



Minimal Disturbance Pipeline Construction in Boreal Peatlands

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Outline

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Introduction

TransCanada installs pipeline in the boreal peatlands of Alberta under challenging ground conditions

Minimal
Surface
Disturbance

A technique that aims to reduce the impacts to wetlands in the region.



Why do we use Minimal Surface Disturbance ?

- Preserves and stabilizes organic soils
- Promotes regeneration of native vegetation
- Minimizes clean up and monitoring efforts
- Cost effective (no stripping, no seeding, no planting)
- Minimizes temporary and long-term impacts
- Reduces the spread of weeds



Minimal Surface Disturbance Planning

Avoid

- The goal is to avoid constructing through deep peatlands if possible

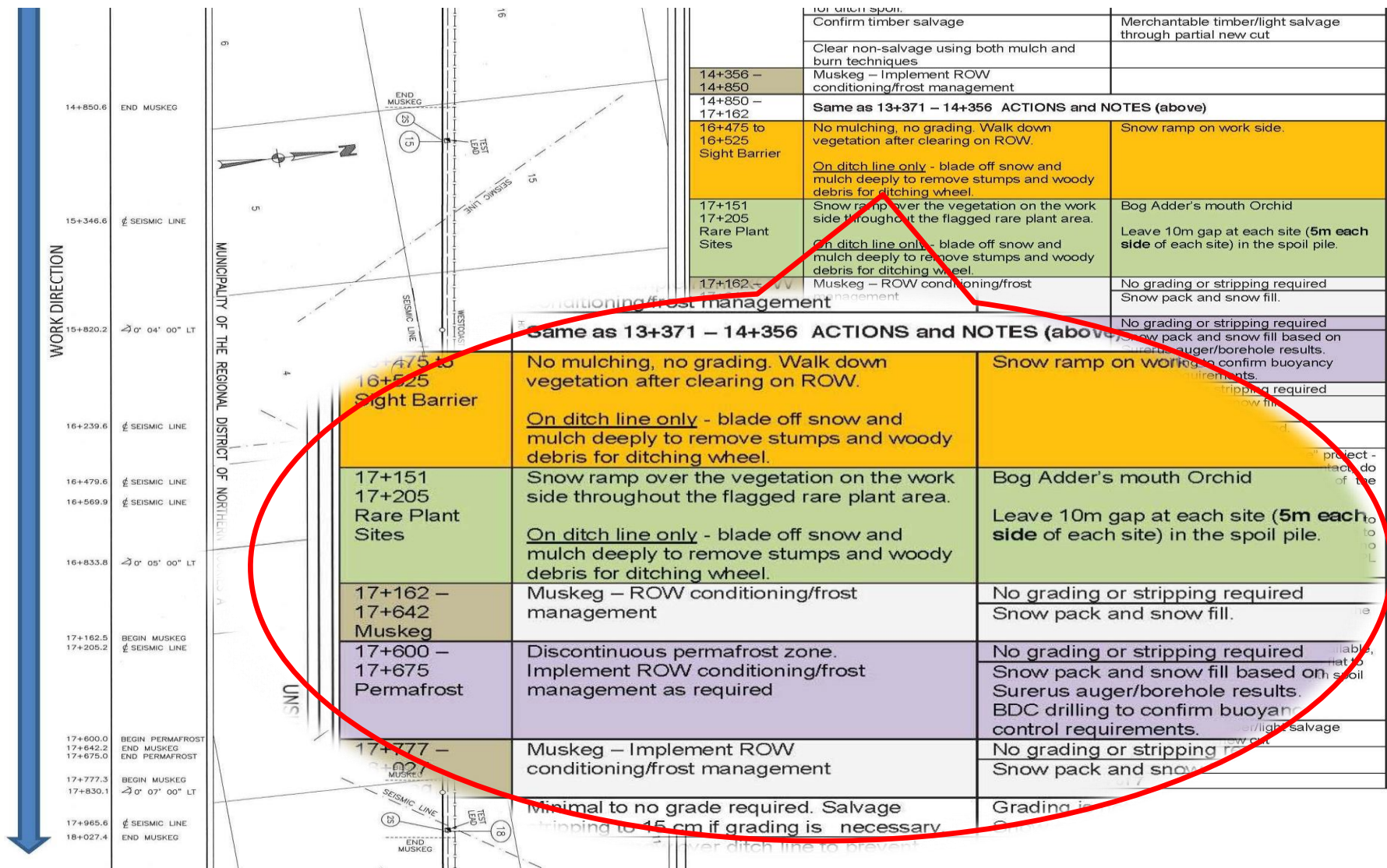
Minimize

- Reduce the level of disturbance to the peatland through mitigations, altering construction methods and paralleling existing RoW's/ disturbances.
- Effects on peatlands are temporary and do not impede wetland function
- Effects are also considered short-term in nature

Compensate

- only required as off-sets on NEB regulated projects in Caribou Range on residual habitat

Clearing and Right-of-Way “Grade” Planning - example



Right-of-Way Prep - Clearing

Select low ground pressure, light equipment

- Soft ground conditions early in construction season
- Since there is usually very little merchantable timber, brush is piled for burning.
- Use the ditchline for access while clearing



Access - Mats

Early season or shoulder season entry

- may have to gain access with mats (access/ rig mats) depending how frozen or soft the ground is



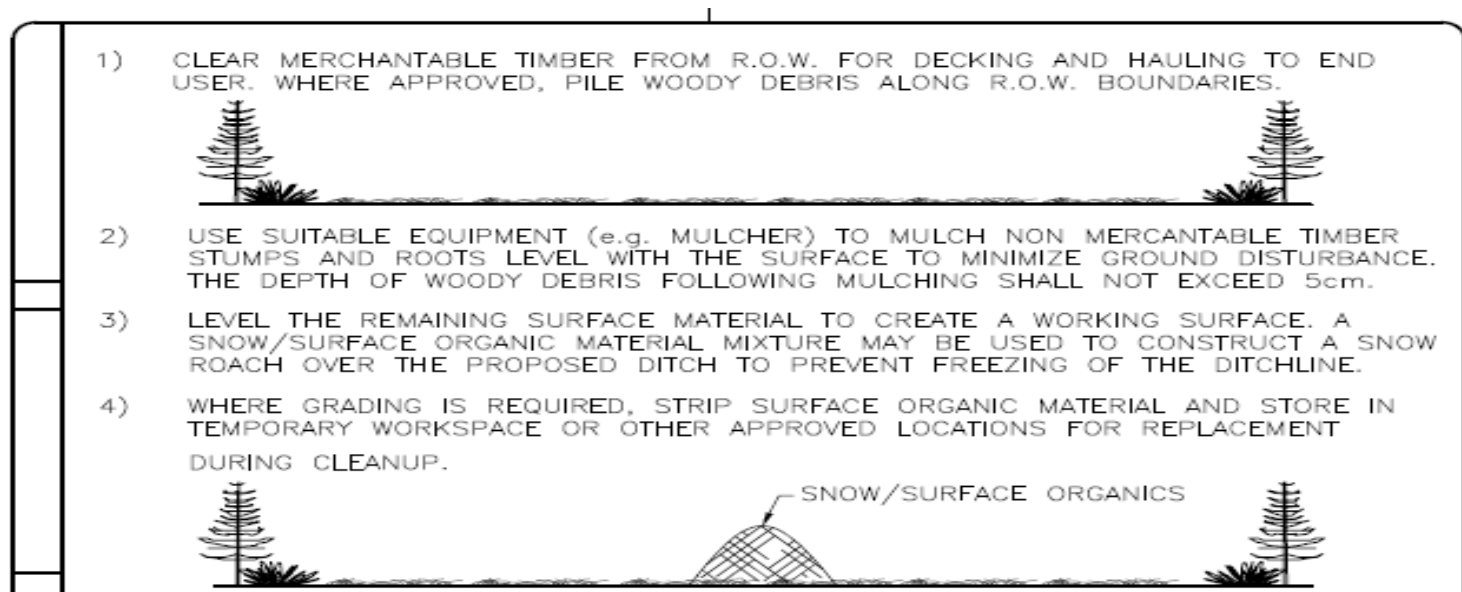
Right-of-Way Prep - Burning

- Merchantable timber not utilized as saw logs and pulp/ paper can be stacked and utilized for rollback to restrict access at key access points after construction
- Waivers can be secured for alternate use of merchantable timber (access control - caribou areas)
- Excess mulch/debris can be a fire hazard and is typically burned.



Right-of-Way Prep - Clearing and RoW prep typical sketch

- Provided as part of construction execution plans



Right-of-Way Prep - Mulching

- Typically begins after area has been cleared of timber
- Conduct very light, single pass mulching to a depth no more than 5 cm, as excess can inhibit vegetation re-establishment
- If ground is still wet, the mulcher has to keep the blades up to minimize damage to organics/ roots
- Ideally mulching occurs under frozen conditions



Frozen Forested Lands

Minimal Surface Disturbance

Mulching and minor smoothing to create a working surface only

Why?

Provides opportunity for quicker response on natural regeneration; less \$ for reclamation (possibly no seeding, no plantings; habitat for wildlife; less chance of non-desirable species competition

- Applies only where grading is not required



Frozen Forested Lands

Minimal Surface Disturbance



Proper Mulching Depth



Mulching Too Deep

Frozen Forested Lands

Minimal Surface Disturbance



Proper
Mulching
Depth



Mulching Too Deep



Freezing In the Right of Way

- Once the ROW has been cleared, and as weather gets colder, frost is driven into the ground to stabilize, compress and freeze the organic layer along the work side of the ROW for travel by heavy equipment
- This process also protects the root zone for quick revegetation the following growing season
- The following methods are used:
 - Dragging tires
 - Spraying water
 - Driving progressively heavier equipment along ROW

Freezing In the ROW – Low Ground Pressure Methods



Snow Fill Bridge



Freezing In the Right of Way - Crossings

- Snow fill or ice bridges are constructed at watercourse crossings to protect the banks and to promote revegetation
- Riparian areas are typically hand cut, not mulched
- Rig mats can also be used build the crossing

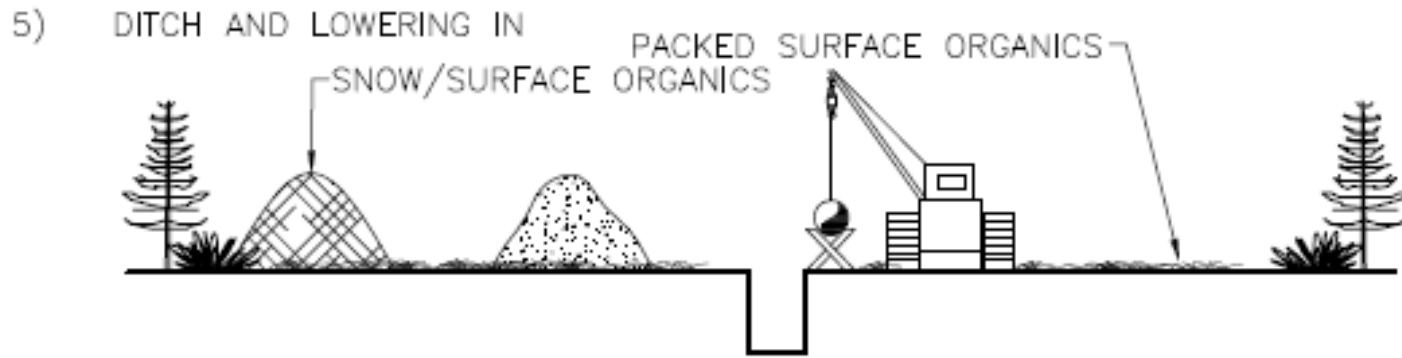


Right-of-Way Prep - Grading

- Grading the ROW is restricted to upland areas only where required
- Organics in upland areas are salvaged and stockpiled separately
- Grading is strictly prohibited in wet lowland peatland areas



Ditching



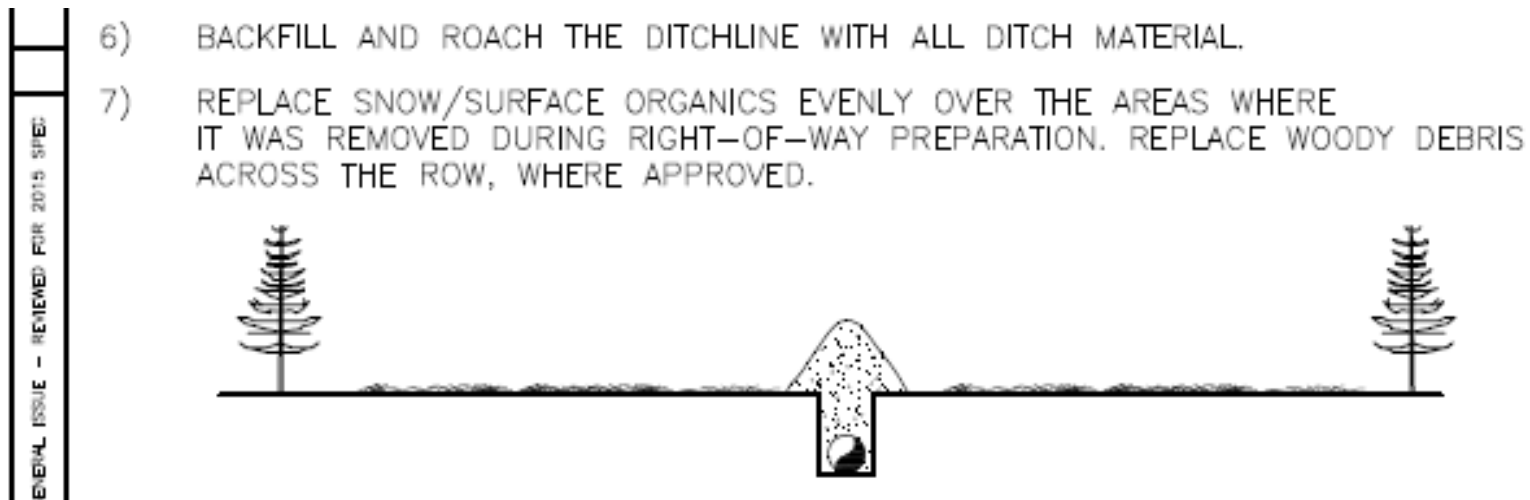
Dewatering – Erosion Prevention

- The ditch can fill with water after excavation
- Ditch water is pumped downgradient into adjacent vegetation
- Filter cloth, filter bags, plywood are used to capture sediment, diffuse flow and prevent erosion
- Dewatering is monitored regularly



Backfill

- Materials are placed back into the ditch in the reverse order to what they were removed
- Frozen surface below spoil aides in minimizing disturbance
- Ditch plugs or stub berms are used to prevent the travel of water along the ditch over long grades and gradual slopes
- The goal is to restore natural drainage patterns of the landscape
- Gaps in the pipeline roach are constructed to promote cross ROW drainage and natural flow



Backfill



Clean Up

- Activities include
 - Re-establishing surface contours
 - Erosion control
 - Access control
 - Mat removal
 - Watercourse crossing removal
- Complete as much clean up as possible to minimize the need to return for repairs or planting
- Prevents re-disturbing the peatland over multiple years



Planting

- Conducted the summer after clean-up only if required
- For example:
 - Planting conifers where needed for habitat restoration (i.e, caribou range)
 - Willow and alder staking in riparian areas (bio-engineering)



Challenges

Not controllable

- Soft ground conditions
- Late or unseasonably warm winters
 - Can result in amendments to the mitigations or schedule

Controllable

- Include drawings and specifications in contract documents
- Awareness and education
- Clear communication of the plan
- Supervision

Results – How do we know it works?

- Operational experience has demonstrated the success of the practices in the field
- No monitoring studies have been completed on TransCanada ROWs to date specific to MSD
- A TransCanada project will be conducting wetland function monitoring on a recently approved project
- Comparing ROWs built without minimal disturbance techniques to subsequently paralleled ROWs



Results – How do we know it works?



Results – How do we know it works?

- TransCanada has shown that disturbance to mineral wetlands by pipeline construction in the White area is considered temporary and short-term
- Minimal disturbance techniques are beginning to demonstrate that this is the same for peatlands in the Green area



Results – How do we know it works?



Rake and Pile Method



Questions?