Evolving Vegetation Management Responsibilities from Capital Project Execution to Operations and Maintenance on Large Scale Linear Developments.

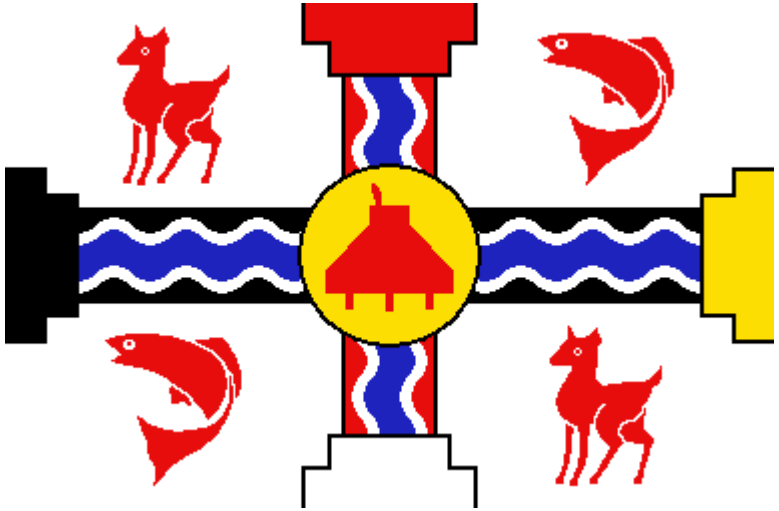
IVMA of BC's Everything in Vegetation Management Forum
November 2021

ENBRIDGE

Dan Tisseur M.Sc., R.P.Bio.
Sr. Environmental Advisor - Westcoast

Acknowledgements

- Sun Peaks is on the unceded traditional territory of the Secwepemc Nation, specifically the following:
  - Sexqeltqín (Adams Lake)
  - Sk’atsin (Neskonlith)
  - Qw7ewt (Little Shuswap)
- My hometown of Prince George is on the unceded traditional territory of the Lheidli T'enneh



Flag of the Secwepemc Nation

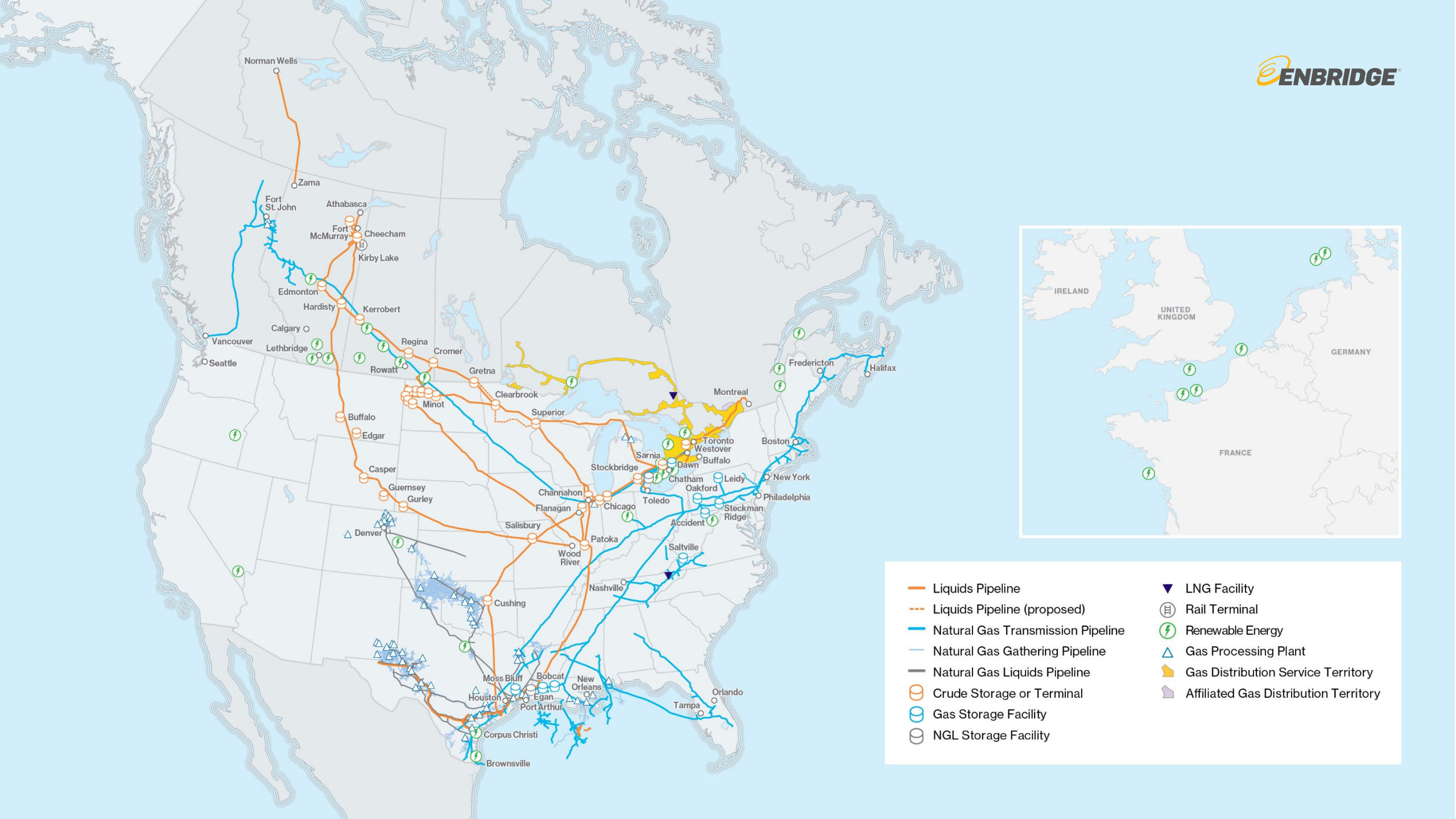
Every Child Matters

Outline

- A little about Enbridge
- A little on perspective
- A lot about large scale linear projects
  - Pre-project planning
  - Vegetation management during construction
  - The handover process
  - The legacy operations inherits
- Conclusion

Track packing of replaced topsoil.

Clear communication between stakeholders is critical at all phases.


ENBRIDGE
Norman Wells
Zama
Fort St. John
Athabasca
Fort McMurray
Cheecham
Kirby Lake
Edmonton
Hardisty
Kerrobert
Calgary
Vancouver
Lethbridge
Seattle
Regina
Cromer
Rowatt
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Minot
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Casper
Guernsey
Gurley
Denver
Salisbury
Channahon
Flanagan
Chicago
Toledo
Stockbridge
Sarnia
Dawn
Buffalo
Toronto
Westover
Montreal
Chatham
Oakford
Leidy
New York
Philadelphia
Steckman Ridge
Accident
Boston
Fredericton
Halifax
Patoka
Wood River
Saltville
Nashville
Cushing
Moss Bluff
Bobcat
New Orleans
Houston
Egan
Port Arthur
Tampa
Orlando
Corpus Christi
Brownsville
IRELAND
UNITED KINGDOM
GERMANY
FRANCE
Liquids Pipeline
Liquids Pipeline (proposed)
Natural Gas Transmission Pipeline
Natural Gas Gathering Pipeline
Natural Gas Liquids Pipeline
Crude Storage or Terminal
Gas Storage Facility
NGL Storage Facility
LNG Facility
Rail Terminal
Renewable Energy
Gas Processing Plant
Gas Distribution Service Territory
Affiliated Gas Distribution Territory

What we do

Enbridge is North America's largest energy infrastructure company

Liquids Pipelines

- ~27,500 km of pipe
- Moving 3 million barrels/day

25%
of crude oil produced in North America

Natural Gas Pipelines

- ~38,375 km of pipe
- Moving 18 Bcf/day

20%
of the natural gas consumed in the U.S.

Natural Gas Utilities

- 3.8 million retail customers
- Serving 670+ communities

75%
of Ontario residents' energy needs delivered

Renewable Power

- 30+ renewable power facilities
- 2,075 MW generating capacity

940,000
homes powered by our assets

Safety is our #1 priority

We invested
$12.5 B
2012-20 to maintain the integrity of our system

We performed
107,739
pipeline integrity inspections in 2020

We monitor our lines
24-7
with people and computerized leak detection systems

We held/participated in
186
emergency exercises and drills in 2020

Above all else, we are always working to ensure the safety of our employees, neighbors, communities and the environment

My Perspective

- An Advisor to Operations and Management teams
  - Perspective relevant to other linear industries
- Typically inheriting large scale projects rather than running them
  - Though O&M activities provide an awareness and subsequent expectation of what final deliverables should look like
- Working with set budgets
  - Makes unanticipated expenditures arising from newly completed projects difficult to fund
- Vegetation Management not traditionally a concern for projects
  - Focus is on project completion
  - longer term concern transferred to O&M

When Capital Projects are separated from Operations and Maintenance a relationship must be managed.

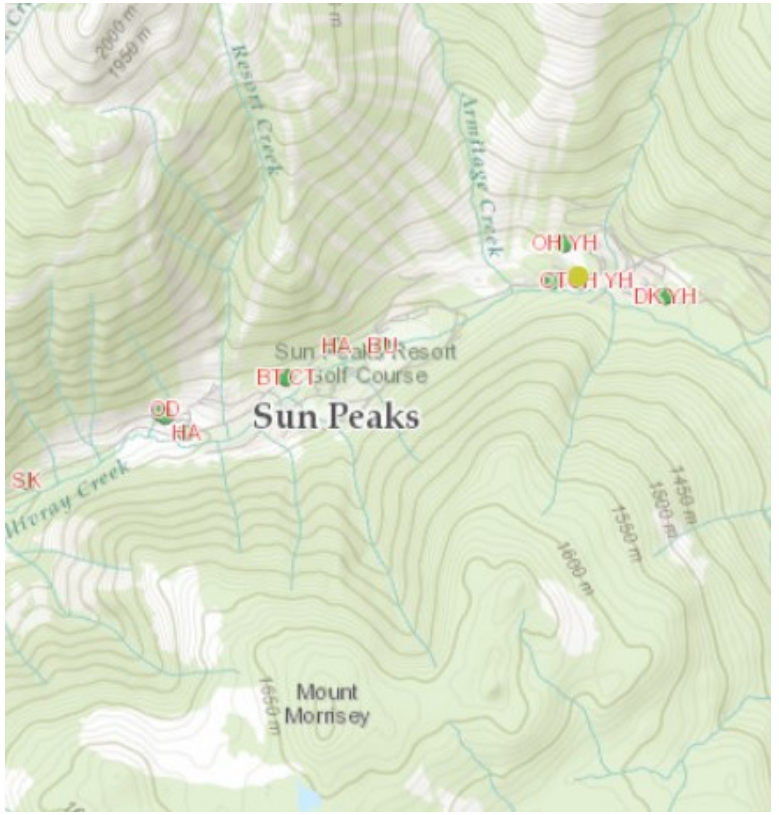
Evolving VM from Projects to Operations

- The evolution of vegetation management concerns follows the logical progression of a project:
  - Planning
  - Execution
  - Handover
- O&M teams must be recognized as stakeholders within project execution
- Clear communications between parties is critical
- Post construction regulatory / community commitments must be understood.

What is the relationally preferred outcome?

Planning Considerations

- Projects must look at both short term and long-term considerations
  - Project team must recognize how the duration of an effort may influence VM activities
    - Projects with multi year timelines will require ongoing and evolving VM considerations
  - Traditional end of project is when asset is in service, however regulatory commitments are helping to extend project timelines
- O&M must ensure that the project is not missing any potential liabilities
  - Representation at the onset of the project, with a clear communication of known risks, and a clear demonstration of what will be expected at end of project.



IAPP Generated image of known weed occurrences near Sun Peaks

Planning Key Points

- Project team:
  - Identify opportunities for pre-work preventative treatments
  - Understand risks associated with duration of project

- Operations team
  - Communicate known issues/risks, insert into project process
  - Establish clear expectations to be met prior to handover at completion of the project.
  - Ensure project has funding allocated to VM activities

Preventative treatments are a reasonable cost for a project to bear.

Project Execution Considerations

- Risk Prevention should be a top priority for projects
  - Mitigative measures to reduce risk should be implemented to:
    - Reduce the potential for introduction (e.g., wash stations)
    - Increase the potential for recovery (e.g., seeding topsoil piles)
    - Meet erosion and sediment control and other project needs
  - Communication to O&M groups must be maintained
- O&M must “keep a finger on the pulse” of the project
  - Baseline communications at an acceptable frequency should be a project deliverable, and a means for O&M to monitor progress
    - Daily Environmental Monitoring reports
    - Monthly summaries, meetings, etc.

Equipment cleaning prior to mobilizing to a project site should now be second nature

Project Execution Considerations

Topsoil preservation and erosion and sediment control at an outlet point.

Invasive and noxious weed management should be completed while projects are under way..

Project Execution Key Points

- Project team:
  - Implement mitigative strategies, which may need to include chemical, mechanical and preventative options
    - Includes undeveloped areas within eventual footprints
  - Ensure communications and updates are provided to O&M
- Operations team
  - Keep a finger on the pulse of the project
  - Reinforces expectations established at the onset of the project.

O&M must find the time to monitor Project progress

Project Completion Considerations

- Project costs should include longer term restoration
  - Funding should be allocated to:
    - Meet new VM concerns (weeds) introduced by the project
    - Meet regulatory and community commitments.
    - Overcome any deficiencies
  - Project teams need to recognize that project completion may not be defined purely by asset functionality.

- O&M must thoroughly review project footprint prior to accepting handover
  - Ensure funding for deficiencies is accounted for by project, or in subsequent O&M budgets
  - Ensure regulatory and community commitments are accounted for.

Slope stability issues within a riparian zone may have been mitigated through VM design.

The traditional model of project completion needs to include vegetation recovery

Project Completion Considerations

Topsoil preservation and replacement is critical

An area previously identified as contaminated with invasive plants is handled separately and marked.

Project Completion Considerations

Hydroseeding and ESC measures in place.

Inventory data of hotspots encountered during the project will be valuable even if the project is unable to capture treatment costs.

Project Completion Key Points

- Project team:
  - Ensure VM considerations from Ops have been met.
  - Ensure VM related commitments to regulators and communities have been met.
  - Ensure budgets for ongoing commitments are in place

- Operations team
  - Conduct a thorough assessment of project footprint
  - Be prepared to refuse acceptance of completion if deficiencies are not suitably addressed.

The responsibility for funding construction deficiencies should fall on the project itself.

Project Legacies

- Projects with ground disturbances inherently increase the risk of invasive and noxious weed introduction and spread
  - Despite the best mitigative efforts
  - Not necessarily manifested during or immediately after project
- O&M must anticipate increases in VM costs as projects are completed and after transfer of ownership
  - O&M VM activities should adopt Early Detection Rapid Response (EDRR) mindset for project footprints
  - O&M VM budgets should increase as new assets are added
  - O&M managers should pessimistically assume that VM issues will manifest on project footprints and have reactive resources available to minimize the effect

Invasive and noxious weeds may capitalize on project disturbances

EDRR responses to project footprints limits growth potential.

Conclusions

- Project team:
  - Eschew the traditional “asset delivery = completion” model and adapt longer term management strategies as a project cost.
  - Vegetation management during a project should include chemical and mechanical means as both preventative and mitigative strategies

- Operations team
  - Must clearly articulate expectations, and hold capital teams accountable
  - Anticipate project failings, and ensure budgets are prepared to meet shortcomings.

No project is perfect, anticipate and plan for EDRR actions on project footprints following handover.

Special Thanks

- Thanks to everyone who travelled and attended in person, and to those jpoining online.
- Photos provided by:
  - Alana-Rose Lynes
  - Keenan Mattock
  - Tom Peters

Q&A

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Image references

- Slide 2: https://en.wikipedia.org/wiki/Secwepemc#/media/File:Flag_of_the_Kamloops_Indian_Band.PNG
- Slide 10: https://maps.gov.bc.ca/ess/hm/iapp/

Bonus content if no questions…

My silly hobby: hitting people with sticks…

- Full contact
- Re-creates medieval training/fighting techniques
- Hurts
- Probable long term health ramifications
- Can’t stop won’t stop
- Back at it with vaccine passports at practices!
- www.sca.org