ET’O NYÄK TAGÉ VALLEY
HAGGART CREEK SLOPE STABILIZING RESTORATION

Yukon Seed & Restoration

SILVICULTURE TREATMENT PLAN

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Executive summary

Yukon Seed & Restoration (YSR) is a delivery partner for the federal Government's Two Billion Trees program, the initiative taking a "significant step forward in Canada's approach to tackle the dual crises of climate change and biodiversity loss". YSR aims to plant 50,000 Yukon provenance tree and shrub species in 20 hectares of heavily fire impacted forest on both the First Nation of Nacho Nyäk Dun's (NND) Category A Settlement land and Federal Crown Land in the Central Yukon. This Silvicultural Treatment Plan concerns itself with two slumps covering 2.5 hectares in the Et'o Nyäk Tagé Valley (South McQuesten Valley), northeast of Mayo.

The aim of this project is to utilize tree planting alongside live staking and erosion control methods to stabilise active slumping and landslides in a fire-affected area, bringing structural and ecological integrity to the area. Stabilising the debris flow will reduce sedimentation into Haggart Creek, a vital habitat for vulnerable populations of fish species, including Chinook Salmon and Arctic Grayling, as well as promoting natural succession and carbon sequestration.

This project was developed at the request of the First Nation of Na-Cho Nyäk Dun (NND) Lands Department, given the importance of the area and the fish habitat to their community. Based on this consultation, YSR directed 7,500 trees under its allocation of 50,000 trees for the Two Billion Trees program to this important restoration project.

Treatment will include site preparation with traditional erosion control methods such as burlap matting and coir wattles, alongside live staking of *Salix spp.* (Willow) and *Populus balsamifera* (Balsam Poplar) cuttings and planting *Betula neoalaskana* (Alaska Paper Birch) seedlings in landslide zones. Ongoing monitoring and adaptive management will ensure the successful establishment of planted species.

Background

Disturbance history

The Et'o Nyäk Tagé (South McQuesten) Valley is subject to both industrial activity and impacts of climate change, as identified in a 2023 cumulative impacts study of the watershed by the Yukon Government (Water Resources Branch, 2023). A 2023 wildfire burned extensively across the area, causing permafrost thaw and runoff, resulting in slumping and subsidence of the ground. In several places this disturbance has transported the burned soil and vegetation from the landscape, becoming point sources of sediment flowing into Haggart Creek, downslope of the South McQuesten Road.

In June 2024 a heap leach failure at the Eagle Gold mine site released cyanide into the McQuesten watershed, causing elevated levels of cyanide in Haggart Creek and adding substantial additional pressures to the environment.

Previous silviculture prescriptions

YSR is not aware of any prescriptions or treatments that have been applied to the area. Current management methods for sediment accumulation on the road is grading, with sediment pushed downslope (south) of the road.

Treatment location

Location Area:

The treatment site is in the Et'o Nyäk Tagé Valley in the heart of Na-Cho Nyäk Dun (NND) Traditional Territory in the central Yukon. Access to the site is via the South McQuesten Road, accessible off of the Silver Trial 38km north of Mayo. The Et'o Nyäk Tagé Valley falls within the McQuesten Highlands ecoregion of the Central Yukon. Mean annual temperature is approximately -5°C and varies by elevation, which ranges from 320 to 2,160 m above sea level (Smith et al., 2004). Precipitation is moderate with annual amounts of 300 mm to 600 mm. Permafrost is common throughout the area where valley floors host discontinuous permafrost in silty sediments overlain by organic deposits. Valley soils are often a mixture of

glacial parent materials and include coarse-textured well-drained Eutric Brunisols and imperfectly drained Turbic Cryosols. Black and White Spruce forests dominate at mid to low elevations which transition to Willows and ericaceous shrubs in the subalpine. Wetlands are primarily found in the lower portions of larger river valleys (e.g., McQuesten River), but are also found on northern aspects and drainages at higher elevations or steeply sloping terrain.

Site Location:

The two specific slumps to be stabilised and planted in this program are between kilometer 30 and 35 on the South Mcquesten road, approximately 60 km from Mayo YT (Figure 1). The first slump is within a Black Spruce Labrador Tea forest ecosite and the second slump is a treed fen wetland. Both areas have experienced a landslide disturbance removing the soil/ peat and vegetation cover from the northern aspect slopes.

Access Consideration:

Access to the sites is via the South McQuesten Road, with a pullout at around kilometer 34. The first site is immediately roadside and the second site is accessible on foot, about 300m from the road.

Site details

- The site is in the McQuesten Highlands ecoregion of the Central Yukon.
- The Et'o Nyäk Tagé Valley is subject to cumulative effects from industry and climate change, notably a 2023 wildfire, resulting in permafrost thaw, subsidence and runoff, and the 2024 Eagle Gold cyanide heap leach failure, causing more frequent detections of cyanide in Haggart Creek.
- Due to active and ongoing landslide activity causing soil and vegetation flow down slope carrying sediment onto the South McQuesten Road and onward into Haggart Creek, the sites have seen no natural revegetation. The ongoing loss of soil and vegetation has resulted in the removal of an active seed bank to aid in natural regeneration.
- Surveys completed include a 2023 cumulative impacts study of the McQuesten watershed by the Government of Yukon, highlighting the pressures of cumulative

Et;o Nyäk Tagé Valley
Erosion Control and Restoration Project Sites

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South McQuesten Road

Haggart Creek

Haggart Creek

1

2

N

0 0.25 0.5 1 Km

Site	Area (ha
Site 1	1
Site 2	1.5

Legend

Project Sites

Watercourses

Roads

Waterbodies

Wetlands

Map produced by Naomi Butterfield, Yukon Seed & Restoration
Date Created: 2024-11-20
Projection: NAD 1983 Yukon Albers
Data Source: GeoYukon

- effects, and surveys completed by the NND Lands Department (Water Resources Branch, 2023).
- No site preparation has been completed since the 2023 wildfire.
- The current area to reforest are two active slumps (1ha and 1.5ha), roadside between kilometers 30 and 35 of the South McQuesten Road.
- Slump 1 (Photos 1-2):
    - Southeast facing with slope of 30-40%.
    - Soils are Organic Cryic Turbisols, Silty Fines, Sandy Silt, with 30-60 cm of material depth, typed in the field during 2024 delineation site surveys.
    - The slump is within a Black Spruce-Ledum-Feathermoss forest ecosite, likely Sb34 or Sb35, hosting a vegetation inventory of Black Spruce, Willow spp., Crowberry, Lowbush Cranberry, Labrador Tea, and Pelt Lichen (Environment Yukon, 2019).
    - Post disturbance conditions are 90% bare ground and 10% woody debris.
- Slump 2 (Photo 3):
    - East facing with a slope of 20%.
    - Soils are sandy silt, fully comprised of newly deposited silty sand, with no vegetation or woody debris present.
    - Prior to disturbance the ecosite was a treed fen wetland, Sb34/35, dominated by Black Spruce (Environment Yukon, 2019).

Photos 1-2: Slump 1

Photo 3: Slump 2

Planning considerations

The Director is required to ensure consistency with approved plans and legislation. This treatment plan follows the principles set out in higher level plans and agreements. Each are described below:

Public and First Nations consultation

YSR works closely with the NND, engaging with the Government and Community to guide the work that we do. The application to Environment and Climate Change Canada for the Two Billion Trees program arose through community consultation, where interest in reforestation projects was identified as important to the community. After YSR was awarded the funding, the NND Lands Department identified active slumping across the Et'o Nyäk Tagé Valley as an ecological and cultural concern. In particular, the impacts of increased sedimentation into Haggart Creek, a vital habitat for vulnerable populations of fish species, including Chinook Salmon and Arctic Grayling, was highlighted. This project was borne out of conversations and collaborations with the NND Lands Department.

First Nations Final Agreements

While parts of the South McQuesten Road are categorised as Settlement A land under the final agreement of NND, this section of the road falls under Yukon Highways authority, prompting the need for the Silviculture Treatment Plan.

Timber Harvest Plans

This area falls under the McQuesten Timber Harvest Plan. This plan outlines the need to focus on the climate, soil conservation and hydrology of the area during revegetation, addressed by the erosion control and use of provenance species to maintain ecological integrity (Government of Yukon - Energy, Mines and Resources Forest Management Branch, 2014).

Stocking Standards

The silviculture treatment for this area will be a pure stand, planting *Betula neoalaskana* (Alaska Paper Birch) due to high moisture availability, and its fast growing properties which will aid in slope stabilisation and landslide mitigation. The Yukon Silviculture Stocking Standards (2019) for a pure stand composed of Birch require a target stocking of 1,400 sph, and a minimum stocking of 1,100 sph at the end of the regeneration period (Government of Yukon, 2019). This will be done alongside an erosion control program utilising erosion control materials and live staking of *Salix spp.* (Willow) and *Populus balsamifera* (Balsam Poplar) cuttings.

Treatment objectives

This treatment plan aims to complete the following objectives:

1. Bring structural and ecological integrity to the area by stabilising active landslide activity with use of tree planting, staking and erosion control materials, thereby reducing sedimentation onto the South McQuesten Road and into Haggart Creek.
2. Establish self-sustaining tree and shrub populations to reestablish organic soil layer and reestablish carbon capture and storage potential of the sites.
3. Establish conditions for natural regeneration to continue with use of introduced seed bank and soil stabilization.

Planned treatments and schedule

Planned treatments include:

- Site preparation
    - Erosion Control to stabilise active slump behaviour, to be implemented in spring 2025:
        - Spreading erosion fabric across areas of the slump to slow the movement of sediment.
        - Implement straw wattles to slow the flow of water and trap sediment travelling downslope from upslope source.
        - Use bioengineering methods including live staking *Salix spp.* (Willow) and *Populus balsamifera* (Balsam Poplar) cuttings, utilizing fast rooting capabilities to stabilise soils and fines, reducing erosion.

- Planting treatments
    - The tree planting program will take place in fall 2025 (late August).
        - 7,500 *Betula neoalaskana* (Alaska Paper Birch) will be planted at a density of 3,000 sph in order to account for mortality and to maximise rooting capacity to stabilise the landscape.
        - Seeds for the seedlings were sourced by YSR in fall 2024 from the Yukon Plateau North and Southern Lakes ecoregions. This mix is to account for climate-adapted genetics due to the increased temperatures seen in the central Yukon.
        - Trees will be planted with teabag fertiliser to ensure adequate nutrient availability to support establishment and growth.
        - Seedlings will be covered with browse protection (Freegro TreeShelters) to avoid wildlife damage during early development. These will be sourced from Khowutzun Forestry, an Indigenous Forestry company.
        - The tree planting program will be supplemented by a live staking program using *Salix spp.* (Willow) and *Populus balsamifera* (Balsam Poplar), with live staking targeted to toe slopes and areas of highest erosion. Live staking will be in small areas of high erosion with a density of up to 10,000 sph.

- Tree planting and staking is the primary reforestation method.
- Natural succession is the secondary reforestation method, facilitated by soil stabilisation and seed availability established through initial planting and staking programs.
- Fill planting is the tertiary reforestation method, if tree planting and natural infill doesn't meet the minimum stocking standard of 1,100 sph at 5 years post planting.
- Site preparation will include implementation of various erosion control measures, utilizing plant materials and the power of rooting for soil stabilisation. This will include erosion blanketting areas of the slope, building straw wattle fences to slow the movement of water and collect sediment, as well as staking live *Salix spp.* (Willow) and *Populus balsamifera* (Balsam Poplar) cuttings which are quick-rooting species and are known to hold soil in place. Other site preparations are not required as the woody debris present across the sites will aid in microsites beneficial for plant establishment.
- Preferred species:
    - *Betula neoalaskana* (Alaska Paper Birch)
    - *Populus balsamifera* (Balsam Poplar)
- Acceptable species:
    - All Yukon trees
- The stocking standard for this site is:
    - Target stocking; 1,400 sph
    - Primary minimum stocking: 1,100 sph .
- Following the planting program the site will require ongoing monitoring. This will be completed through annual surveys, completing 10 3.99m plots per ha. Success will be determined by meeting a minimum of 2,000 sph, adapted from the stocking standard, based on the goals of the program as a restoration and erosion control program, requiring high rooting levels to combat erosion. If mortality is high and this is not maintained within 5 years of the initial program, fill planting will be completed.
- Monitoring will be completed until seedlings are considered free to grow at seven years post planting. Additional measurements will be taken on survivability as a percentage, tree heights, and vegetation health, including chlorosis and browse.

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,

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References

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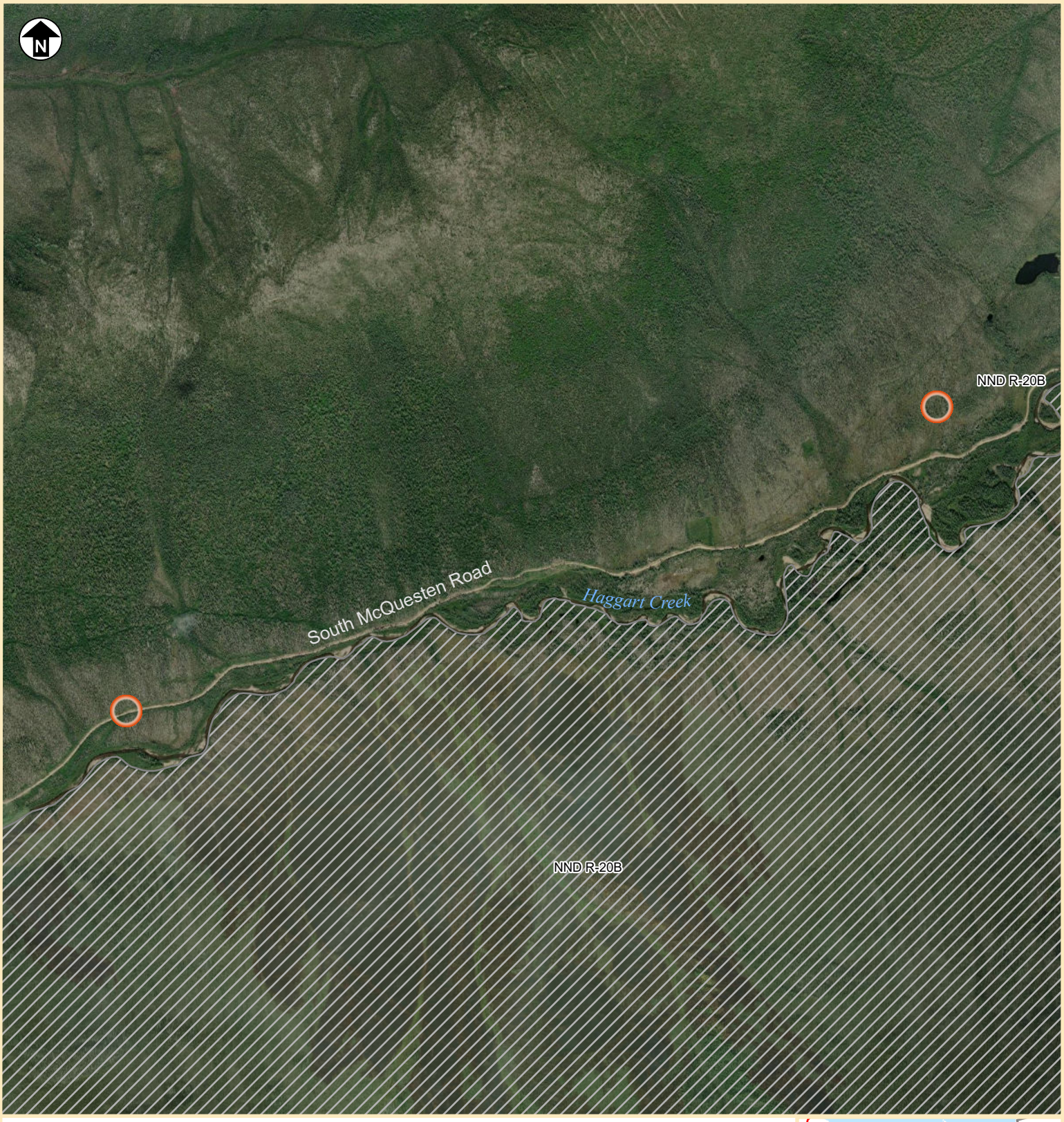
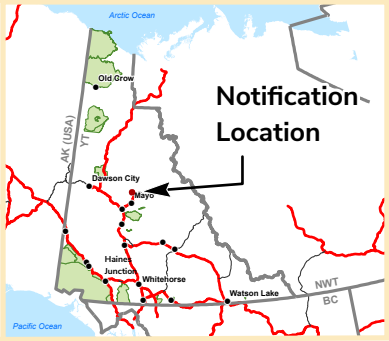
Notification of Silviculture Treatment



Et;o Nyäk Tagé Valley

Notification Area

Notification Location:
Et;o Nyäk Tagé Valley
North of South McQuesten Road



Yukon

1:20,000

February 28, 2025

0 500
Metres

ALR: Mayo
North American Datum 1983
Yukon Albers

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