Issued by the Government of NT		2017QP0004		Feb 24, 2018	Permit was closed
Archaeological Permit No.		2015-011 (Class 2 Permit)			

Part 6: Summary Statement of the Site Professional

The statements must be checked by the Site Professional (e.g., Engineer of Record, Departmental Representative, the author of the Closure Report, etc.). The signature of the Site Professional indicates the fulfillment of the requirements of all the checked statements.

Please check appropriate statements:

- ☒ All work on which this Record of Post Remediation Site Conditions is based was prepared, overseen and/or reviewed by the Site Professional.
- ☒ The site was managed in accordance with the current CIRNAC and CCME contaminated site best practices and procedures.
- ☒ All reports cited in Part 2 and other related documents that have been prepared by the Site Professional have been delivered to the Contaminated Site Manager.
- ☒ The remediation/risk management criteria and objectives as defined by the Site Professional and cited in Part 3 have been achieved for the current or reasonably foreseeable future activities as cited in Part 4.
- ☒ The Remediation/Risk Management Plan was peer reviewed by a qualified independent Site Professional.
- ☐ Based on the results of the site monitoring activities, remedial action and/or any ongoing site management is not required for the current or reasonably foreseeable future site activities.

Site Professional

Name: _____ Signature: _____
Date: _____
Professional Affiliation: _____ Membership No.: _____
Company: _____
Address: _____
Telephone: _____ E-mail: _____





Kidney Pond – Gordon Lake Group of Sites Record of Post Remediation Site Conditions

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Part 1: Property Ownership and Administration

Project Number:	
Exact Site Name (as listed in IDEA):	Kidney Pond / Knights Bay
Integrated Environmental Management System (IEMS) Number:	SM474
NWT Contaminated Site Database Number	474
FCSI Number:	24120
Contaminated Site Manager:	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) - Contaminants and Remediation Division (CARD), Yellowknife, NT
Phone Number:	1-867-669-2500
Project Location:	Gordon Lake Group of Sites, Gordon Lake, NT
Co- or Joint Property Owner:	Crown
NTS Map Sheet Numbers:	085I14 (Zenith Island)

Description of Project Activities and Scope:

The Gordon Lake Remediation Project involved the remediation of nine former mine and advanced exploration sites located approximately 80 kilometres north of Yellowknife, NT. The nine sites, referred to collectively as the Gordon Lake Group (GLG) of Sites, are located on Crown Land on or near Gordon Lake. Remedial work at the GLG Sites occurred between 2017 and 2019.

Remedial activities completed at **Kidney Pond** are listed below:

- Thirteen impacted soil areas were excavated in 2018. Material was disposed of in the Tailings and Soil Containment Area (TSCA) constructed at Camlaren (another GLG Site). Following initial excavation, additional work was completed at three of these impacted areas to confirm objectives had been met.
- A mine opening at Kidney Pond was closed. The decline was backfilled, and the portal sealed. Armour stone was placed over top.
- Abandoned infrastructure items were taken to the TSCA for disposal. Wooden items (including a dock) were burned on-site during controlled burns. Any remaining items were removed from site and transported to the TSCA for disposal.
- Three lead-acid batteries were removed by a hazardous materials specialist in 2017 and taken to an appropriate facility for disposal.
- Non-hazardous waste (scattered surficial debris) was collected by hand, consolidated, and taken to the TSCA for disposal.





Remediation Project Start Date: 2017
Remediation Project End Date: 2019 (Long-Term Monitoring is ongoing)

Name and Address of All Stakeholders

Stakeholder	Name	Address
<i>Contaminated Site Remediation Project Manager</i>	Public Services and Procurement Canada (PSPC) on behalf of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	CIRNAC - PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Site Professional / Environmental Consultant / Departmental Representative (DR)</i>	Stantec Consulting Ltd. (Stantec)	102-40 Highfield Park Drive Dartmouth, NS B3A 0A3
<i>Prime Remediation Contractor</i>	Delta Nahanni Joint Venture (DNV)	100 Nahanni Drive Yellowknife, NT, X1A 2P6
<i>Regional Director - NCSP</i>	Joel Gowman (A/Senior Manager)	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Regional Director General</i>	Matthew Spence	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Land and Water Board</i>	Mackenzie Valley Land and Water Board (MVLWB)	PO Box 2130 4922 - 48th Street 7th Floor YK Centre Mall Yellowknife, NT. X1A 2P6
<i>Aboriginal Organization(s)</i>	Yellowknives Dene First Nation (YKDFN)	PO Box 2514 Yellowknife, NT X1A 2P8
	North Slave Métis Alliance (NSMA)	32 Melville Drive, Box 2301, Yellowknife, NT, X1A 2P7
<i>Director - HQ</i>	Jeff Mackey (A/NCSP Executive Director)	

Part 2: List of Reports

Key report documentation related to the property cited in Part 1 are listed below:

- Updated Report: Construction and Post Construction Monitoring Plan – Gordon Lake Group Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated April 20, 2018
- Final Report: Phase I Long-Term Monitoring Plan, report prepared by Stantec for PSPC, dated December 19, 2018
- Final Report: Post Construction Report, Gordon Lake Group of Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated March 29, 2019
- Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites, report prepared by Stantec Consulting Ltd. for PSPC and AANDC, dated March 29, 2019





For other reports please refer to the Mackenzie Valley Land and Water Board public registry (<https://mvlwb.com/registry>) under Authorization Number MV2016L8-0006 (Water Licence).

Part 3: Summary of Remediation/Risk Management Plan Close Out

- a) Describe the objectives and elements of the Remediation/Risk Management Plan implemented at the property.

The following objectives were established when determining the remedial options for Kidney Pond:

Component	Objective
Co-mingled Impacted Soil	Excavate and consolidate in the TSCA ¹
Metals Impacted Soil	
PHC Impacted Soil	
Mine Opening – Portal	Backfill the decline and place an engineered cap ²
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA.
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA
Waste Rock	Excavate and consolidate in the TSCA
Hazardous Waste	Remove from site and dispose of at an approved facility
Non-Hazardous Waste	Collect and consolidate in the TSCA
¹ Some areas were left in place to be risk managed	
² A cap was not placed. The decline was backfilled, the portal was sealed, and armour stone was placed on top	

- b) List and describe the risk management control measures that were implemented at the property.

Risks to human health and the environment were mitigated through implementation of the remediation program that included activities described in Part 1. Site Specific Remedial Targets (SSRTs) for soil were developed for contaminants of concern (COCs) identified at the GLG Sites and are listed below:

Contaminants of Concern	SSRT (mg/kg)
Arsenic	69
Cobalt	130
Lead	332
Mercury, inorganic	13
Petroleum Hydrocarbon Fraction 1 (F1)	700
Petroleum Hydrocarbon Fraction 2 (F2)	1,000
Petroleum Hydrocarbon Fraction 3 (F3)	2,910

- c) List any active or passive site monitoring that was completed at the property.

Monitoring outlined in the Construction and Post-Construction Monitoring Plan (CPCM Plan) was completed during the remediation program. Phase I of Long-Term Monitoring (LTM) started in Year 1





post-construction (2019) and will be conducted yearly until Year 5 post-construction (2024). Results of Phase I LTM will be evaluated and ongoing LTM (i.e., Year 6 and beyond) will be considered if deemed necessary.

Monitoring Program for Kidney Pond

Monitoring Component	Responsible Organisation	Task Summary
Confirmatory soil samples	DNV, Stantec	Remedial excavations were advanced as per the contract specifications until confirmatory samples indicated concentrations of COCs in soil were below the SSRTs, or until bedrock was encountered. Stantec, as DR, collected the confirmatory samples as outlined in the CPCM plan.
Backfilled excavations	CIRNAC-CARD	Some excavations were backfilled to prevent ponding and so that the excavations did not pose physical hazards. Backfilled excavations were visually monitored for erosion and settlement following remediation activities. Monitoring at three areas will also be completed in Years 1, 3, and 5 of Phase I LTM (i.e., 2019, 2021, and 2024) to verify that backfill material is stable with no significant resulting erosion or washout into down-gradient water. Vegetative health will also be visually monitored to confirm stable or increasing growth.
Surface water monitoring	CIRNAC-CARD	As part of the Surveillance Network Program (SNP) surface water monitoring was conducted during construction and post-construction activities in accordance with the Water Licence issued for the Project. Surface water monitoring stations were established to monitor for potential effects to surface water resources downgradient of significant excavation areas; the station at Kidney Pond is 2016-11d. As per the Phase I LTM Plan, surface water monitoring stations formerly part of the SNP will be monitored during Phase I LTM.
Mine opening seals	CIRNAC-CARD	The backfill material placed at mine openings was visually assessed during post-construction inspections to confirm that material was stable with no significant resulting erosion or settlement. The portal seal will be visually monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), to confirm that backfill material is stable with no significant resulting erosion or settlement. Passive seep controls (i.e., wattles) were installed following remediation activities and will also be monitored.
Waste rock (KID_WR_01)	CIRNAC-CARD	In Years 1, 3 and 5 of Phase I LTM (i.e., 2019, 2021, and 2024), this waste rock area will be monitored to verify excavation backfill and large area of regraded material is stable with no significant resulting erosion or washout, especially into down-gradient water. In addition, vegetative health will be visually monitored to confirm stable or increasing growth.
Waste rock (other)	CIRNAC-CARD	In Years 1 and 5 of Phase I LTM (i.e., 2019, 2021, and 2024), waste rock areas will be monitored to verify no visual signs of acid rock drainage (ARD) down-gradient of remaining impacts. Signs of ARD impacts could include new loss of vegetation, stressed vegetation, discoloration, etc.

- d) Describe the results of the site monitoring that verify the effectiveness of the control measures and the Remediation/Risk Management Plan.





Excavation Areas:

- As per results of confirmatory samples collected following remedial excavations at Kidney Pond, remedial objectives have been met for impacted soil areas.
- No concerns were noted following post-construction inspections of backfilled areas.

Surface Water:

- Post-construction surface water samples from Kidney Pond were collected in July and September 2019. Laboratory results from samples collected indicated no exceedances of the applied guidelines.

Mine Openings:

- A post-construction inspection of the portal was completed in September 2018. No major concerns were noted, although some slumping of backfill material was observed.
- Additional slumping and minor erosion of granular fill was observed in May 2019. In July 2019, fill was manually placed in slump area and wattles were installed for erosion control.

Waste Rock

- Waste rock areas at Kidney Pond were visually assessed in 2019 (i.e., Year 1 of Phase I LTM). No signs of ARD-related impacts were identified.

e) The monitoring requirements were terminated based on the following criteria.

Construction Monitoring concluded upon construction completion. Phase I LTM will continue until 2024.

Part 4: Property Status

Based on the work completed and the results of the Remediation/Risk Management Plan, the property cited in Part 1 is suitable for the following land use(s):

a) For which use(s) is the site now suitable?

1. Residential/Parkland
SSRTs were derived considering a First Nations Site Visitor (sub-chronic exposure i.e., 24 hours/day, 7 days/week, 4 weeks per year)
2. Industrial/Commercial
SSRTS were derived considering an on-site Construction/Remediation Worker (24 hours/day, 7 days/week, 12 weeks per year).

b) Is the groundwater on site Potable or Non-Potable?

1. Non-Potable
There is no groundwater used for drinking water at site.
2. Impacts to nearby surface water resources
No impacts were identified in samples collected in July and September 2019 (refer to Section 3d).

c) Are there any Crown investments constructed during remediation that will remain and require protection/maintenance?





Mine Opening Seals:

- The portal at Kidney Pond was backfilled and sealed. The portal seal will be monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024).

Waste Rock Cover:

- The cover material placed over KID_WR_01 will be visually monitored in Years 1, 3, and 5 of Phase I LTM (i.e., 2019, 2021, and 2024).

d) Are there any site use restrictions?

At the time of writing, there are proposed restrictions to site use related to environmental site conditions following completion of the remediation project. These include (but are not limited to):

- Mine opening seals – The cover and surrounding area should not be compromised by disturbance (e.g. excavation activities, rutting, blocking of drainage), or by excessive weight on the surface of the cover from heavy equipment that could lead to deterioration of the cover.
- Management of land use – Confirm over time that the land uses defined in the risk assessment are maintained.

Part 5: Inspector's Summary

Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Type A Land Use Permit Issued by the MVLWB		MV2016X0021	MV2016X0021	Dec 19, 2016 / Dec 18, 2021	
Type B Water Licence Issued by the MVLWB		MV2016L8-0006	MV2016L8-0006	Feb 16, 2017 / Dec 18, 2023	
DFO Authorization No.					
Quarry Permit (Federal) Issued by CIRNAC		2018QP0002		Feb 9, 2018	Permit was closed
Quarry Permit (Territorial) Issued by the Government of NT		2017QP0004		Feb 24, 2018	Permit was closed
Archaeological Permit No.		2015-011 (Class 2 Permit)			





Part 6: Summary Statement of the Site Professional

The statements must be checked by the Site Professional (e.g., Engineer of Record, Departmental Representative, the author of the Closure Report, etc.). The signature of the Site Professional indicates the fulfillment of the requirements of all the checked statements.

Please check appropriate statements:

- ☒ All work on which this Record of Post Remediation Site Conditions is based was prepared, overseen and/or reviewed by the Site Professional.
- ☒ The site was managed in accordance with the current CIRNAC and CCME contaminated site best practices and procedures.
- ☒ All reports cited in Part 2 and other related documents that have been prepared by the Site Professional have been delivered to the Contaminated Site Manager.
- ☒ The remediation/risk management criteria and objectives as defined by the Site Professional and cited in Part 3 have been achieved for the current or reasonably foreseeable future activities as cited in Part 4.
- ☒ The Remediation/Risk Management Plan was peer reviewed by a qualified independent Site Professional.
- ☐ Based on the results of the site monitoring activities, remedial action and/or any ongoing site management is not required for the current or reasonably foreseeable future site activities.

Site Professional

Name: _____

Signature: _____

Date: _____

Professional Affiliation: _____

Membership No.: _____

Company: _____

Address: _____

Telephone: _____

E-mail: _____





Murray Lake – Gordon Lake Group of Sites Record of Post Remediation Site Conditions

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Part 1: Property Ownership and Administration

Project Number:	
Exact Site Name (as listed in IDEA):	Murray Lake Exploration Site
Integrated Environmental Management System (IEMS) Number:	SM490
NWT Contaminated Site Database Number	490
FCSI Number:	24158
Contaminated Site Manager:	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) - Contaminants and Remediation Division (CARD), Yellowknife, NT
Phone Number:	1-867-669-2500
Project Location:	Gordon Lake Group of Sites, Gordon Lake, NT
Co- or Joint Property Owner:	Crown
NTS Map Sheet Numbers:	085P03 (Gordon Lake)

Description of Project Activities and Scope:

The Gordon Lake Remediation Project involved the remediation of nine former mine and advanced exploration sites located approximately 80 kilometres north of Yellowknife, NT. The nine sites, referred to collectively as the Gordon Lake Group (GLG) of Sites, are located on Crown Land on or near Gordon Lake. Remedial work at the GLG Sites occurred between 2017 and 2019.

Remedial activities completed at **Murray Lake** are listed below:

- Two mine openings were sealed. The main shaft and the deep trench/shaft were closed with polyurethane foam plugs and covered with granular fill or local material.
- Former sumps were regraded.
- Non-hazardous waste (scattered surficial debris) was collected by hand, consolidated, and taken to the Tailings and Soil Containment Area (TSCA) constructed at Camlaren (another GLG Site).

Remediation Project Start Date: 2017

Remediation Project End Date: 2019 (Long-Term Monitoring is ongoing)





Name and Address of All Stakeholders:

Stakeholder	Name	Address
<i>Contaminated Site Remediation Project Manager</i>	Public Services and Procurement Canada (PSPC) on behalf of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	CIRNAC - PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Site Professional / Environmental Consultant / Departmental Representative (DR)</i>	Stantec Consulting Ltd. (Stantec)	102-40 Highfield Park Drive Dartmouth, NS B3A 0A3
<i>Prime Remediation Contractor</i>	Delta Nahanni Joint Venture (DNV)	100 Nahanni Drive Yellowknife, NT, X1A 2P6
<i>Regional Director - NCSP</i>	Joel Gowman (A/Senior Manager)	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Regional Director General</i>	Matthew Spence	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Land and Water Board</i>	Mackenzie Valley Land and Water Board (MVLWB)	PO Box 2130 4922 - 48th Street 7th Floor YK Centre Mall Yellowknife, NT. X1A 2P6
<i>Aboriginal Organization(s)</i>	Yellowknives Dene First Nation (YKDFN)	PO Box 2514 Yellowknife, NT X1A 2P8
	North Slave Métis Alliance (NSMA)	32 Melville Drive, Box 2301, Yellowknife, NT, X1A 2P7
<i>Director - HQ</i>	Jeff Mackey (A/NCSP Executive Director)	

Part 2: List of Reports

Key report documentation related to the property cited in Part 1 are listed below:

- Updated Report: Construction and Post Construction Monitoring Plan – Gordon Lake Group Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated April 20, 2018
- Final Report: Phase I Long-Term Monitoring Plan, report prepared by Stantec for PSPC, dated December 19, 2018
- Final Report: Post Construction Report, Gordon Lake Group of Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated March 29, 2019
- Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites, report prepared by Stantec Consulting Ltd. for PSPC and AANDC, dated March 29, 2019

For other reports please refer to the Mackenzie Valley Land and Water Board public registry (<https://mvlwb.com/registry>) under Authorization Number MV2016L8-0006 (Water Licence)





Part 3: Summary of Remediation/Risk Management Plan Close Out

- a) Describe the objectives and elements of the Remediation/Risk Management Plan implemented at the property.

The following objectives were established when determining the remedial options for Burnt Island:

Component	Objective
Metals Impacted Soil	Excavate and consolidate in the TSCA ¹
Mine Opening – Shaft	Backfill ²
Mine Opening – Deep Trench/Shaft	Backfill ²
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA. Regrade sumps.
Waste Rock	Leave in place and monitor
Non-Hazardous Waste	Collect and consolidate in the TSCA
¹ The impacted soil area was left in place to be risk managed	
² Both mine openings were sealed with a foam plug and covered with fill	

- b) List and describe the risk management control measures that were implemented at the property.

Risks to human health and the environment were mitigated through implementation of the remediation program that included activities described in Part 1. Site Specific Remedial Targets (SSRTs) for soil were developed for contaminants of concern (COCs) identified at the GLG Sites and are listed below:

Contaminants of Concern	SSRT (mg/kg)
Arsenic	69
Cobalt	130
Lead	332
Mercury, inorganic	13
Petroleum Hydrocarbon Fraction 1 (F1)	700
Petroleum Hydrocarbon Fraction 2 (F2)	1,000
Petroleum Hydrocarbon Fraction 3 (F3)	2,910

- c) List any active or passive site monitoring that was completed at the property.

Monitoring outlined in the Construction and Post-Construction Monitoring Plan (CPCM Plan) was completed during the remediation program. Phase I of Long-Term Monitoring (LTM) started in Year 1 post-construction (2019) and will be conducted yearly until Year 5 post-construction (2024). Results of Phase I LTM will be evaluated and ongoing LTM (i.e., Year 6 and beyond) will be considered if deemed necessary.





Monitoring Program for Murray Lake

Monitoring Component	Responsible Organisation	Task Summary
Mine opening seals	CIRNAC-CARD	The backfill material placed at mine openings was visually assessed during post-construction inspections to confirm that material was stable with no significant resulting erosion or settlement. Seals over mine openings will be visually monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), to confirm that backfill material is stable with no significant resulting erosion or settlement.
Waste rock	CIRNAC-CARD	In Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), waste rock areas be monitored to verify no visual signs of acid rock drainage (ARD) down-gradient of remaining impacts. Signs of ARD impacts could include new loss of vegetation, stressed vegetation, discoloration, etc.

- d) Describe the results of the site monitoring that verify the effectiveness of the control measures and the Remediation/Risk Management Plan.

Mine Openings:

- Post-construction inspections were completed in 2018. No concerns were noted.
- Sealed mine openings at Murray Lake were visually assessed in 2019 (i.e., Year 1 of Phase I LTM) to verify backfill material was stable with no significant erosion or settlement. No concerns were noted.

Waste Rock

- The waste rock area at Murray Lake was visually assessed in 2019 (i.e., Year 1 of Phase I LTM) for signs of ARD down-gradient of remaining impacts. No signs of ARD-related impacts were identified.

- e) The monitoring requirements were terminated based on the following criteria.

Construction Monitoring concluded upon construction completion. Phase I LTM will continue until 2024.

Part 4: Property Status

Based on the work completed and the results of the Remediation/Risk Management Plan, the property cited in Part 1 is suitable for the following land use(s):

- a) For which use(s) is the site now suitable?

- Residential/Parkland
SSRTs were derived considering a First Nations Site Visitor (sub-chronic exposure i.e., 24 hours/day, 7 days/week, 4 weeks per year)
- Industrial/Commercial
SSRTS were derived considering an on-site Construction/Remediation Worker (24 hours/day, 7 days/week, 12 weeks per year).

- b) Is the groundwater on site Potable or Non-Potable?

- Non-Potable
There is no groundwater used for drinking water at site.





2. Impacts to nearby surface water resources
Surface water sampling is not required at this Site.

c) Are there any Crown investments constructed during remediation that will remain and require protection/maintenance?

Mine Opening Seals:

- Two shafts at Murray Lake were sealed with polyurethane foam plugs and covered with granular fill and/or local material. These seals will be monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024).

d) Are there any site use restrictions?

At the time of writing, there are proposed restrictions to site use related to environmental site conditions following completion of the remediation project. These include (but are not limited to):

- Mine opening seals – The cover and surrounding area should not be compromised by disturbance (e.g. excavation activities, rutting, blocking of drainage), or by excessive weight on the surface of the cover from heavy equipment that could lead to deterioration of the cover.
- Management of land use – Confirm over time that the land uses defined in the risk assessment are maintained.

Part 5: Inspector's Summary

Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Type A Land Use Permit Issued by the MVLWB		MV2016X0021	MV2016X0021	Dec 19, 2016 / Dec 18, 2021	
Type B Water Licence Issued by the MVLWB		MV2016L8-0006	MV2016L8-0006	Feb 16, 2017 / Dec 18, 2023	
DFO Authorization No.					
Quarry Permit (Federal) Issued by CIRNAC		2018QP0002		Feb 9, 2018	Permit was closed
Quarry Permit (Territorial) Issued by the Government of NT		2017QP0004		Feb 24, 2018	Permit was closed
Archaeological Permit No.		2015-011 (Class 2 Permit)			





Part 6: Summary Statement of the Site Professional

The statements must be checked by the Site Professional (e.g., Engineer of Record, Departmental Representative, the author of the Closure Report, etc.). The signature of the Site Professional indicates the fulfillment of the requirements of all the checked statements.

Please check appropriate statements:

- ☒ All work on which this Record of Post Remediation Site Conditions is based was prepared, overseen and/or reviewed by the Site Professional.
- ☒ The site was managed in accordance with the current CIRNAC and CCME contaminated site best practices and procedures.
- ☒ All reports cited in Part 2 and other related documents that have been prepared by the Site Professional have been delivered to the Contaminated Site Manager.
- ☒ The remediation/risk management criteria and objectives as defined by the Site Professional and cited in Part 3 have been achieved for the current or reasonably foreseeable future activities as cited in Part 4.
- ☒ The Remediation/Risk Management Plan was peer reviewed by a qualified independent Site Professional.
- ☐ Based on the results of the site monitoring activities, remedial action and/or any ongoing site management is not required for the current or reasonably foreseeable future site activities.

Site Professional

Name: _____

Signature: _____

Date: _____

Professional Affiliation: _____

Membership No.: _____

Company: _____

Address: _____

Telephone: _____

E-mail: _____





Storm – Gordon Lake Group of Sites Record of Post Remediation Site Conditions

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Part 1: Property Ownership and Administration

Project Number:	
Exact Site Name (as listed in IDEA):	Storm Property
Integrated Environmental Management System (IEMS) Number:	SM471
NWT Contaminated Site Database Number	471
FCSI Number:	24145
Contaminated Site Manager:	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) - Contaminants and Remediation Division (CARD), Yellowknife, NT
Phone Number:	1-867-669-2500
Project Location:	Gordon Lake Group of Sites, Gordon Lake, NT
Co- or Joint Property Owner:	Crown
NTS Map Sheet Numbers:	085P03 (Gordon Lake)

Description of Project Activities and Scope:

The Gordon Lake Remediation Project involved the remediation of nine former mine and advanced exploration sites located approximately 80 kilometres north of Yellowknife, NT. The nine sites, referred to collectively as the Gordon Lake Group (GLG) of Sites, are located on Crown Land on or near Gordon Lake. Remedial work at the GLG Sites occurred between 2017 and 2019.

Remedial activities completed at **Storm** are listed below:

- Two mine openings were sealed. The north and south mine shafts were closed with a polyurethane foam plug and covered with granular fill.
- A lead-acid battery was removed by a hazardous materials specialist and taken to an appropriate facility for disposal.
- Non-hazardous waste (scattered surficial debris) was collected by hand, consolidated, and disposed of in the Tailings and Soil Containment Area (TSCA) constructed at Camlaren (another GLG Site).

Remediation Project Start Date: 2017

Remediation Project End Date: 2019 (Long-Term Monitoring is ongoing)





Name and Address of All Stakeholders

Stakeholder	Name	Address
<i>Contaminated Site Remediation Project Manager</i>	Public Services and Procurement Canada (PSPC) on behalf of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	CIRNAC - PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Site Professional / Environmental Consultant / Departmental Representative (DR)</i>	Stantec Consulting Ltd. (Stantec)	102-40 Highfield Park Drive Dartmouth, NS B3A 0A3
<i>Prime Remediation Contractor</i>	Delta Nahanni Joint Venture (DNV)	100 Nahanni Drive Yellowknife, NT, X1A 2P6
<i>Regional Director - NCSP</i>	Joel Gowman (A/Senior Manager)	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Regional Director General</i>	Matthew Spence	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Land and Water Board</i>	Mackenzie Valley Land and Water Board (MVLWB)	PO Box 2130 4922 - 48th Street 7th Floor YK Centre Mall Yellowknife, NT. X1A 2P6
<i>Aboriginal Organization(s)</i>	Yellowknives Dene First Nation (YKDFN)	PO Box 2514 Yellowknife, NT X1A 2P8
	North Slave Métis Alliance (NSMA)	32 Melville Drive, Box 2301, Yellowknife, NT, X1A 2P7
<i>Director - HQ</i>	Jeff Mackey (A/NCSP Executive Director)	

Part 2: List of Reports

Key report documentation related to the property cited in Part 1 are listed below:

- Updated Report: Construction and Post Construction Monitoring Plan – Gordon Lake Group Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated April 20, 2018
- Final Report: Phase I Long-Term Monitoring Plan, report prepared by Stantec for PSPC, dated December 19, 2018
- Final Report: Post Construction Report, Gordon Lake Group of Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated March 29, 2019
- Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites, report prepared by Stantec Consulting Ltd. for PSPC and AANDC, dated March 29, 2019

For other reports please refer to the Mackenzie Valley Land and Water Board public registry (<https://mvlwb.com/registry>) under Authorization Number MV2016L8-0006 (Water Licence)





Part 3: Summary of Remediation/Risk Management Plan Close Out

- a) Describe the objectives and elements of the Remediation/Risk Management Plan implemented at the property.

The following objectives were established when determining the remedial options for Storm:

Component	Objective
Metals Impacted Soil	Excavate and consolidate in the TSCA ¹
Mine Opening – North Shaft	Backfill ²
Mine Opening – South Shaft	Backfill ²
Waste Rock	Leave in place and monitor
Hazardous Waste	Remove from site and dispose of at an approved facility
Non-Hazardous Waste	Collect and consolidate in the TSCA

¹One area was left in place to be risk managed

²Mine openings were sealed with foam plugs and covered with granular fill

- b) List and describe the risk management control measures that were implemented at the property.

Risks to human health and the environment were mitigated through implementation of the remediation program that included activities described in Part 1. Site Specific Remedial Targets (SSRTs) for soil were developed for contaminants of concern (COCs) identified at the GLG Sites and are listed below:

Contaminants of Concern	SSRT (mg/kg)
Arsenic	69
Cobalt	130
Lead	332
Mercury, inorganic	13
Petroleum Hydrocarbon Fraction 1 (F1)	700
Petroleum Hydrocarbon Fraction 2 (F2)	1,000
Petroleum Hydrocarbon Fraction 3 (F3)	2,910

- c) List any active or passive site monitoring that was completed at the property.

Monitoring outlined in the Construction and Post-Construction Monitoring Plan (CPCM Plan) was completed during the remediation program. Phase I of Long-Term Monitoring (LTM) started in Year 1 post-construction (2019) and will be conducted yearly until Year 5 post-construction (2024). Results of Phase I LTM will be evaluated and ongoing LTM (i.e., Year 6 and beyond) will be considered if deemed necessary.





Monitoring Program for Storm

Monitoring Component	Responsible Organisation	Task Summary
Mine opening seals	CIRNAC-CARD	The backfill material placed at mine openings was visually assessed during post-construction inspections to confirm that material was stable with no significant resulting erosion or settlement. Seals over mine openings will be visually monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), to confirm that backfill material is stable with no significant resulting erosion or settlement.
Waste rock	CIRNAC-CARD	In Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), waste rock areas will be monitored to verify no visual signs of acid rock drainage (ARD) down-gradient of remaining impacts. Signs of ARD impacts could include new loss of vegetation, stressed vegetation, discoloration, etc.

- d) Describe the results of the site monitoring that verify the effectiveness of the control measures and the Remediation/Risk Management Plan.

Mine Openings:

- Post-construction inspections were completed in 2018. No concerns were noted
- Sealed mine openings at Storm were visually assessed in 2019 (i.e., Year 1 of Phase I LTM) to verify backfill material was stable with no significant erosion or settlement. No concerns were noted.

Waste Rock

- Waste rock areas at Storm were visually assessed in 2019 (i.e., Year 1 of Phase I LTM) for signs of ARD down-gradient of remaining impacts. No signs of ARD-related impacts were identified.

- e) The monitoring requirements were terminated based on the following criteria.

Construction Monitoring concluded upon construction completion. Phase I LTM will continue until 2024.

Part 4: Property Status

Based on the work completed and the results of the Remediation/Risk Management Plan, the property cited in Part 1 is suitable for the following land use(s):

- a) For which use(s) is the site now suitable?

- Residential/Parkland
SSRTs were derived considering a First Nations Site Visitor (sub-chronic exposure i.e., 24 hours/day, 7 days/week, 4 weeks per year)
- Industrial/Commercial
SSRTS were derived considering an on-site Construction/Remediation Worker (24 hours/day, 7 days/week, 12 weeks per year).

- b) Is the groundwater on site Potable or Non-Potable?





1. Non-Potable
There is no groundwater used for drinking water at site.
2. Impacts to nearby surface water resources
Surface water sampling is not required at this Site.

c) Are there any Crown investments constructed during remediation that will remain and require protection/maintenance?

Mine Opening Seals:

- Two mine openings at Storm were closed with polyurethane foam plugs and covered in granular fill. These seals will be monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024).

d) Are there any site use restrictions?

At the time of writing, there are proposed restrictions to site use related to environmental site conditions following completion of the remediation project. These include (but are not limited to):

- Mine opening seals – The cover and surrounding area should not be compromised by disturbance (e.g. excavation activities, rutting, blocking of drainage), or by excessive weight on the surface of the cover from heavy equipment that could lead to deterioration of the cover.
- Management of land use – Confirm over time that the land uses defined in the risk assessment are maintained.

Part 5: Inspector's Summary

Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Type A Land Use Permit Issued by the MVLWB		MV2016X0021	MV2016X0021	Dec 19, 2016 / Dec 18, 2021	
Type B Water Licence Issued by the MVLWB		MV2016L8-0006	MV2016L8-0006	Feb 16, 2017 / Dec 18, 2023	
DFO Authorization No.					
Quarry Permit (Federal) Issued by CIRNAC		2018QP0002		Feb 9, 2018	Permit was closed
Quarry Permit (Territorial) Issued by the Government of NT		2017QP0004		Feb 24, 2018	Permit was closed
Archaeological Permit No.		2015-011 (Class 2 Permit)			





Part 6: Summary Statement of the Site Professional

The statements must be checked by the Site Professional (e.g., Engineer of Record, Departmental Representative, the author of the Closure Report, etc.). The signature of the Site Professional indicates the fulfillment of the requirements of all the checked statements.

Please check appropriate statements:

- ☒ All work on which this Record of Post Remediation Site Conditions is based was prepared, overseen and/or reviewed by the Site Professional.
- ☒ The site was managed in accordance with the current CIRNAC and CCME contaminated site best practices and procedures.
- ☒ All reports cited in Part 2 and other related documents that have been prepared by the Site Professional have been delivered to the Contaminated Site Manager.
- ☒ The remediation/risk management criteria and objectives as defined by the Site Professional and cited in Part 3 have been achieved for the current or reasonably foreseeable future activities as cited in Part 4.
- ☒ The Remediation/Risk Management Plan was peer reviewed by a qualified independent Site Professional.
- ☐ Based on the results of the site monitoring activities, remedial action and/or any ongoing site management is not required for the current or reasonably foreseeable future site activities.

Site Professional

Name: _____

Signature: _____

Date: _____

Professional Affiliation: _____

Membership No.: _____

Company: _____

Address: _____

Telephone: _____

E-mail: _____





Treacy – Gordon Lake Group of Sites Record of Post Remediation Site Conditions

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Part 1: Property Ownership and Administration

Project Number:	
Exact Site Name (as listed in IDEA):	Treacy Mine
Integrated Environmental Management System (IEMS) Number:	SM475
NWT Contaminated Site Database Number	475
FCSI Number:	24141
Contaminated Site Manager:	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) - Contaminants and Remediation Division (CARD), Yellowknife, NT
Phone Number:	1-867-669-2500
Project Location:	Gordon Lake Group of Sites, Gordon Lake, NT
Co- or Joint Property Owner:	Crown
NTS Map Sheet Numbers:	085I14 (Zenith Island)

Description of Project Activities and Scope:

The Gordon Lake Remediation Project involved the remediation of nine former mine and advanced exploration sites located approximately 80 kilometres north of Yellowknife, NT. The nine sites, referred to collectively as the Gordon Lake Group (GLG) of Sites, are located on Crown Land on or near Gordon Lake. Remedial work at the GLG Sites occurred between 2017 and 2019.

Remedial activities completed at **Treacy** are listed below:

- Five impacted soil areas were excavated in 2018. Material was disposed of in the Tailings and Soil Containment Area (TSCA) constructed at Camlaren (another GLG Site).
- Remedial work occurred at two trenches. The east (deep) trench was backfilled. Tailings in/near the west trench were removed and the trench was backfilled.
- Structure remains were taken to the TSCA for disposal.
- Waste rock from the Mill Area was excavated and consolidated in the TSCA.
- One tailings area (associated with the west trench, as noted above) was excavated and taken to the TSCA for disposal.
- Lead-containing painted wood was removed by a hazardous materials specialist and taken to an appropriate facility for disposal.
- Non-hazardous waste (scattered surficial debris) was collected by hand, consolidated, and taken to the TSCA for disposal.

Remediation Project Start Date:

2017

Remediation Project End Date:

2019 (Long-Term Monitoring is ongoing)





Name and Address of All Stakeholders

Stakeholder	Name	Address
<i>Contaminated Site Remediation Project Manager</i>	Public Services and Procurement Canada (PSPC) on behalf of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	CIRNAC - PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Site Professional / Environmental Consultant / Departmental Representative (DR)</i>	Stantec Consulting Ltd. (Stantec)	102-40 Highfield Park Drive Dartmouth, NS B3A 0A3
<i>Prime Remediation Contractor</i>	Delta Nahanni Joint Venture (DNV)	100 Nahanni Drive Yellowknife, NT, X1A 2P6
<i>Regional Director - NCSP</i>	Joel Gowman (A/Senior Manager)	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Regional Director General</i>	Matthew Spence	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Land and Water Board</i>	Mackenzie Valley Land and Water Board (MVLWB)	PO Box 2130 4922 - 48th Street 7th Floor YK Centre Mall Yellowknife, NT. X1A 2P6
<i>Aboriginal Organization(s)</i>	Yellowknives Dene First Nation (YKDFN)	PO Box 2514 Yellowknife, NT X1A 2P8
	North Slave Métis Alliance (NSMA)	32 Melville Drive, Box 2301, Yellowknife, NT, X1A 2P7
<i>Director - HQ</i>	Jeff Mackey (A/NCSP Executive Director)	

Part 2: List of Reports

Key report documentation related to the property cited in Part 1 are listed below:

- Updated Report: Construction and Post Construction Monitoring Plan – Gordon Lake Group Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated April 20, 2018
- Final Report: Phase I Long-Term Monitoring Plan, report prepared by Stantec for PSPC, dated December 19, 2018
- Final Report: Post Construction Report, Gordon Lake Group of Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated March 29, 2019
- Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites, report prepared by Stantec Consulting Ltd. for PSPC and AANDC, dated March 29, 2019

For other reports please refer to the Mackenzie Valley Land and Water Board public registry (<https://mvlwb.com/registry>) under Authorization Number MV2016L8-0006 (Water Licence)





Part 3: Summary of Remediation/Risk Management Plan Close Out

- a) Describe the objectives and elements of the Remediation/Risk Management Plan implemented at the property.

The following objectives were established when determining the remedial options for Treacy:

Component	Objective
Metals Impacted Soil	Excavate and consolidate in the TSCA
PHC Impacted Soil	Excavate and consolidate in the TSCA
Trench – East Trench	Backfill
Trench – West Trench	Remove tailings and backfill
Waste Rock	Excavate and consolidate in the TSCA
Hazardous Waste	Remove from site and dispose of at an approved facility
Non-Hazardous Waste	Collect and consolidate in the TSCA

- b) List and describe the risk management control measures that were implemented at the property.

Risks to human health and the environment were mitigated through implementation of the remediation program that included activities described in Part 1. Site Specific Remedial Targets (SSRTs) for soil were developed for contaminants of concern (COCs) identified at the GLG Sites and are listed below:

Contaminants of Concern	SSRT (mg/kg)
Arsenic	69
Cobalt	130
Lead	332
Mercury, inorganic	13
Petroleum Hydrocarbon Fraction 1 (F1)	700
Petroleum Hydrocarbon Fraction 2 (F2)	1,000
Petroleum Hydrocarbon Fraction 3 (F3)	2,910

- c) List any active or passive site monitoring that was completed at the property.

Monitoring outlined in the Construction and Post-Construction Monitoring Plan (CPCM Plan) was completed during the remediation program. Phase I of Long-Term Monitoring (LTM) started in Year 1 post-construction (2019) and will be conducted yearly until Year 5 post-construction (2024). Results of Phase I LTM will be evaluated and ongoing LTM (i.e., Year 6 and beyond) will be considered if deemed necessary.





Monitoring Program for Treacy

Monitoring Component	Responsible Organisation	Task Summary
Confirmatory soil samples	DNV, Stantec	Remedial excavations were advanced as per the contract specifications until confirmatory samples indicated concentrations of COCs in soil were below the SSRTs, or until bedrock was encountered. Stantec, as DR, collected the confirmatory samples as outlined in the CPCM plan.
Backfilled excavations	CIRNAC-CARD	Some excavations were backfilled to prevent ponding and so that the excavations did not pose physical hazards. Backfilled excavations were visually monitored for erosion and settlement following remediation activities. Monitoring at two areas will also be completed in Years 1, 3, and 5 of Phase I LTM (i.e., 2019, 2021, and 2024) to verify that backfill material is stable with no significant resulting erosion or washout into down-gradient water. Vegetative health will also be visually monitored to confirm stable or increasing growth.
Surface water monitoring	CIRNAC-CARD	As part of the Surveillance Network Program (SNP) surface water monitoring was conducted during construction and post-construction activities in accordance with the Water Licence issued for the Project. Surface water monitoring stations were established to monitor for potential effects to surface water resources downgradient of significant excavation areas; the station at Treacy is 2016-11e. As per the Phase I LTM Plan, surface water monitoring stations formerly part of the SNP will be monitored during Phase I LTM.
Trenches	CIRNAC-CARD	Backfill material will be visually monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024) to confirm that material is stable with no significant resulting erosion or settlement.

- d) Describe the results of the site monitoring that verify the effectiveness of the control measures and the Remediation/Risk Management Plan.

Excavation Areas and Trenches:

- As per results of confirmatory samples collected following remedial excavations at Treacy, remedial objectives have been met for impacted soil areas.
- No concerns were noted following post-construction inspection of backfilled areas.

Surface Water:

- Post-construction surface water samples from Treacy were collected in July and September 2019. Laboratory results from the sample collected in July indicated a marginal exceedance of the applied guidelines for zinc. No exceedances were observed in the September sample.

- e) The monitoring requirements were terminated based on the following criteria.

Construction Monitoring concluded upon construction completion. Phase I LTM will continue until 2024.

Part 4: Property Status

Based on the work completed and the results of the Remediation/Risk Management Plan, the property cited in Part 1 is suitable for the following land use(s):





a) For which use(s) is the site now suitable?

1. Residential/Parkland
SSRTs were derived considering a First Nations Site Visitor (sub-chronic exposure i.e., 24 hours/day, 7 days/week, 4 weeks per year)
2. Industrial/Commercial
SSRTs were derived considering an on-site Construction/Remediation Worker (24 hours/day, 7 days/week, 12 weeks per year).

b) Is the groundwater on site Potable or Non-Potable?

1. Non-Potable
There is no groundwater used for drinking water at site.
2. Impacts to nearby surface water resources
A marginal exceedance of zinc was noted in one post-construction sample collected at Treacy (refer to Section 3d).

c) Are there any Crown investments constructed during remediation that will remain and require protection/maintenance?

No.

d) Are there any site use restrictions?

At the time of writing, there are proposed restrictions to site use related to environmental site conditions following completion of the remediation project. These include (but are not limited to):

- Trench areas – The backfilled trenches and surrounding area should not be compromised by disturbance (e.g. excavation activities, rutting, blocking of drainage), or by excessive weight from heavy equipment that could lead to deterioration of the backfilled area.
- Management of land use – Confirm over time that the land uses defined in the risk assessment are maintained.

Part 5: Inspector's Summary

Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Type A Land Use Permit Issued by the MVLWB		MV2016X0021	MV2016X0021	Dec 19, 2016 / Dec 18, 2021	
Type B Water Licence Issued by the MVLWB		MV2016L8-0006	MV2016L8-0006	Feb 16, 2017 / Dec 18, 2023	
DFO Authorization No.					
Quarry Permit (Federal) Issued by CIRNAC		2018QP0002		Feb 9, 2018	Permit was closed





Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Quarry Permit (Territorial) Issued by the Government of NT		2017QP0004		Feb 24, 2018	Permit was closed
Archaeological Permit No.		2015-011 (Class 2 Permit)			

Part 6: Summary Statement of the Site Professional

The statements must be checked by the Site Professional (e.g., Engineer of Record, Departmental Representative, the author of the Closure Report, etc.). The signature of the Site Professional indicates the fulfillment of the requirements of all the checked statements.

Please check appropriate statements:

- ☒ All work on which this Record of Post Remediation Site Conditions is based was prepared, overseen and/or reviewed by the Site Professional.
- ☒ The site was managed in accordance with the current CIRNAC and CCME contaminated site best practices and procedures.
- ☒ All reports cited in Part 2 and other related documents that have been prepared by the Site Professional have been delivered to the Contaminated Site Manager.
- ☒ The remediation/risk management criteria and objectives as defined by the Site Professional and cited in Part 3 have been achieved for the current or reasonably foreseeable future activities as cited in Part 4.
- ☒ The Remediation/Risk Management Plan was peer reviewed by a qualified independent Site Professional.
- ☐ Based on the results of the site monitoring activities, remedial action and/or any ongoing site management is not required for the current or reasonably foreseeable future site activities.

Site Professional

Name: _____ Signature: _____
Date: _____
Professional Affiliation: _____ Membership No.: _____
Company: _____
Address: _____
Telephone: _____ E-mail: _____





Try Me – Gordon Lake Group of Sites Record of Post Remediation Site Conditions

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Part 1: Property Ownership and Administration

Project Number:	
Exact Site Name (as listed in IDEA):	Try Me Exploration Site
Integrated Environmental Management System (IEMS) Number:	SM488
NWT Contaminated Site Database Number	488
FCSI Number:	24155
Contaminated Site Manager:	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) - Contaminants and Remediation Division (CARD), Yellowknife, NT
Phone Number:	1-867-669-2500
Project Location:	Gordon Lake Group of Sites, Gordon Lake, NT
Co- or Joint Property Owner:	Crown
NTS Map Sheet Numbers:	085P03 (Gordon Lake)

Description of Project Activities and Scope:

The Gordon Lake Remediation Project involved the remediation of nine former mine and advanced exploration sites located approximately 80 kilometres north of Yellowknife, NT. The nine sites, referred to collectively as the Gordon Lake Group (GLG) of Sites, are located on Crown Land on or near Gordon Lake. Remedial work at the GLG Sites occurred between 2017 and 2019.

Remedial activities completed at **Try Me** are listed below:

- One mine opening was sealed. A shaft was closed with a polyurethane foam plug and covered with local material.
- Abandoned infrastructure items were removed from site and disposed of in the Tailings and Soil Containment Area (TSCA) constructed at Camlaren (another GLG Site).
- An abandoned cabin and other wooden structures were demolished and burned, or debris was placed in the TSCA.
- A lead-acid battery was removed by a hazardous materials specialist and taken to an appropriate facility for disposal.
- Non-hazardous waste (scattered surficial debris) was collected by hand, consolidated, and taken to the TSCA for disposal.

Remediation Project Start Date:

2017

Remediation Project End Date:

2019 (Long-Term Monitoring is ongoing)





Name and Address of All Stakeholders

Stakeholder	Name	Address
<i>Contaminated Site Remediation Project Manager</i>	Public Services and Procurement Canada (PSPC) on behalf of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	CIRNAC - PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Site Professional / Environmental Consultant / Departmental Representative (DR)</i>	Stantec Consulting Ltd. (Stantec)	102-40 Highfield Park Drive Dartmouth, NS B3A 0A3
<i>Prime Remediation Contractor</i>	Delta Nahanni Joint Venture (DNV)	100 Nahanni Drive Yellowknife, NT, X1A 2P6
<i>Regional Director - NCSP</i>	Joel Gowman (A/Senior Manager)	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Regional Director General</i>	Matthew Spence	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Land and Water Board</i>	Mackenzie Valley Land and Water Board (MVLWB)	PO Box 2130 4922 - 48th Street 7th Floor YK Centre Mall Yellowknife, NT. X1A 2P6
<i>Aboriginal Organization(s)</i>	Yellowknives Dene First Nation (YKDFN)	PO Box 2514 Yellowknife, NT X1A 2P8
	North Slave Métis Alliance (NSMA)	32 Melville Drive, Box 2301, Yellowknife, NT, X1A 2P7
<i>Director - HQ</i>	Jeff Mackey (A/NCSP Executive Director)	

Part 2: List of Reports

Key report documentation related to the property cited in Part 1 are listed below:

- Updated Report: Construction and Post Construction Monitoring Plan – Gordon Lake Group Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated April 20, 2018
- Final Report: Phase I Long-Term Monitoring Plan, report prepared by Stantec for PSPC, dated December 19, 2018
- Final Report: Post Construction Report, Gordon Lake Group of Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated March 29, 2019
- Operations, Maintenance and Surveillance Plan – Gordon Lake Group of Sites, report prepared by Stantec Consulting Ltd. for PSPC and AANDC, dated March 29, 2019

For other reports please refer to the Mackenzie Valley Land and Water Board public registry (<https://mvlwb.com/registry>) under Authorization Number MV2016L8-0006 (Water Licence)





Part 3: Summary of Remediation/Risk Management Plan Close Out

- a) Describe the objectives and elements of the Remediation/Risk Management Plan implemented at the property.

The following objectives were established when determining the remedial options for Try Me:

Component	Objective
Mine Opening – Shaft	Backfill and place an engineered cap ¹
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA.
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA
Hazardous Waste	Remove from site and dispose of at an approved facility
Non-Hazardous Waste	Collect and consolidate in the TSCA
¹ The shaft was sealed with a foam plug and covered with fill	

- b) List and describe the risk management control measures that were implemented at the property.

Risks to human health and the environment were mitigated through implementation of the remediation program that included activities described in Part 1. Site Specific Remedial Targets (SSRTs) for soil were developed for contaminants of concern (COCs) identified at the GLG Sites and are listed below:

Contaminants of Concern	SSRT (mg/kg)
Arsenic	69
Cobalt	130
Lead	332
Mercury, inorganic	13
Petroleum Hydrocarbon Fraction 1 (F1)	700
Petroleum Hydrocarbon Fraction 2 (F2)	1,000
Petroleum Hydrocarbon Fraction 3 (F3)	2,910

- c) List any active or passive site monitoring that was completed at the property.

Monitoring outlined in the Construction and Post-Construction Monitoring Plan (CPCM Plan) was completed during the remediation program. Phase I of Long-Term Monitoring (LTM) started in Year 1 post-construction (2019) and will be conducted yearly until Year 5 post-construction (2024). Results of Phase I LTM will be evaluated and ongoing LTM (i.e., Year 6 and beyond) will be considered if deemed necessary.





Monitoring Program for Try Me

Monitoring Component	Responsible Organisation	Task Summary
Mine opening seal	CIRNAC-CARD	The backfill material placed at mine openings was visually assessed during post-construction inspections to confirm that material was stable with no significant resulting erosion or settlement. The seal over the shaft will be visually monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024) to confirm that backfill material is stable with no significant resulting erosion or settlement.

- d) Describe the results of the site monitoring that verify the effectiveness of the control measures and the Remediation/Risk Management Plan.

Mine Openings:

- Post-construction inspections were completed in 2018. No concerns were noted.
- The sealed mine opening at Try Me was visually assessed in 2019 (i.e., Year 1 of Phase I LTM) to verify backfill material was stable with no significant erosion or settlement. No concerns were noted.

- e) The monitoring requirements were terminated based on the following criteria.

Construction Monitoring concluded upon construction completion. Phase I LTM will continue until 2024.

Part 4: Property Status

Based on the work completed and the results of the Remediation/Risk Management Plan, the property cited in Part 1 is suitable for the following land use(s):

- a) For which use(s) is the site now suitable?

1. Residential/Parkland
SSRTs were derived considering a First Nations Site Visitor (sub-chronic exposure i.e., 24 hours/day, 7 days/week, 4 weeks per year)
2. Industrial/Commercial
SSRTS were derived considering an on-site Construction/Remediation Worker (24 hours/day, 7 days/week, 12 weeks per year).

- b) Is the groundwater on site Potable or Non-Potable?

1. Non-Potable
There is no groundwater used for drinking water at site.
2. Impacts to nearby surface water resources
Surface water sampling is not required at this Site.

- c) Are there any Crown investments constructed during remediation that will remain and require protection/maintenance?





Mine Opening Seals:

- The shaft at Try Me was sealed with a polyurethane foam plug and covered with local material. This seal will be monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024).

d) Are there any site use restrictions?

At the time of writing, there are proposed restrictions to site use related to environmental site conditions following completion of the remediation project. These include (but are not limited to):

- Mine opening seals – The cover and surrounding area should not be compromised by disturbance (e.g. excavation activities, rutting, blocking of drainage), or by excessive weight on the surface of the cover from heavy equipment that could lead to deterioration of the cover.
- Management of land use – Confirm over time that the land uses defined in the risk assessment are maintained.

Part 5: Inspector's Summary

Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Type A Land Use Permit Issued by the MVLWB		MV2016X0021	MV2016X0021	Dec 19, 2016 / Dec 18, 2021	
Type B Water Licence Issued by the MVLWB		MV2016L8-0006	MV2016L8-0006	Feb 16, 2017 / Dec 18, 2023	
DFO Authorization No.					
Quarry Permit (Federal) Issued by CIRNAC		2018QP0002		Feb 9, 2018	Permit was closed
Quarry Permit (Territorial) Issued by the Government of NT		2017QP0004		Feb 24, 2018	Permit was closed
Archaeological Permit No.		2015-011 (Class 2 Permit)			





Part 6: Summary Statement of the Site Professional

The statements must be checked by the Site Professional (e.g., Engineer of Record, Departmental Representative, the author of the Closure Report, etc.). The signature of the Site Professional indicates the fulfillment of the requirements of all the checked statements.

Please check appropriate statements:

- ☒ All work on which this Record of Post Remediation Site Conditions is based was prepared, overseen and/or reviewed by the Site Professional.
- ☒ The site was managed in accordance with the current CIRNAC and CCME contaminated site best practices and procedures.
- ☒ All reports cited in Part 2 and other related documents that have been prepared by the Site Professional have been delivered to the Contaminated Site Manager.
- ☒ The remediation/risk management criteria and objectives as defined by the Site Professional and cited in Part 3 have been achieved for the current or reasonably foreseeable future activities as cited in Part 4.
- ☒ The Remediation/Risk Management Plan was peer reviewed by a qualified independent Site Professional.
- ☐ Based on the results of the site monitoring activities, remedial action and/or any ongoing site management is not required for the current or reasonably foreseeable future site activities.

Site Professional

Name: _____

Signature: _____

Date: _____

Professional Affiliation: _____

Membership No.: _____

Company: _____

Address: _____

Telephone: _____

E-mail: _____





West Bay – Gordon Lake Group of Sites Record of Post Remediation Site Conditions

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Part 1: Property Ownership and Administration

Project Number:	
Exact Site Name (as listed in IDEA):	West Bay / Black Ridge
Integrated Environmental Management System (IEMS) Number:	SM302
NWT Contaminated Site Database Number	302
FCSI Number:	C1037001
Contaminated Site Manager:	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) - Contaminants and Remediation Division (CARD), Yellowknife, NT
Phone Number:	1-867-669-2500
Project Location:	Gordon Lake Group of Sites, Gordon Lake, NT
Co- or Joint Property Owner:	Crown
NTS Map Sheet Numbers:	085I14 (Zenith Island)

Description of Project Activities and Scope:

The Gordon Lake Remediation Project involved the remediation of nine former mine and advanced exploration sites located approximately 80 kilometres north of Yellowknife, NT. The nine sites, referred to collectively as the Gordon Lake Group (GLG) of Sites, are located on Crown Land on or near Gordon Lake. Remedial work at the GLG Sites occurred between 2017 and 2019.

Remedial activities completed at **West Bay** are listed below:

- Seven impacted soil areas were excavated. Material was disposed of in the Tailings and Soil Containment Area (TSCA) constructed at Camlaren (another GLG Site).
- A chain link fence was installed around a large open pit.
- A tailings area was excavated and the material was disposed of in the TSCA.
- Abandoned infrastructure items were removed from site and taken to the TSCA for disposal.
- Structure remains were burned on site or taken to the TSCA for disposal.
- One battery in an advanced state of decay was removed during remedial excavation
- Non-hazardous waste (scattered surficial debris) was collected by hand, consolidated, and taken to the TSCA for disposal.

Remediation Project Start Date:

2017

Remediation Project End Date:

2019 (Long-Term Monitoring is ongoing)





Name and Address of All Stakeholders

Stakeholder	Name	Address
<i>Contaminated Site Remediation Project Manager</i>	Public Services and Procurement Canada (PSPC) on behalf of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	CIRNAC - PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Site Professional / Environmental Consultant / Departmental Representative (DR)</i>	Stantec Consulting Ltd. (Stantec)	102-40 Highfield Park Drive Dartmouth, NS B3A 0A3
<i>Prime Remediation Contractor</i>	Delta Nahanni Joint Venture (DNV)	100 Nahanni Drive Yellowknife, NT, X1A 2P6
<i>Regional Director - NCSP</i>	Joel Gowman (A/Senior Manager)	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Regional Director General</i>	Matthew Spence	PO Box 1500 4923 - 52nd Street Yellowknife, NT X1A 3Z4
<i>Land and Water Board</i>	Mackenzie Valley Land and Water Board (MVLWB)	PO Box 2130 4922 - 48th Street 7th Floor YK Centre Mall Yellowknife, NT. X1A 2P6
<i>Aboriginal Organization(s)</i>	Yellowknives Dene First Nation (YKDFN)	PO Box 2514 Yellowknife, NT X1A 2P8
	North Slave Métis Alliance (NSMA)	32 Melville Drive, Box 2301, Yellowknife, NT, X1A 2P7
<i>Director - HQ</i>	Jeff Mackey (A/NCSP Executive Director)	

Part 2: List of Reports

Key report documentation related to the property cited in Part 1 are listed below:

- Updated Report: Construction and Post Construction Monitoring Plan – Gordon Lake Group Sites, report prepared by Stantec for PSPC on behalf of CIRNAC, dated April 20, 2018
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For other reports please refer to the Mackenzie Valley Land and Water Board public registry (<https://mvlwb.com/registry>) under Authorization Number MV2016L8-0006 (Water Licence)





Part 3: Summary of Remediation/Risk Management Plan Close Out

- a) Describe the objectives and elements of the Remediation/Risk Management Plan implemented at the property.

The following objectives were established when determining the remedial options for West Bay:

Component	Objective
Co-mingled Impacted Soil	Excavate and consolidate in the TSCA
Metals Impacted Soil	
PHC Impacted Soil	
Mine Opening – Open Pit	Construct a barrier around the pit
Abandoned Infrastructure	Disassemble, burn and/or remove from site; consolidate as non-hazardous debris in the TSCA.
Abandoned Site Buildings	Demolish and/or burn; consolidate as non-hazardous debris in the TSCA
Waste Rock	Monitor in place
Tailings	Excavate and consolidate in the TSCA
Hazardous Waste	Remove from site
Non-Hazardous Waste	Collect and consolidate in the TSCA

- b) List and describe the risk management control measures that were implemented at the property.

Risks to human health and the environment were mitigated through implementation of the remediation program that included activities described in Part 1. Site Specific Remedial Targets (SSRTs) for soil were developed for contaminants of concern (COCs) identified at the GLG Sites and are listed below:

Contaminants of Concern	SSRT (mg/kg)
Arsenic	69
Cobalt	130
Lead	332
Mercury, inorganic	13
Petroleum Hydrocarbon Fraction 1 (F1)	700
Petroleum Hydrocarbon Fraction 2 (F2)	1,000
Petroleum Hydrocarbon Fraction 3 (F3)	2,910

- c) List any active or passive site monitoring that was completed at the property.

Monitoring outlined in the Construction and Post-Construction Monitoring Plan (CPCM Plan) was completed during the remediation program. Phase I of Long-Term Monitoring (LTM) started in Year 1 post-construction (2019) and will be conducted yearly until Year 5 post-construction (2024). Results of Phase I LTM will be evaluated and ongoing LTM (i.e., Year 6 and beyond) will be considered if deemed necessary.





Monitoring Program for West Bay

Monitoring Component	Responsible Organisation	Task Summary
Confirmatory soil samples	DNV, Stantec	Remedial excavations were advanced as per the contract specifications until confirmatory samples indicated concentrations of COCs in soil were below the SSRTs, or until bedrock was encountered. Stantec, as DR, collected the confirmatory samples as outlined in the CPCM plan.
Backfilled excavations	CIRNAC-CARD	Some excavations were backfilled to prevent ponding and so that the excavations did not pose physical hazards. Backfilled excavations were visually monitored for erosion and settlement following remediation activities.
Surface water monitoring (SNP)	CIRNAC-CARD	As part of the Surveillance Network Program (SNP) surface water monitoring was conducted during construction and post-construction activities in accordance with the Water Licence issued for the Project. Surface water monitoring stations were established to monitor for potential effects to surface water resources downgradient of significant excavation areas; the station at West Bay is 2016-11f. As per the Phase I LTM Plan, surface water monitoring stations formerly part of the SNP will be monitored during Phase I LTM.
Mine opening	CIRNAC-CARD	In Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), the fence will be visually inspected to confirm that it is structurally sound and effective.
Waste rock	CIRNAC-CARD	In Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024), waste rock areas will be monitored to verify no visual signs of acid rock drainage (ARD) down-gradient of remaining impacts. Signs of ARD impacts could include new loss of vegetation, stressed vegetation, discoloration, etc. In addition to visual inspections, surface water samples will be collected from surrounding waterbodies to verify water chemistry. There are two sampling stations in the open pit, two stations in a wetland, and three stations in Gordon Lake.

- d) Describe the results of the site monitoring that verify the effectiveness of the control measures and the Remediation/Risk Management Plan.

Excavation Areas:

- As per results of confirmatory samples collected following remedial excavations at West Bay, remedial objectives have been met for impacted soil areas.
- No concerns were noted following post-construction inspection of backfilled areas.

SNP Surface Water Sampling

- Post-construction surface water samples from West Bay were collected in July and September 2019. Laboratory results from samples collected indicated no exceedances of the applied guidelines.

Mine Openings:

- The fence around the pit at West Bay was visually assessed in 2019 (i.e., Year 1 of Phase I LTM) to verify structural stability and effectiveness. Minor concerns were noted and will be addressed if deemed necessary.





Waste Rock and LTM Surface Water Sampling

- The waste rock piles at West Bay were visually assessed in 2019 (i.e., Year 1 of Phase I LTM) for signs of ARD down-gradient of remaining impacts. No signs of ARD-related impacts were identified.
- Surface water samples associated with LTM were collected at West Bay in September 2019; results are reported in monthly SNP reports.

e) The monitoring requirements were terminated based on the following criteria.

Construction Monitoring concluded upon construction completion. Phase I LTM will continue until 2024.

Part 4: Property Status

Based on the work completed and the results of the Remediation/Risk Management Plan, the property cited in Part 1 is suitable for the following land use(s):

a) For which use(s) is the site now suitable?

1. Residential/Parkland
SSRTs were derived considering a First Nations Site Visitor (sub-chronic exposure i.e., 24 hours/day, 7 days/week, 4 weeks per year)
2. Industrial/Commercial
SSRTs were derived considering an on-site Construction/Remediation Worker (24 hours/day, 7 days/week, 12 weeks per year).

b) Is the groundwater on site Potable or Non-Potable?

1. Non-Potable
There is no groundwater used for drinking water at site.
2. Impacts to nearby surface water resources
Refer to Section 3d.

c) Are there any Crown investments constructed during remediation that will remain and require protection/maintenance?

Mine Openings:

- A fence was installed around the open pit at West Bay, which will be monitored in Years 1 and 5 of Phase I LTM (i.e., 2019 and 2024).

d) Are there any site use restrictions?

At the time of writing, there are proposed restrictions to site use related to environmental site conditions following completion of the remediation project. These include (but are not limited to):

- Fence – The fence and surrounding area should not be compromised by disturbance (e.g. excavation activities, rutting, blocking of drainage) that could lead to damage to the fence.
- Management of land use – Confirm over time that the land uses defined in the risk assessment are maintained.





Part 5: Inspector's Summary

Regulatory Authorizations for the GLG Sites

Regulatory Authorization	During Original Operation	During Remediation Work	During Post-Remediation Monitoring	Date Issued / Date of Expiry	Notes
Type A Land Use Permit Issued by the MVLWB		MV2016X0021	MV2016X0021	Dec 19, 2016 / Dec 18, 2021	
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Archaeological Permit No.		2015-011 (Class 2 Permit)			





Part 6: Summary Statement of the Site Professional

The statements must be checked by the Site Professional (e.g., Engineer of Record, Departmental Representative, the author of the Closure Report, etc.). The signature of the Site Professional indicates the fulfillment of the requirements of all the checked statements.

Please check appropriate statements:

- ☒ All work on which this Record of Post Remediation Site Conditions is based was prepared, overseen and/or reviewed by the Site Professional.
- ☒ The site was managed in accordance with the current CIRNAC and CCME contaminated site best practices and procedures.
- ☒ All reports cited in Part 2 and other related documents that have been prepared by the Site Professional have been delivered to the Contaminated Site Manager.
- ☒ The remediation/risk management criteria and objectives as defined by the Site Professional and cited in Part 3 have been achieved for the current or reasonably foreseeable future activities as cited in Part 4.
- ☒ The Remediation/Risk Management Plan was peer reviewed by a qualified independent Site Professional.
- ☐ Based on the results of the site monitoring activities, remedial action and/or any ongoing site management is not required for the current or reasonably foreseeable future site activities.

Site Professional

Name: _____

Signature: _____

Date: _____

Professional Affiliation: _____

Membership No.: _____

Company: _____

Address: _____

Telephone: _____

E-mail: _____

