CENTRE FOR
BOREAL RESEARCH

TECHNICAL NOTE #23
PEATLAND RESTORATION
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# Wood Chip Overburden Reclamation in Peatland



## INTRODUCTION

Thick wood chips on a temporary access road through a peatland provided a unique operational opportunity to test an adaption of the peat inversion process. The thick layer of wood chips prevented natural revegetation of the road, even though surrounding chemistry and hydrology were minimally affected by their presence.

The project was constrained by what to do with the removed wood chips, as well as an underground pipeline running parallel to the road. By inverting the wood chips with the underlying peat, no offsite removal costs were incurred and the surrounding area was not disturbed. A suitable peat surface substrate was restored to facilitate natural revegetation, along with nursery stock tree planting.

## OUR SITE

The winter road is located in a wooded fen near Peace River, Alberta. The fen is dominated by:

- **Larch** (*Larix laricina*)
- **Dwarf birch** (*Betula pumila*)
- **Sedges** (*Carex aquatilis, Carex paupercula, Carex canescens, Carex tenuifora*)

The road, which led to a decommissioned exploration well pad, was approximately 6 m wide and 400 m long. It was built with wood chips (average 50 cm deep) from a nearby upland site and placed directly on top of the peat without any geotextile.

**Figure 1.** Wood chip road prior to reclamation in summer 2014. White line indicates buried pipeline parallel to the road.

## MAIN CHALLENGES

Even with readily available local seed sources, the thick layer (~50 cm) of wood chips created a barren substrate:

- low in organic content and water-holding capacity.
- prone to flooding in spring and desiccation throughout the rest of the growing season.
- which perpetuated conditions unsuitable for seed germination and growth, particularly for woody species.

**Buried pipeline** parallel to the wood chip road presented additional operational challenges and as a result, all reclamation activities were limited to the road surface.

**Figure 2**. Thick wood chip overburden (top) and close-up of the fine wood chips (bottom).

## RECLAMATION PLANNING – BEFORE YOU START

### HYDROLOGY & TOPOGRAPHY

**GOAL: Reintegration** of site hydrology

**Considerations:**

- Ensure there is no barrier between restored surface and the surrounding peatland.
- Restored surface should be moist but not inundated for long.

**Wood chip road example:**

- Lateral water flow across this road remained largely unaffected due to the permeability of the wood chips.
- Reclaimed surface was leveled with surrounding fen hollows.

### SUBSTRATE CHEMISTRY

**GOAL: Reconstruction** of soil profiles

**Considerations:**

- Introduced foreign materials may change site chemistry.
- Extra caution should be taken if clay material is to be buried.

**Wood chip road example:**
In this case, buried wood chips will become part of the peat. Additional changes to site chemistry are not expected.

### VEGETATION

**GOAL: Reestablishment** of sustainable peatland vegetation

**Considerations:**

- Reconstructed surface should support the appropriate wetland vegetation.
- Are abundant seed sources closely available for natural regeneration or should vegetation be re-introduced?

**Wood chip road example:**

- Local seed sources from surrounding fen (e.g., larch seed rain) and vegetative propagules (e.g., sedge rhizomes) will naturally revegetate site.
- Additional sedges and shrubs can be transplanted from the surrounding fen to speed up revegetation.
- Nursery stock of black spruce and larch seedlings were planted.

# RECLAMATION PROCEDURE

## HOW DID WE RECLAIM?

- Completed **civil earth work during winter** to take advantage of extensive frost to support machinery onsite.
- Reclamation completed within **two days** employing a **single operator** using a backhoe with a digging bucket (Figure 3).
- Minimized disturbance of the surrounding natural area by working from the **far end of the road** and **piling** excavated material **onto** the road (Figure 4).

**Figure 3.** Stripping chips and pilling of peat using a backhoe.

# INVERSION – STEP BY STEP

**1. Scrape frozen wood chips** from the road surface; **pile behind** the back hoe on the road.

**2. Excavate ~ 1 m underlying buried peat; pile in front** of the pit onto the road.

**3. Return the stripped wood chips** into the open pit.

**4. Pull the excavated peat** into the pit to bury the wood chips.

**5. Lightly tap** down and smooth peat surface to remove air pockets. Leave surface elevation roughly **10 cm higher** than surrounding natural fen to **account for settling.**

**OPTIONAL:** If surface does not settle enough, further lower it to match the surrounding fen level by track-packing it with a bulldozer (D6/D7).

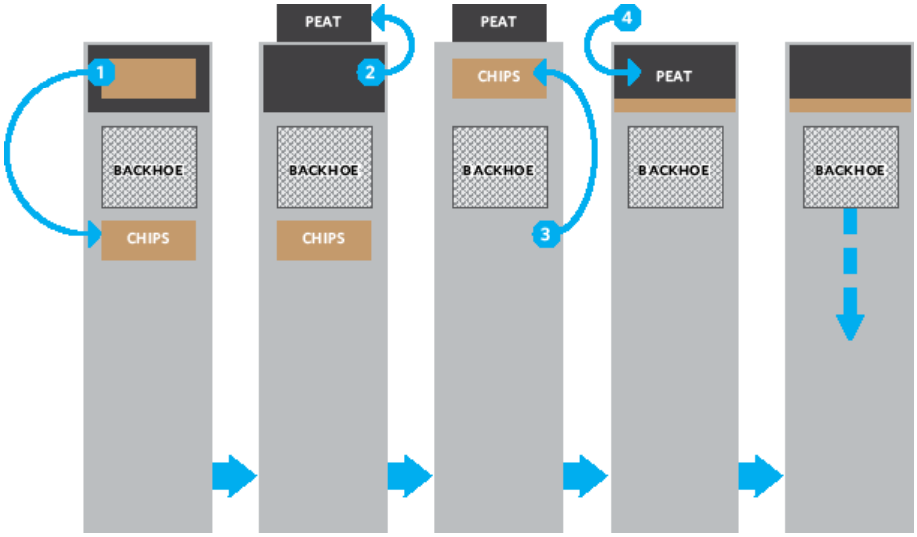


**Figure 4.** Step by step of the inversion process burying wood chips under peat.

## SITE PROGRESSION

A. Summer 2015: pre-reclamation

B. February 2015: immediately after reclamation

C. August 2015: after track-packing

D. August 2017: 2 years after reclamation

**Figure 5.** Site progression of wood chip road before (2014) and after (2015 to 2017) reclamation.

## LESSONS TO DATE

- Due to dry conditions in 2015, the reclaimed **peat surface did not settle** as much as originally anticipated, so **track-packing** was **utilized** in August 2015 to further lower the surface. Under wetter conditions, this step would not have been necessary.
- Abundant natural ingress of sedges and willows two years after restoration as expected.
- Planted seedlings of larch and black spruce are performing well despite two dry summer seasons (Figure 6).

**Figure 6.** Healthy planted spruce seedling and natural regeneration of willow

### VISIT OUR WEBSITE

**nait.ca/borealresearch**
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