Reclamation of a wood chipped winter road: application of the peat inversion technique in a new context

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INTRODUCTION

Sites demonstrating operational reclamation strategies for linear disturbances in peatlands are still lacking in Alberta. These strategies must address the abiotic themes of hydrology and suitable surface substrate in order to support persisting wetland vegetation communities.

Based on learnings from our first full clay pad restoration, we adapted the peat inversion technique to reclaim a wood chipped winter road back to a peat surface suitable for natural regeneration of fen species from seed sources adjacent to the road. We chose this natural ingression of bryophyte, herbaceous and shrubby vegetation to demonstrate the applicability of natural regeneration in a highly specific scenario, but supplemented with stock planting of *Larix laricina* and *Picea mariana* with site certification using the peatland criteria in mind.

We discuss site progress, considerations for use of this method and its possible future applications, and alternative strategies for future trials.

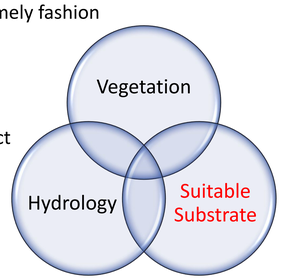
PROJECT PLANNING

Three Aspects Of Wetland Reclamation

1. Hydrology – main driver of successful wetland reclamation
2. Suitable surface substrate – can be mineral or peat, must not hinder plant growth (ie. compaction, salinity, contamination, obstruction)
3. Revegetation – method to establish plants on site in a timely fashion

Our Site Conditions

- 6m wide winter road through circumneutral fen
- Hydrological connection with wetland on both sides intact
- 1.5 meter deep wood chip surface
- Abundant propagule sources available
- Buried pipeline next to road



GOAL: remove obstruction and re-create peat surface suitable for natural regeneration

CHALLENGES

Similar challenges between wood chipped winter road and clay well pad:

1. need to remove unsuitable surface substrate to restore a peat surface
2. what to do with the material, limiting transportation and disposal costs
3. how to ensure the final peat surface elevation would not be so low as to create an inundated pond, rather than a saturated surface

Prescription – invert wood chips with the buried peat, and adjust the final elevation to be equivalent to that of the hollows in the natural area adjacent to the road (Figure 1).

PEAT INVERSION TECHNIQUE

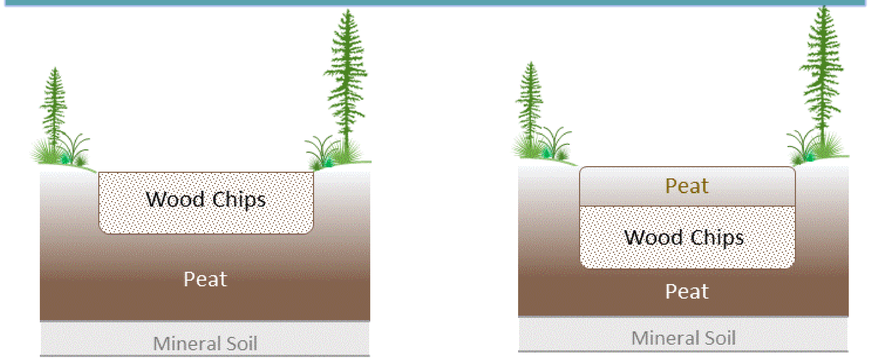


Figure 1. Perpendicular cross section of the chip road. Left: Chip road in place, Right: chip layer inverted with buried peat.

SITE PROGRESS

2017 NATURAL REGENERATION

	Scientific Name	Common Name
Tree	*Larix laricina*	Larch
	Picea mariana	Black spruce
Shrub	*Salix spp.*	Willow spp.
Herb	*Agrostis scabra*	Tickle grass
	Calamagrostis inexpensa	Northern reed grass
	Caltha palustris	Marsh marigold
	Carex aquatilis	Water Sedge
	Carex canescens	Grey sedge
	Carex diandra	Two-stemened sedge
	Carex paupercula	Bog sedge
	Carex tenuiflora	Thin flowered sedge
	Epilobium palustre	Marsh willowherb
	Equisetum scirpoides	Dwarf scouring rush
	Juncus bufonius	Toad rush
	Potentilla palustris	Marsh cinquefoil
	Scirpus microcarpus	Small fruited bulrush
	Typha latifolia	Cattail
Moss	*Aulacomnium palustre*	Golden fuzzy fen moss
	Leptobryum pyriforme	Long-necked bryum

Total veg % cover	9.7%
Desirable species	79%
Undesirable species	21%
Species richness	19
Dominant vegetation	*Carex* spp.

Table 1. Permanent plot vegetation surveys, two years post reclamation (August 2017). *L. laricina* and *P. mariana* germinants were present in addition to our planted tree stock. Desirability of species is designated using the peatland reclamation criteria. Of the 21% undesirable species (red), none are considered true detrimental weed species (ie. clover).

FURTHER APPLICATIONS

Peat Inversion Technique

- Mineral road with geotextile (Figure 2)

Natural Regeneration

- Sites with some desirable vegetation present (ie. compressed features)
- Areas with intact seed bank (ie. scalped sites)
- Sites with close propagule sources, small enough to allow reasonable ingression timeframe (linear features rather than rectangular pad)
- Sites with little worry for weed invasion/competition

NOTE: must have abiotic factors of the site addressed very well to use this revegetation strategy

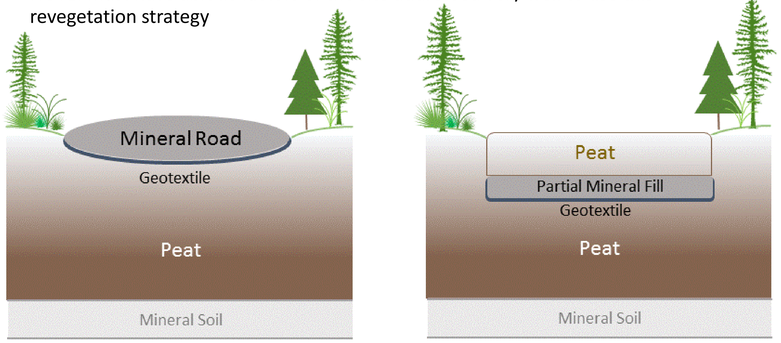


Figure 2. Perpendicular cross section of mineral road. Left) Mineral fill in place, Right) mineral layer & geotextile inverted with buried peat.

ALTERNATIVE STRATEGIES

Soil Modification Technique

- Ripping – sites with thin obstruction layer, so peat will be exposed (Figure 3)
- Mounding – sites with compressed surface elevation where risk of mounds drying out is low (Figure 3)

Revegetation Strategy

- Donor moss transfer (ground, field, shrub and tree layer introduction)
- Transplant (field layer)
- Hand collect adjacent seed and spread (field, shrub and tree layer introduction)
- Plant commercial stock (field, shrub and tree layer introduction)

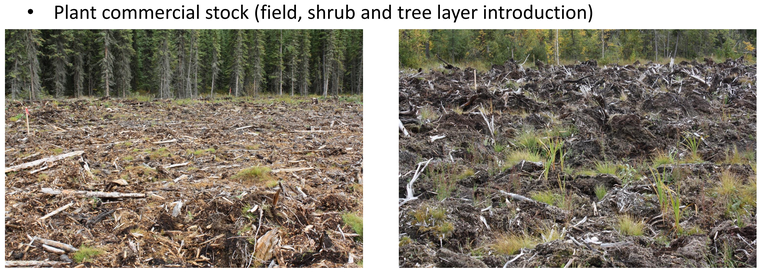


Figure 3. Examples of ripping (left) and mounding (right) used on shallow peat upland sites where the chip layer was ~10cm deep.

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