NORTHWEST TERRITORIES POWER CORPORATION

Empowering Communities

SNARE HYDROELECTRIC FACILITY
QUARRY AND WINTER ROADS CLOSURE AND RECLAMATION PLAN

SNARE HYDROELECTRIC FACILITY
SNARE RIVER, NORTHWEST TERRITORIES

October 2021

DOCUMENT MAINTENANCE AND CONTROL

The Senior Environmental Licensing Specialist is responsible for the distribution, maintenance and updating of the Vegetation and Wildlife Management Plan. This Plan will be reviewed annually and updated as required, taking into account changes in the law, environmental factors, NTPC policies, and Snare Hydroelectric Facility characteristics. Changes in phone numbers, names of individuals, etc. that do not affect the intent of the Plan are to be made as required. Additional copies can be provided by the Director, Health, Safety & Environment.

DOCUMENT HISTORY				
Revision #	**Revised Section(s)**	**Description of Revision**	**Prepared by**	**Issue Date**
0	All	First Version	NTPC	October 2021

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1 INTRODUCTION

The Northwest Territories Power Corporation (NTPC) owns and operates the Snare Hydroelectric Facility (Snare Hydro) located on the Snare River, approximately 145 km northwest of Yellowknife, NT. The facility includes four hydro generation stations that provide power to the North Slave communities of Yellowknife, Behchokǫ̀, Dettah and N'Dilo along with the power generated by the Bluefish Hydroelectric Facility.

Snare Hydro currently operates under three Type A Land Use Permits (LUP) from the Wek' èezhìi Land and Water Board (WLWB) for the construction and operation of the winter roads (WR's) and quarry and borrow sites. In the fall of 2021 NTPC intends to apply for a site-wide Type A LUP that will consolidate the current LUP's for Snare Hydro under one permit. This consolidated LUP will increase efficiencies for all regulatory undertakings related to land use at Snare Hydro, improving processes and interactions for the WLWB, GNWT Lands Inspectors, NTPC and all Snare Hydro stakeholders moving forward.

NTPC has prepared this Closure and Reclamation Plan (CRP) for the upcoming land use activities to be regulated under the site-wide Type A LUP. This CRP provides the general closure and reclamation procedures for the upcoming land use activities at Snare Hydro.

1.1 OBJECTIVE

The primary objective to reclamation is to return the disturbed area to a natural, ecologically stable condition that blends in with the existing landscape. The CRP provides information on the progressive reclamation that will be undertaken to close and reclaim the snare hydro winter roads, quarry and borrow sites, and associated temporary supporting facilities including the temporary camps and fuel storage locations should NTPC no longer require them. However, it is unlikely that the Snare Facility will be closed, and the plans contained in this document are only conceptual. If the Snare Hyrdroelectric Facility is operational, NTPC must retain the ability to access the facility via the winter road, maintain active quarry and borrow locations, and allow for temporary camps and fuel storage in support of the operations. As a result, the Snare winter roads and quarry/borrow sites, access roads will not be fully reclaimed until the facility is permanently closed and abandoned. If another organization were to assume operating and maintenance responsibilities for the Snare Hydro Facility, the responsibility to close and reclaim would be transferred to that organization. Should the scope and/or purpose of the reclamation goals change, this document will be updated to reflect those changes.

1.2 PROJECT DESCRIPTION

1.2.1 Winter Roads

NTPC annually constructs the historical Snare Winter Road (WR) from Snare Forks to the Wekweètì Winter Road, NT linking the facility to Yellowknife via NWT Highway #3, allowing

access for resupply fuel, oversized equipment, and freight to be delivered to site. The Snare WR follows the same historical alignment of previous years, so relatively little brushing is required. The road does not cross any water courses and is 12.5km of portage winter road. The start point of the WR is a temporary laydown/marshalling area located at the southwest corner of Snare Forks, and the end point is a temporary laydown area located at the Wekweètì winter road junction. The temporary laydown at the Wekweètì winter road junction will be expanded to allow more space for staging of equipment and the potential for a temporary camp and/or fuel to be installed if required.

Three additional winter roads which have been used intermittently throughout the operation of the facility as required and will be included in the scope of the LUP include:

- Strutt Lake WR (8.1 km) connecting to three borrow locations on the east side of Strutt Lake. This winter road is currently authorized under Land Use Permit W2019Q0003, which expires on December 18, 2024 and is constructed when crushing is completed at Strutt Lake Pits every 4-8 years.
- The Big Spruce Lake WR 1 (17.8 km) connecting Snare rapids to the Side Dams, and Snare 5B Spillway. This route is entirely on Big Spruce Lake and is constructed every 10-20 years when major maintenance work is required at 5B or Side Dams. There is also a Big Spruce Lake WR 2 route that connects the side dams on Big Spruce Lake to the Snare site road using a couple portages and local inland lakes. The Big Spruce Lake WR 2 route would be used if ice conditions on Big Spruce Lake were not sufficient for WR construction.
- The 5B Bridge route (1.1 km) allowing for continued movement of equipment over the winter months if the 5B bridge every had any issues which impeded travel over the bridge in winter months. This is a contingency route only and would only be used in emergency situations.

The overland portion of the proposed WRs will follow previously constructed WR alignments (Strutt Lake WR, Snare WR), with an average width of the portages (overland) right-of-way of 8 to 10 metres (m). Widening of the existing portages is not expected, and only minimal brushing of the portages will be required for the Snare WR and the Strutt Lake WR. If ice and/or environmental conditions are not sufficient on the existing alignments minor changes may be required to ensure the safety of the route.

No soil stripping, removal of overburden, or draining of waterbodies/wetlands is expected during WR construction. However, small amounts of vegetation present on the portages and surface of the borrow sources will be removed. Vegetation clearing will be minimized to danger tree removal only. These activities will occur during winter months only. Any bushes or trees that are cleared will be moved to the edge of the WR corridor and left to naturally decompose..

Operation of the WRs will include use of the road for routine maintenance of the hydro facilities, and for transportation of materials and fuel for the planned upcoming construction activities.

For the Snare WR the road may be used for personnel transportation until the end of March or until the road is closed due to weather. The Snare winter roads are presented in Figure 2.

The annual construction, operation, and maintenance for the Snare WR will occur in five phases. Although each phase of the project is sequential in the annual program, there are elements of overlap between the phases.

- Phase 1 – Detailed Planning (June – October)
- Phase 2 – Mobilization (November – December)
- Phase 3 – Construction (December – January)
- Phase 4 – Operation and Maintenance (February – March)
- Phase 5 – Demobilization and Road Closure (March – April)

1.2.2 Quarries, Borrow and Storage Locations

Materials from 10 existing historical quarries and/or borrow locations across Snare Hydro will be excavated as required for future construction, resurfacing, upgrades and maintenance at the Snare Hydro Facility. All locations are existing historical borrow locations used intermittently since 1948 throughout the operation of the facility. Blasting would only occur at Snare Forks Rocks Quarry. Excavated aggregate will be stockpiled as needed at quarry and/or borrow locations, or alongside roadways or constructions sites for blending and utilizing. In addition, there will be 4 designated stockpile, storage and/or laydown locations at Snare Cascades Stockpile, KM 28, Snare Forks Laydown and the Wekweètì winter road junction.

In late 2021 GNWT will release the Quarry Sampling and Testing Guidance for the identification of Acid Rock Drainage and metal leaching potential guidelines which NTPC will reference to complete geochemical testing for all quarries and/or borrow locations across Snare Hydro in 2022 as per the requirements. The quarry, borrow and stockpile locations to be used include:

- Snare Rapids Silt Pit
- Snare Falls Clay Pit
- Snare Airstrip Sand Pit
- Snare Airstrip Junction Pit
- Snare Cascades Stockpile
- Strutt Lake Aggregate Pit 1
- Strutt Lake Aggregate Pit 2
- Strutt Lake Aggregate Pit 3
- Snare Forks Rock Quarry
- Snare Forks Till Pit 1
- Snare Forks Till Pit 2
- KM 28 Stockpile
- Snare Forks Laydown
- Snare Winter Road Laydown

Minimal vegetation clearing, overburden removal and/or disturbance to wildlife is expected throughout the quarrying, as all borrow locations have minimal overburden and vegetation present as they are historical borrow locations that have been used throughout the operation of the facility. Minor vegetation and overburden removal will be completed around the edges of the

existing borrow locations when required. The existing historical quarries and/or borrow locations across Snare Hydro are presented in Figure 2.

1.2.3 Snare Falls Substation

The existing substation at the Snare Falls Generating Station will be relocated approximately 70 m southeast of its current location and a new access road, 50 m in length and 6 m wide, will be constructed to link the existing road to the new substation (**Error! Reference source not found.**). Pole structures will be relocated and/or replaced to accommodate the new location...

1.2.4 Operation of Temporary Camps and Fuel Storage

To accommodate additional personnel, 9 potential locations for temporary camps have been identified within quarry/borrow locations and at the start and end of the Snare WR. These proposed locations are presented in Figure 3. Temporary camps will be project specific and used as contingency only if resourcing levels exceed the capacity of the main camp. These camps may include accommodations, offices, washroom facilities, fuel and waste storage. Temporary camps would have a capacity of 4 to 20 people. Maximum water usage would be 250 L/p/day x 20 p= 5000L/day or 5m3/day through a temporary self-sustaining water system in which water would be manually drawn from the forebay and stored in a water tank for use at the camp. Sewage would be discharged into temporary sewage pit similar to a winter road camp. All management plans and standard procedures for the Snare Land Use Permit would also apply to the overflow camps

Temporary fuel storage has been included to support any of the temporary camps or locations where crushing would take place but only used when required. Each location would include:

- 1 60,000L double walled diesel tank or another acceptable container for the storage of hydrocarbons.
- 1 double walled 1000L gas tank

The storage of fuel and any hazardous materials will be in accordance with the SPC and WMP, which conforms with the Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (CCME 2003), and the Northern Land Use Guidelines: Camp and Support Facilities (GNWT-Lands 2014a). Locations for temporary fuels storage are outlined in Figure 3.

1.2.5 Miscellaneous Construction Activities

In addition to the above noted land use activities, the following activities will be completed:

- Minor clearing for access roads and access to transmission lines for maintenance.
- Use of heavy equipment not on an existing Right-of-Way, including but not limited to:

- Maintenance of site roads.
- Maintenance of transmission infrastructure.
- Maintenance of dams and side dams.

- Major civil works and construction upgrades over the next 5 years.

Figure 1: Snare hydroelectric system map.

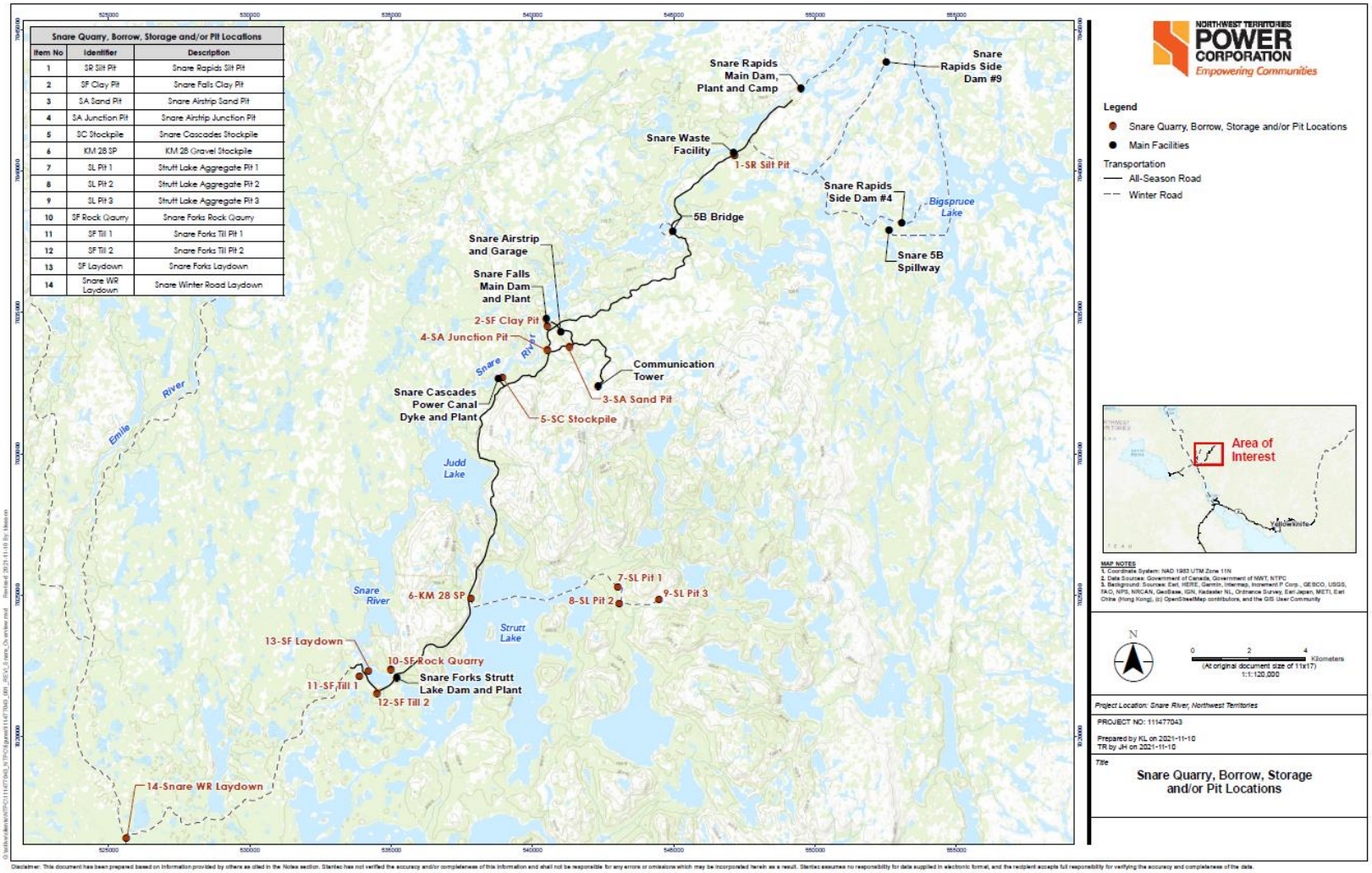

Figure 2 Snare Hydro Quarries, Winter Roads and Transmission Lines

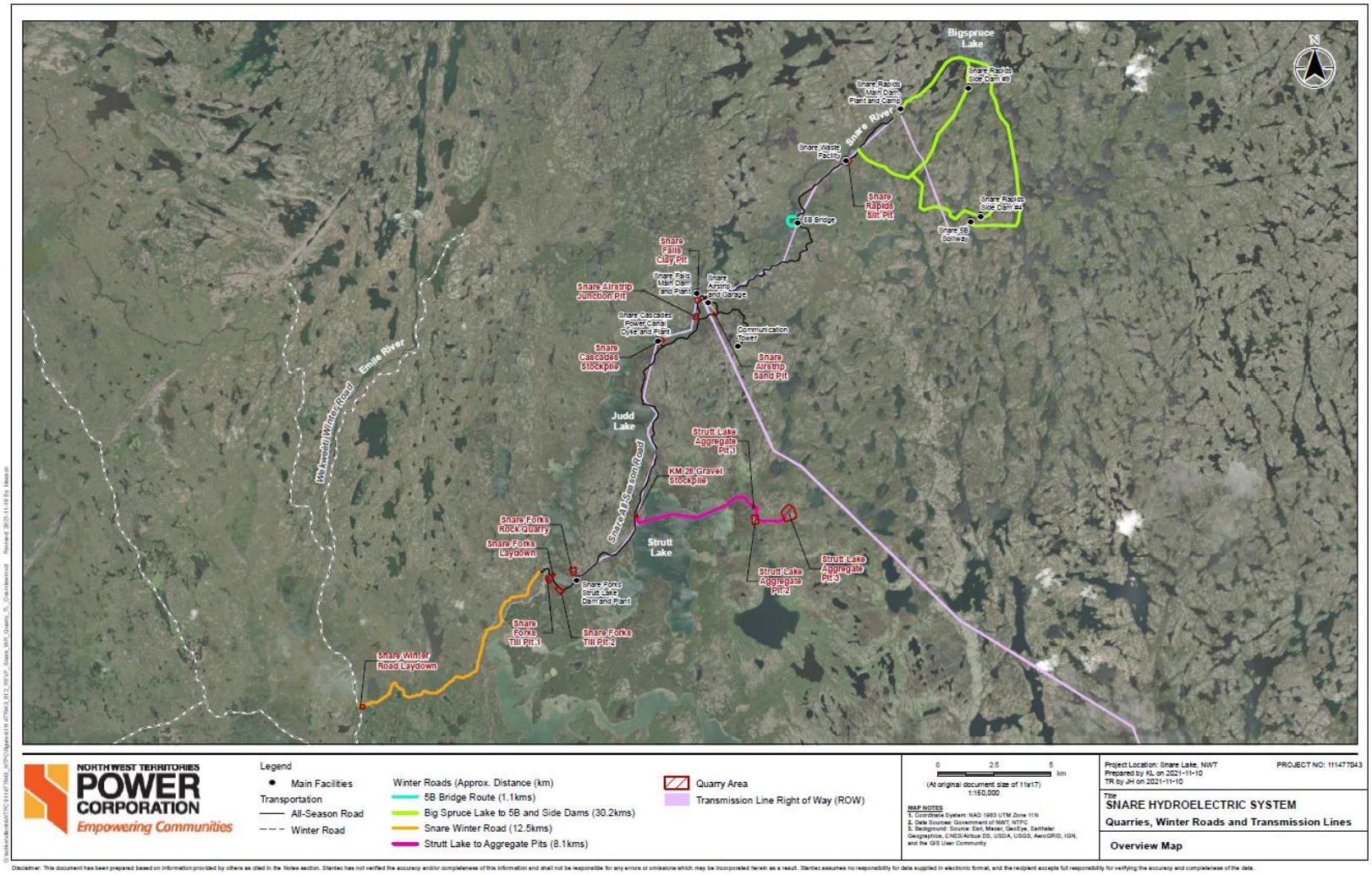

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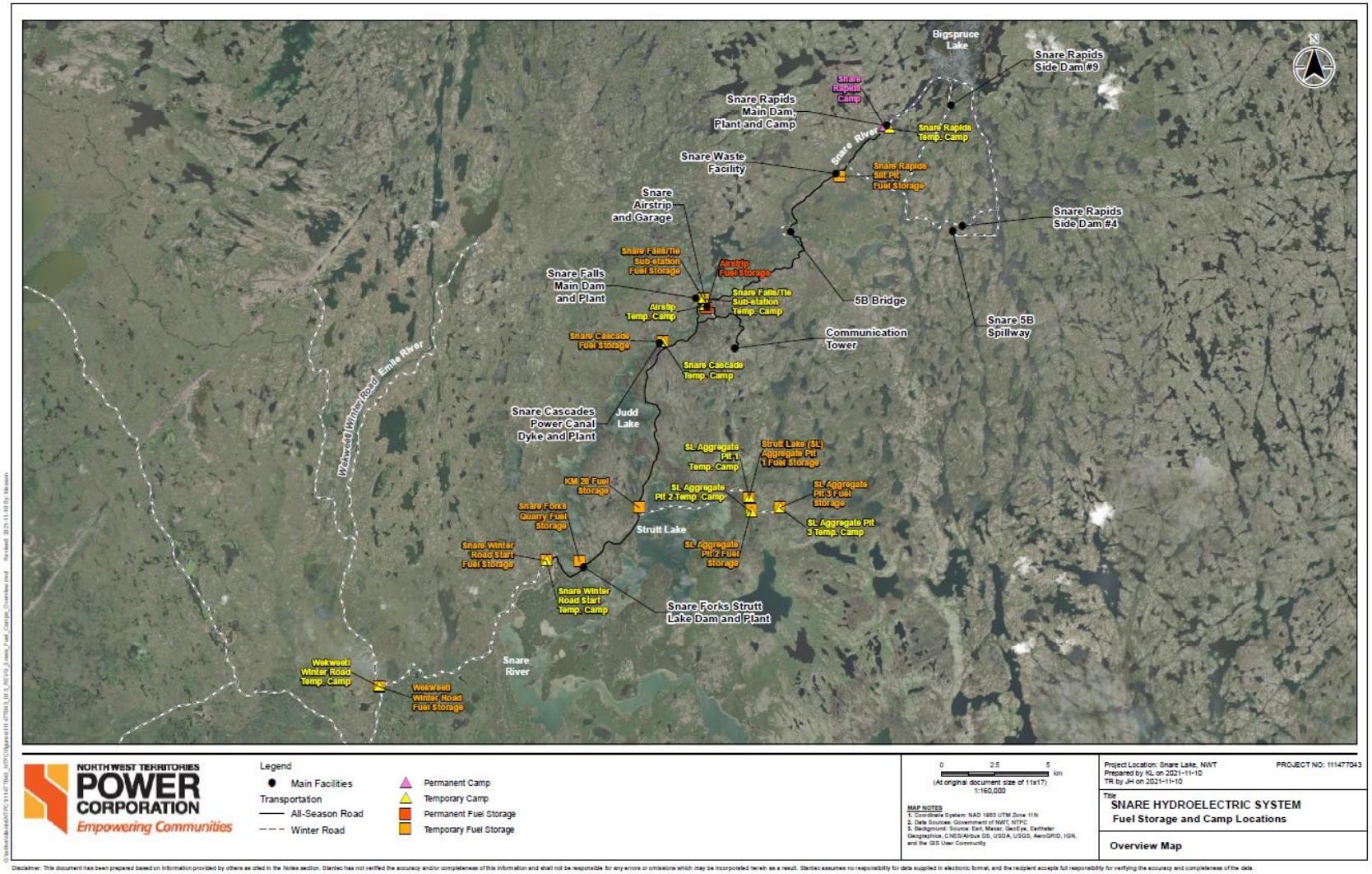
Figure 3 Temporary Overflow Camps and Fuel Storage Locations



2 WINTER ROAD CLOSURE AND RECLAMATION

The progressive reclamation that will be taken to close and reclaim the WRs includes the removal of all structures, equipment, and material related to the WR with minimal environmental disturbance, allowing for natural revegetation of the WR corridor during summer months.

Upon permanent closure of the WRs, all materials and generated debris must be removed from site including buildings, machinery, fuel containers, garbage, blasting materials, granular material, overburden and soil piles. The following sections detail the cleanup required.

2.1 PORTAGES, LAKES AND STAGING AREAS

The construction and operation of the Snare WR system will follow best practices in accordance with the Northern Land Use Guidelines – Access: Roads and Trails (GNWT, 2015) to protect the ground surface and prevent erosion on overland roads, and laydown areas. At the end of each winter road season, the following progressive reclamation will be undertaken to facilitate natural revegetation:

- Remove all garbage, petroleum products, machinery, and equipment from the WR corridor. Waste products will be disposed of in accordance with the Waste Management Plan. Machinery and equipment will be demobilized to either Yellowknife or the Snare Facility.
- Remove any snow from lakes that have been contaminated due to petroleum hydrocarbon spills or other hazardous materials. Contaminated snow will be handled in accordance with the Snare Hydroelectric Facility Spill Contingency Plan.
- Scrape off any sand/gravel placed on transitions or ramps for traction control using heavy equipment. Sand/gravel will be moved off ramps and onto portage a minimum 10 m away from the high-water mark to avoid impacts on the aquatic environment. The sand/gravel will be spread out over portages so that it does not accumulate in a pile. This will be inspected by the Lands Inspector at the end of each winter road season.
- V-notch all snowfills at stream crossings to avoid flooding and minimise the risk of bank erosion. This will be inspected by the Lands Inspector at the end of each winter road season.
- Remediate and/or remove any portages or rest stops that have been contaminated due to petroleum hydrocarbon spills or other hazardous materials. Contaminated snow will be handled in accordance with the Snare Hydro Spill Contingency Plan. In the event contaminated soils are treated in-situ, the GNWT Environmental Guideline for Contaminated Site Remediation (GNWT 2003) will be followed. For parameters not covered under the GNWT guidelines, the CCME Canada-wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008) and the CCME Soil Quality Guidelines for the Protection of Environment and Human Health (2007) will be followed. The final land use criteria proposed for soils remediation standards is Residential/Parkland.

- Vehicles used during reclamation will carry erosion control materials (i.e., silt fencing, hay bales, polyethylene sheeting). Progressive erosion control will be achieved by installing erosion control structures, as required, between each winter road season. Erosion control measures will be located and maintained to the satisfaction of an Inspector.
- Restore areas impacted by operation by removing fallen trees and any other obstructions from the corridor.
- Install adequate cross drainage on areas that have been improved with heavy equipment and/or granular fill. Drainage will be directed into vegetation and away from surface water.

The completion of the steps above at the end of each season of operation will meet the long-term reclamation goal of this CRP document.

2.2 ENVIRONMENTAL MONITORING

A minimum of 10 days prior to the commencement of any progressive reclamation NTPC will provide written notification to the LUP Inspector. A designated Environmental Monitor will oversee the closure of the Snare WR and the implementation of the progressive reclamation outlined in Section 3.2. The Environmental Monitor will be responsible for ensuring:

- All garbage, machinery, and equipment are removed.
- Any sand/gravel is spread out a minimum of 10 m from the high-water mark.
- Any large snowfills and ice bridges over streams are v-notched. Any petroleum hydrocarbon spills or other hazardous materials are removed or treated in-situ to thein line with appropriate standards for Residential/Parkland land use.

In accordance with the Northern Land Use Guidelines, environmental monitoring will be performed for at least two years after the reclamation activities are completed and results demonstrate that the desired steady state conditions have been achieved and the road is impassible in summer. Photographic evidence will be provided to the Lands Inspector on an annual basis until this is achieved. This is expected to be achieved within one year of closure and rehabilitation. The Snare WR system is not expected to be accessed in summer as this would not contribute to the goal of the Closure and Reclamation Plan and may result in environmental effects beyond those realised by the operation of the WR's.

3 QUARRY CLOSURE AND RECLAMATION

The borrow sites and quarries are existing legacy locations and abandonment is unlikely as they are useful reserves of valuable aggregate for the NTPC to maintain various infrastructure for the Snare Hydro Facility in the future, and operation of the proposed quarries is anticipated to continue until either the material is depleted, or until the permit allows. At the end of the permit

the following measures will be taken to ensure no adverse effects while the sites are decommissioned until future use:

Table 3: Temporary Reclamation Measures for Quarries and Borrow Locations

Measure	Description
Remove all hazardous waste and explosives	• No hazardous waste or explosives are currently on site and it will be ensured that none are on site at the time of reclamation.
Re-grading slopes to ensure stability	• All slopes from any excavations will be graded to ensure stability of slope and positive drainage to avoid failure and erosion.
Re-grading to ensure slopes are less than 70 degrees to deter migratory bird nesting	• All slopes from any excavations will be graded to have slopes less than 70 degrees to prevent Bank Swallows from nesting there.
Re-grading to ensure positive drainage	• Quarry floors will have positive grades applied for drainage to flow and to minimize ponding effects. Grades will not exceed 4 percent (%) to avoid adverse flow and erosion, and the final borrow site/quarry configurations should have surfaces graded at approximately 1% in the down slope direction.
Redistribution of topsoil and seeding	• Stockpiled organic topsoil will be used to contour the open cut side slopes, and area planted with tree seedlings (if local supply available) in areas cleared during quarry development.

4 TEMPORARY CAMP & FUEL STORAGE CLOSURE AND RECLAMATION

Any temporary camp facilities placed at laydown areas in the quarries, borrow pits or at the start and end of the Snare WR will be removed as soon as the work has been completed, and they are no longer needed. Any buildings or infrastructure on site at time of reclamation will be dismantled and moved to an approved facility or may be reused at another location.

All material, and waste will be removed off site and properly disposed of offsite. Waste (including hazardous waste) will be handled and managed as per the *Snare Hydroelectric Facility Waste Management Plan*. The disturbed areas will be inspected during the summer to ensure all debris has been collected and removed from the area. Any areas contaminated by fuel or other hazardous waste will be properly remediated with any contaminated soil being removed for processing at a designated facility.

Temporary sewage pits used during the construction and operation of the WRs, and quarries/borrows will be decommissioned upon closure of the temporary camp(s). Lime will be spread over the temporary sewage pit and suitable sandy or granular material will be used for backfill which will be at least 1m thick.

Temporary fuel storage locations that were installed to support the temporary camps, construction of the WRs and quarrying activities will be dismantled and removed to an approved or reused at another location on the Snare Hydro site if possible. The fuel tanks will be removed from site via the winter road.

Handling of fuel and all hazardous materials will be in accordance with the Spill Contingency Plan (SCP), which conforms with the Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (CCME 2003), and the Northern Land Use Guidelines: Camp and Support Facilities (GNWT-Lands 2014a).

5 TRANSMISSION LINE AND ACCESS ROUTES CLOSURE AND RECLAMATION

During transmission line and access route maintenance activities, only the minimum amount of soil and vegetation necessary for the construction/reconstruction, and maintenance of the access routes and the transmission line will be disturbed. No new roads will be created unless an existing cannot be utilized and all access will be via existing site roads. Vegetation will only be cleared from those areas necessary to obtain adequate working width and turning radius space for maintenance equipment. Where possible, topsoil will be segregated from sub-soils and returned to cover disturbed areas to facilitate re-growth of vegetation. Salvageable timber from clearing activities that are not utilized by the end of the construction period may be mulched onsite and incorporated into the site reclamation as cover material.

Erosion control measures (*Snare Hydroelectric Facility Erosion and Sediment Control Plan*) will be employed to allow for revegetation to be established and may consist of active revegetation by seeding or planting, ditching, and contouring. Stockpiled organic topsoil will be replaced where available and areas planted with tree seedlings (if local supply available) in areas that had been cleared.

6 SOIL REMEDIATION

Guidance on the remediation of contaminated soils that are not on NTPC owned lands will be adhered to, in order to ensure that soil conditions are returned to a state where they are no longer a threat to human health and the environment. Suitable guidance is detailed in the *Environmental Guideline for Contaminated Site Remediation* (2003), published by the NT government (ENR) and based on background soil conditions.

An assessment of background soil conditions at all quarry sites will be undertaken, in order to evaluate texture and composition of soils, as well as soil chemistry and the presence of middle to heavy-end hydrocarbon fraction concentrations in the soil that are naturally occurring. The results of this assessment inform the appropriate guidelines required for specific soil background conditions, for the purpose of soil remediation on site.

7 REFERENCES

CCME (Canadian Council of Ministers of the Environment). 2014. Canadian Environmental Quality Guidelines.

CCME (Canadian Council of Ministers of the Environment). 2008. Canada-wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008)

CCME (Canadian Council of Ministers of the Environment).2007. Soil Quality Guidelines for the Protection of Environment and Human Health (2007)

GNWT (Government of the Northwest Territories). 2017. Guidelines for Hazardous Waste Management.

GNWT. 2015. Northern Land Use Guidelines –Access: Roads and Trails.

GNWT. 2003. Environmental Guidelines for Contaminated Site Remediation.