

Northern Ontario Aggregates



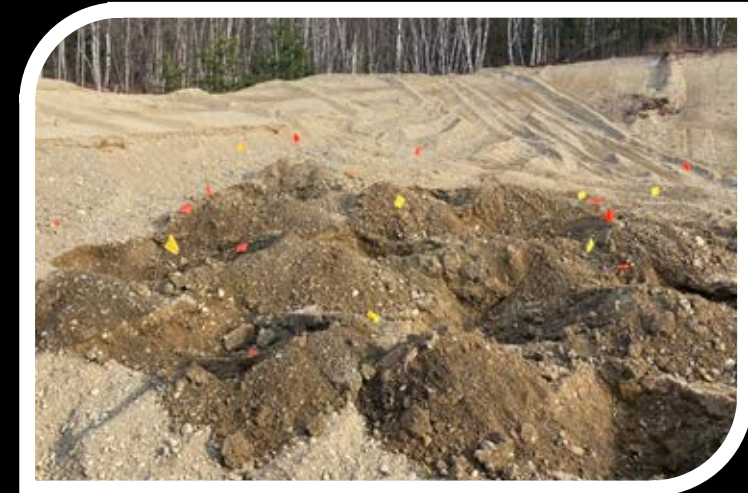
Project site prior to any work being completed.



Trial site after debris and garbage removal.



Slopes stabilization (October 2022)



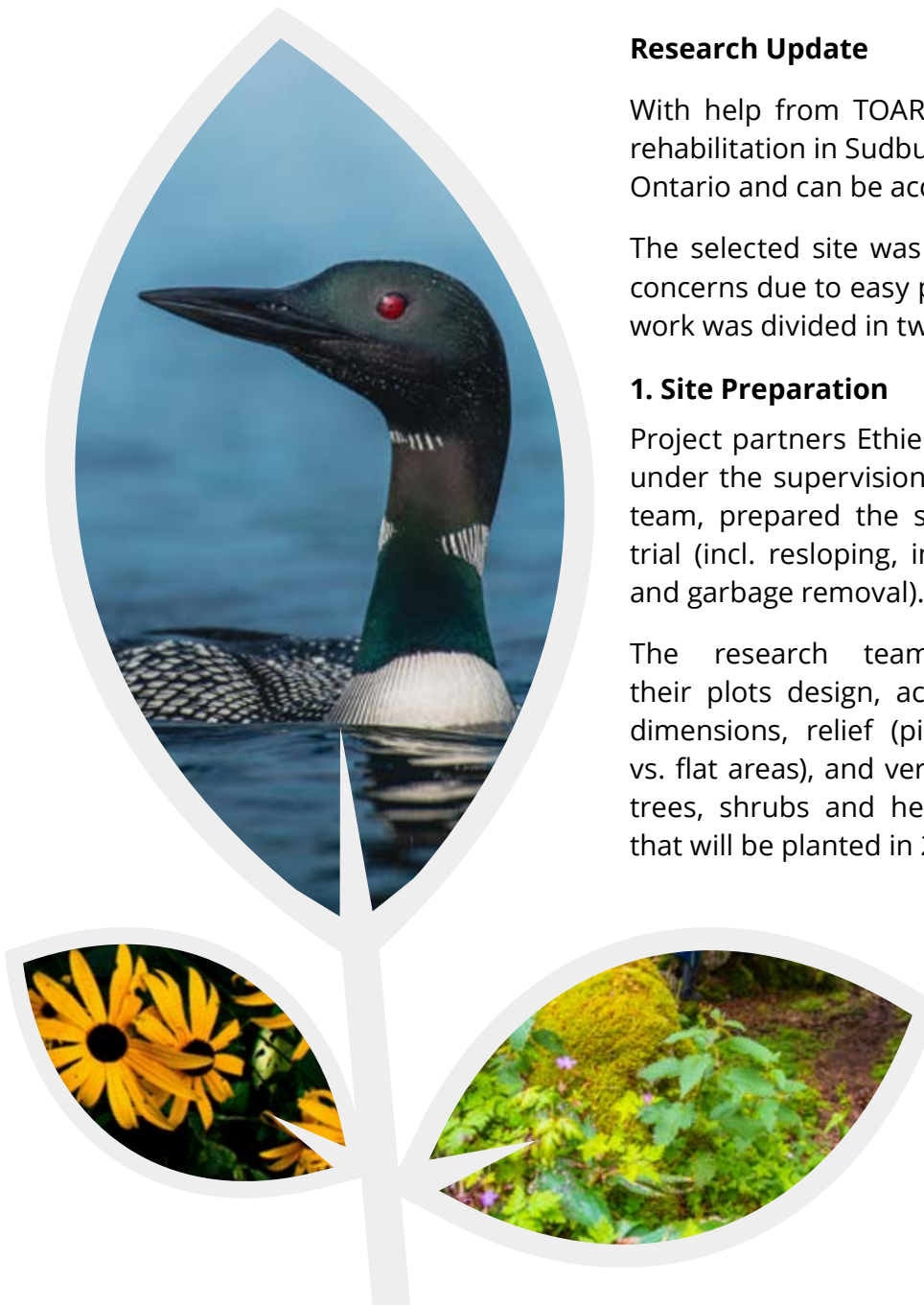
Pits and mounds trial run (November 2022)

Novel Strategies for Enhancing Biodiversity and Ecosystem Function at Northern Ontario Aggregate Pits

Working with TOARC, and in collaboration with industrial partners Pioneer Construction, Ethier Sand and Gravel, and Glencore's Sudbury Integrated Nickel Operations, the Collège Boreal and Laurentian University research team surveyed a dozen regional legacy pits and conducted a comprehensive greenhouse trial in 2020 and 2021. Preparations for a field trial have now begun.

This collaboration was established to develop new strategies to improve the rehabilitation of former aggregate sites in northeastern Ontario, as current methods have yielded sub-optimal results in the region. It is suspected northern sites do not respond as positively to hydroseeding treatments as southern Ontario due to a harsher climate, but it is recognized to be primarily due to a lack of available soil organic matter, a defining feature of the region's soil. In addition to identifying the main limiters to rehabilitation, the project aims to utilize novel soil amendments, planting strategies, and earthwork techniques that will facilitate an increase of biodiversity in disturbed legacy sites by promoting key ecosystem functions.

Initial trial results suggest blended pulp mill sludges improve seedling outcome, soil fertility and water holding capacity, as well as seed germination rate. In contrast, low organic treatments, like the renowned lime and fertilizer mix used to treat Greater Sudbury's acid damaged soils, produce poor to moderate response in seedlings. Based on these findings the team is preparing field trials for summer 2023.



Research Update

With help from TOARC, the research team identified a legacy pit in the summer of 2022 that required rehabilitation in Sudbury, Ontario. The site is a good depiction of an average legacy aggregate pit in northern Ontario and can be accessed with heavy machinery.

The selected site was identified as a priority due to steep unstable slopes, lack of vegetation and safety concerns due to easy public accessibility. The team selected a study plot area of about 4000 sq. m. and field work was divided in two phases:

1. Site Preparation

Project partners Ethier Sand & Gravel, under the supervision of the research team, prepared the site for the field trial (incl. resloping, improving access and garbage removal).

The research team implemented their plots design, according to their dimensions, relief (pits and mounds vs. flat areas), and verifying species of trees, shrubs and herbaceous plants that will be planted in 2023.

2. Field trials:

Field work will be completed using novel site earthworks (ex. Rough and Loose and Polster approaches) in the spring of 2023. Additionally, biomass boiler ash and lime treated municipal bio-solids (with and without municipal compost) will be incorporated into the pit floor material. The team is awaiting approval for use of blended primary and secondary pulp sludge on the trial site.

Additionally, 2023 will include planting and sowing native trees and shrub species followed by a monitoring phase (incl. plant health, ground and surface water quality, and soil analysis). This phase will continue over two years and end in May 2025.

The findings of the project will aid in legacy site rehabilitation and benefit regional aggregate and waste rock producers, as well as other regions with similar surficial geology and climate. The protocols developed are solutions that improve long-term rehabilitation trajectories and a broad range of ecosystem services.

Follow updates for this project on our website at, <https://toarc.com/legacy-pits-quarries-maap/research-funding/research-publications/>