Alberta Wellsite Certification Tools for Legacy Upland and Padded Peatland Sites

RemTech 2022

InnoTech Alberta: Natalie Shelby-James
Vertex Resource Group Ltd.: Dean MacKenzie

October 12, 2022

1

InnoTech ALBERTA
A SUBSIDIARY OF ALBERTA INNOVATES

VERTEX

Enviro Q&A Services

NAIT

Outline

- **Project Background**

- **Stage 1 Findings**

- **Stage 2 Outputs**

  - **Preparing Variance Justifications for Reclamation Certification of Wellsites and Associated Facilities on Forested Lands**

  - **Certification of Mineral Soil Pads in the Boreal Region - Decision Framework and Support Tools (DSTs)**

- **Stage 3 Research Program: Mapping Padded Wellsites, Field Pilot & Full Research Program**

What's the problem?

- Historically, industry and regulators have agreed **that in certain site-specific circumstances**, **legacy forested sites** that have natural vegetation establishment can be certified without removing existing vegetation and re-starting the reclamation process

- Similarly, sites with mineral pads in peatlands have been certified without pad removal or with partial pad removal.

- However, practitioners were often unclear on processes to follow and recommended data to include in applications for variance(s) and change in end-land use.
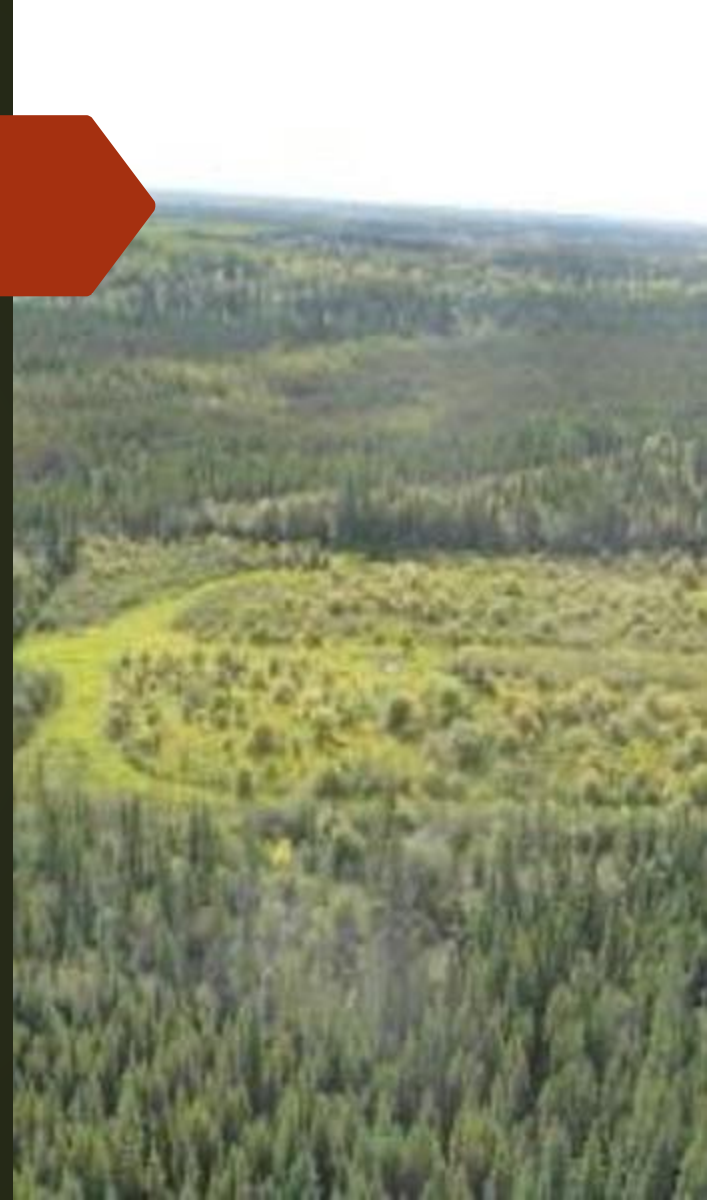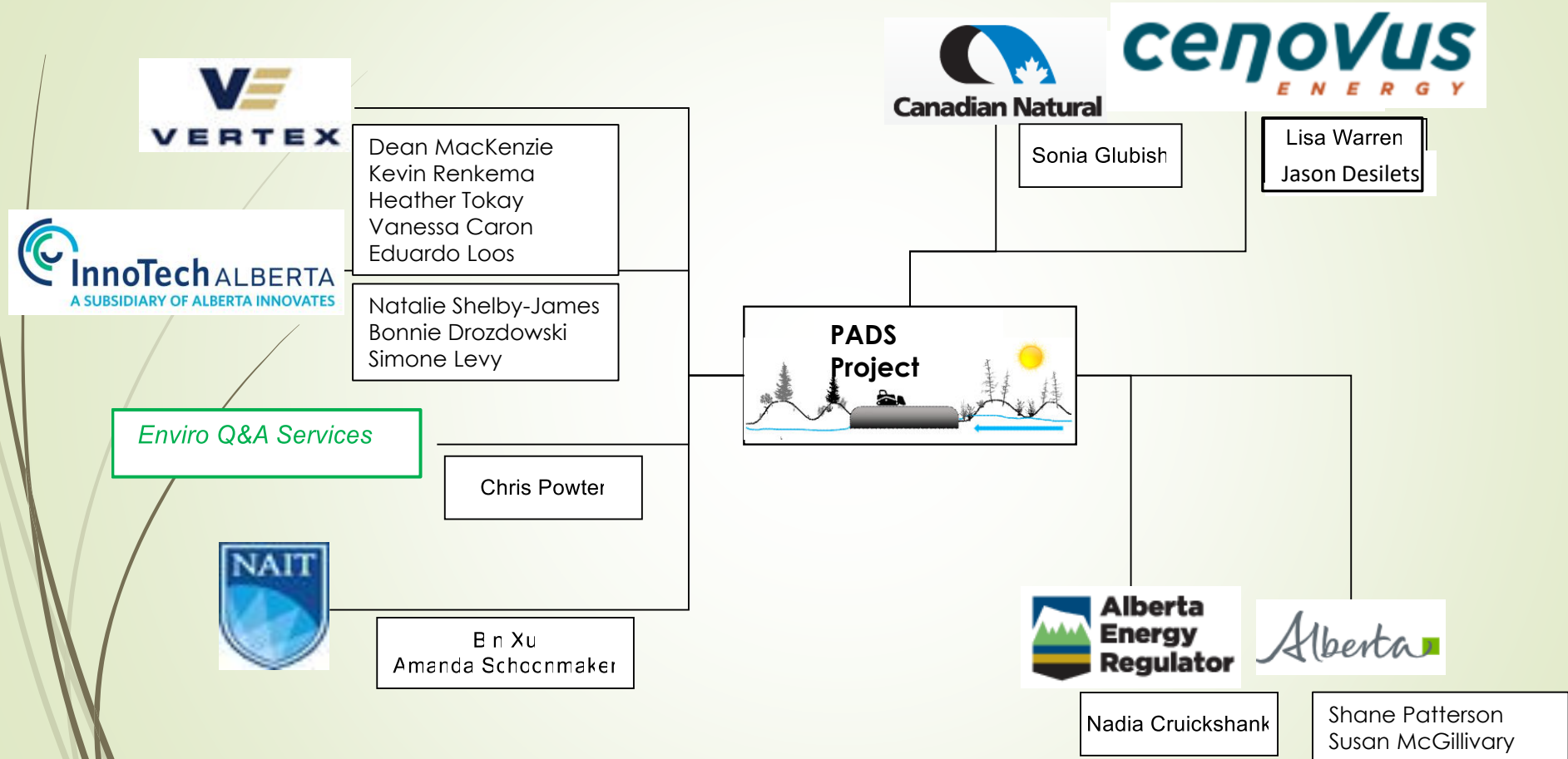
Objectives

- Document basis for current industry practices and regulatory decisions for legacy upland and padded peatland sites

- Provide practitioners with streamlined processes to follow and recommended supporting data to include in variances and change in end land use applications

> The goal is to ensure that sites are on a trajectory towards <u>functioning ecosystems</u> with an appropriate level of activity

Project Team

VERTEX

Dean MacKenzie
Kevin Renkema
Heather Tokay
Vanessa Caron
Eduardo Loos

InnoTech ALBERTA
A SUBSIDIARY OF ALBERTA INNOVATES

Natalie Shelby-James
Bonnie Drozdowski
Simone Levy

Enviro Q&A Services

Chris Powter

NAIT

Bin Xu
Amanda Schoonmaker

Canadian Natural

cenovus ENERGY

Sonia Glubish

Lisa Warren
Jason Desilets

PADS Project

Alberta Energy Regulator

Alberta

Nadia Cruickshank

Shane Patterson
Susan McGillivary

3 Stage Multi-Year Project (2018-now)

➡ **Stage 1 – Desktop review (complete)**

➡ **Stage 2 – Draft support documentation & verification (complete)**

➡ **Stage 3 – Research to address knowledge gaps**

  ➡ Mapping of Padded Sites **(complete)**

  ➡ Research Objectives Review & Site Selection **(in Progress)**

  ➡ Pilot Program to inform larger program **(complete)**

  ➡ Full research program **(In Progress)**

6

Stage 1 – Literature Review and Outreach

- Regulatory review of applicable legislation, authorizations, guidelines and policies with emphasis on:
  - Factors affecting ecosystem function for naturally revegetated upland forested sites
  - Factors affecting functional peatland ecosystems
- Reviewed assessment methods outside oil and gas
- Surveyed practitioners, industry & regulators/government

Tokay, H., C.B. Powter, B. Xu, B. Drozdowski, D. MacKenzie and S. Levy, 2019. Evaluation of Reclamation Practices on Upland and Peatland Wellsites. Prepared for the Petroleum Technology Alliance of Canada, Calgary, Alberta. 227 pp.

Drozdowski, B., C.B. Powter, H. Tokay, D. Mackenzie and B. Xu, 2020. Certification of Mineral Pads in the Boreal Region – A Path Forward. Working Session Summary. Prepared for the Petroleum Technology Alliance of Canada, Calgary, Alberta. Report 19-RRC-09_3. 47 pp.

Stage 1 Key Findings – Legacy Upland Sites

- AER is the primary regulatory agency for variance requests
- AEP is only involved in decisions where there is a request to leave an improvement in place
- Overall, there is good support for accepting variance to criteria providing rationale is properly justified (ecologically based)
- **However, a poor-quality justification with little back up information will likely be rejected.**

Approved variance for subsidence and Canada thistle

Stage 1 Key Findings – Pads in Peatlands

➡ Multiple government agencies involved in each decision:

- Requires approval from **AEP** (effectively the "landowner") for a <u>change in land use request</u>

- With this approval, **AER** certifies the site *if* it <u>meets forested criteria</u> (vegetation override)

Pads left in place with forest cover

Stage 1 Key Findings – Pads in Peatlands

➡ Ultimately there is a lack of clarity on the *process* to obtain approvals and the *criteria* for evaluating the requests

- Likely why we found a diverse range in responses to leaving pads in place

Offsite impacts from access road pad material

Stage 2: Draft Support Documents

Forested Legacy Upland Sites

- Guidance to prepare complete and comprehensive variance requests to streamline for rec cert applications under **Forested Criteria**
- Emphasis on achieving best possible ecological outcomes (net environmental benefits)
- Detailed information for common variances (Landscape, woody debris; Soils; Vegetation)

Forested Pad within a Peatland

- Decision support tool(s) outlining
  - Process for practitioners to follow to guide decisions on whether an application should be made to leave a pad in place, and
  - to provide supporting information for the request to AEP for a Change in Land use

Document Development Process

- 128 people participated in knowledge transfer session
- Solicited selected industry, regulatory and practitioner feedback to improve original draft(35 industry/practitioners and 18 AEP and AER)
- 29 (uplands) & 122 (peatlands) nominated sites for verification trial

2020 Draft Guidance Document

June 2021 Knowledge Transfer Session

Feb 2022 Solicit Feedback from selected Stakeholders

2020 Case Studies

June 2021 Field Verification Training

2022 Updated documents

Preparing Variance Justifications

- Key changes include:
  - New Title
  - List of Caveats (Section 1.2)
  - Section 3.0 to emphasize achieving best possible ecological outcome (net environmental benefit)
  - Justification form to reduce redundancy and focus on key information to include

PREPARING VARIANCE JUSTIFICATIONS FOR RECLAMATION CERTIFICATION OF WELLSITES AND ASSOCIATED FACILITIES ON FORESTED LAND:

2022 UPDATE

Heather Tokay, Kevin Renkema, and Dean MacKenzie, Vertex Professional Services Ltd.

Chris Powter, Enviro Q&A Services

Natalie Shelby-James, InnoTech Alberta Inc.

REPORT PREPARED FOR
PETROLEUM TECHNOLOGY ALLIANCE CANADA
Reclamation Remediation Research Committee

CONFIDENTIAL
20 – RRRC – 05_3b
June 2022

Section 4: Preparing Justifications

Applicants (recommended) to summarize:

- relevant background information,

- rationale or evidence that a variance request will result in the best ecological outcome,

- why the deficiency is not expected to have adverse environmental impacts, and

- demonstration of equivalent land capability and ecosystem function despite not meeting the Forested Land Criteria.

Decision Framework and Support Tools

CERTIFICATION OF MINERAL SOIL PADS IN
THE BOREAL REGION –
DECISION FRAMEWORK AND SUPPORT
TOOLS: 2022 UPDATE

Chris Powter, Enviro Q&A Services

Natalie Shelby-James, InnoTech Alberta Inc.

Bin Xu, Center for Boreal Research, Northern Alberta Institute of Technology

Kevin Renkema, Vertex Professional Services Ltd.

REPORT PREPARED FOR
PETROLEUM TECHNOLOGY ALLIANCE CANADA
Reclamation Remediation Research Committee

- ▶ Second version of the document

- ▶ Revised based on stakeholder feedback from 2021 and 2022

- ▶ Key changes include:
  - List of caveats
  - Pre-screening tool
  - Added detailed description(terminology and explanation) to decision framework and support tools
  - Updated tables and support tools
  - Added section on back up documentation required

Recommended Information to Include with a 'Change in Land Use' Application

- Rationale for not removing pad
- Site background information
- Results from DST recommendation calculator
- Adjacent and regional DST information
- Site specific considerations DST information
- Access DST information
- Borrow DST information
- Additional supporting information

Stage 3 Research Program Goals

➡ Address knowledge gaps for sites that were **constructed using mineral soils in peatlands**, and

➡ Refine the decision framework and support tools, where required.

Stage 3 - Priority Research Objectives

1) Determine factors that result in sustainable forest ecosystem development on padded sites (which includes access roads) in peatlands

2) Develop a mechanism for detecting and evaluating off-site impacts associated with padded sites

3) Determine factors that result in padded sites having impacts to their surrounding peatland ecosystems in the long term and affect the extent and severity of these impacts

4) Evaluate the effectiveness of partial reclamation activities for alleviating off-site impacts resulting from pads left in place in peatlands

Stage 3.1: Inventory of Padded Sites

Objective

- Map and characterize **abandoned padded wellsites** in peatlands within Alberta (sites built between 1940 and 2020)

Approach

- Remote sensing (LiDAR bare earth DEM & Sentinel-2) & machine learning supervised image classification

Results will be used to:

- Obtain general statistics currently unknown about padded wellsites
- Guide sampling design for field research
- Dataset can be used to address additional research objectives

Study Area

Criteria for wellsite selection

➤ Abandoned wells

➤ Conventional wells (oil sands exploration well excluded)

➤ Located within peatlands areas in the Boreal and Foothills Regions of the Green Area

➤ Areas with LiDAR coverage

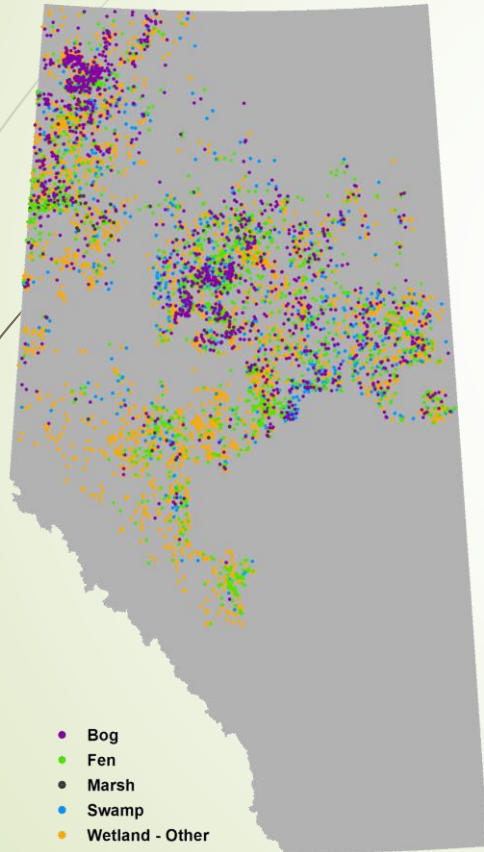➤ Excluded sites that overlap other existing dispositions

- Padded Wellsites
  LiDAR Coverage
  Peatland

15,083 wellsites selected for assessment
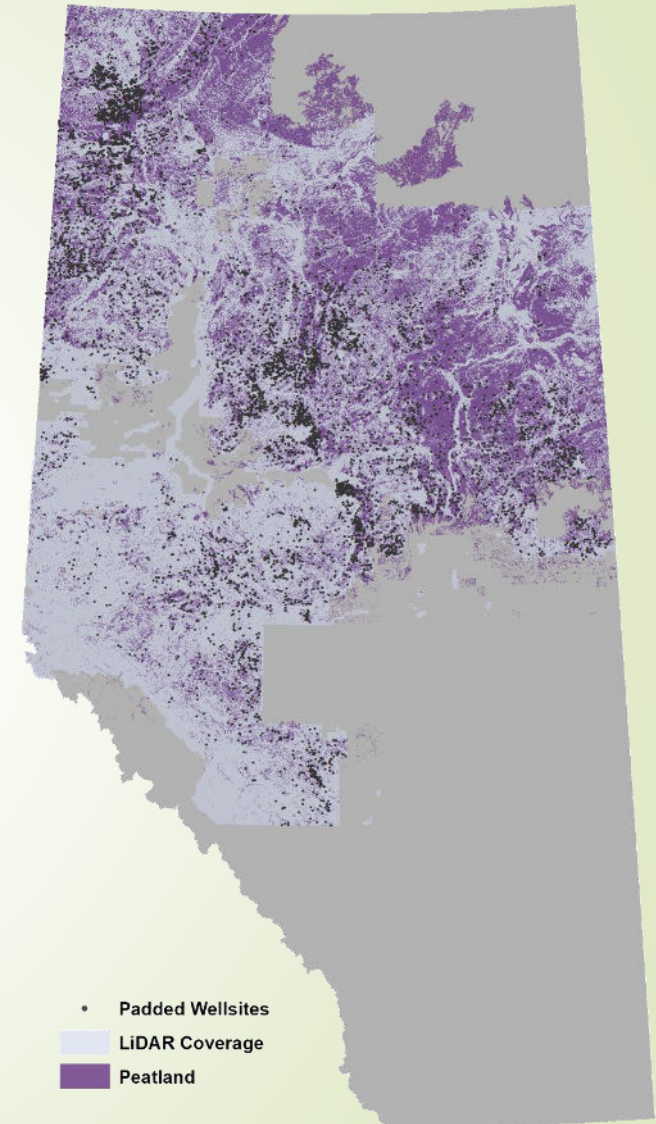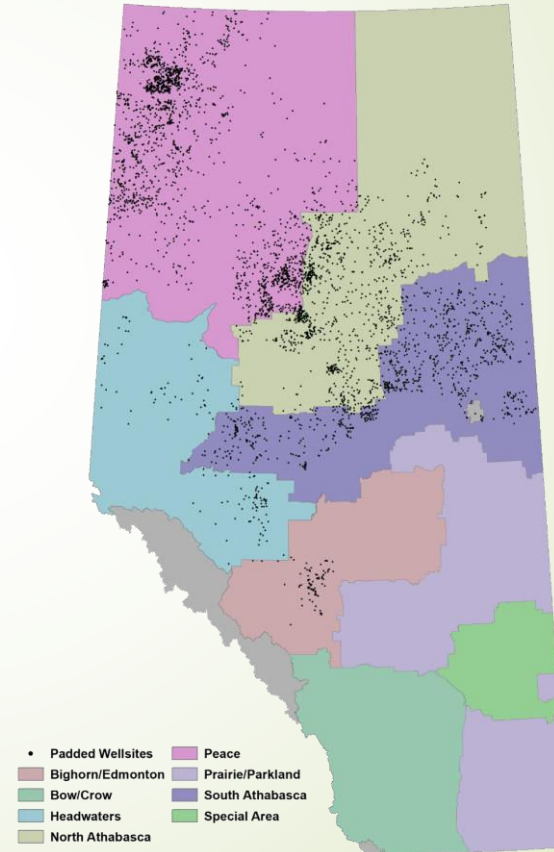
Results

- Overall classification accuracy: 78%
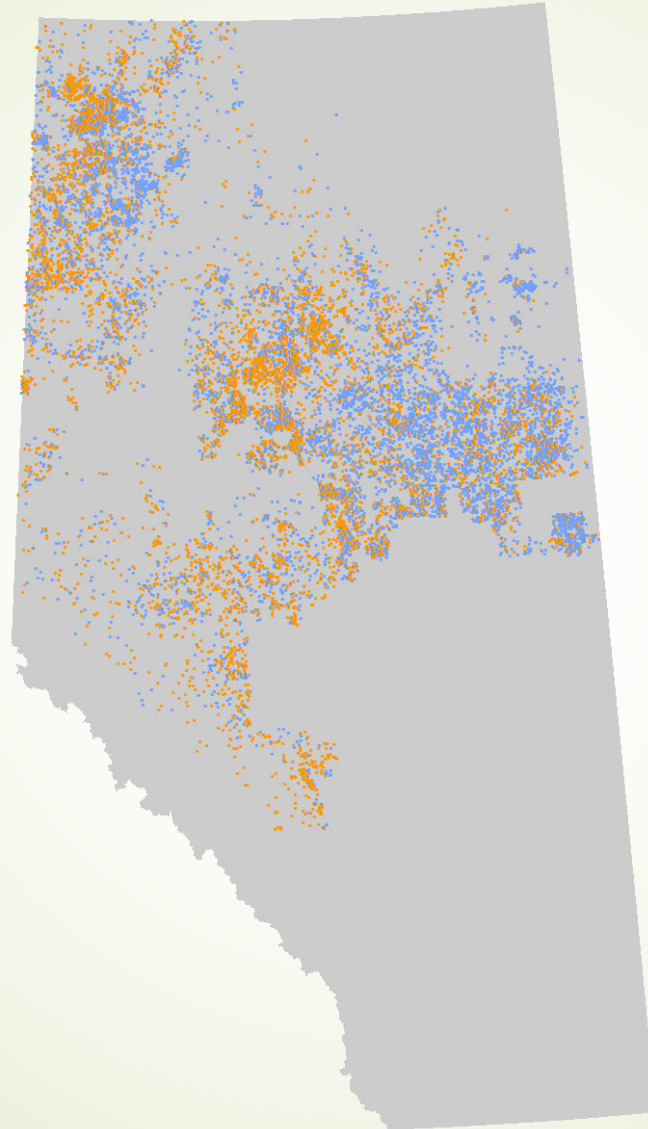
- **Padded wellsites: 7,077**
- **Unpadded wellsites: 8,006**

Results – Padded Sites by Region Of Interest

Wetland Type
(from ABMI & DEP layers)

AEP Land Division Districts

Legend (left map):
- Bog
- Fen
- Marsh
- Swamp
- Wetland - Other

Legend (right map):
- Padded Wellsites
- Bighorn/Edmonton
- Bow/Crow
- Headwaters
- North Athabasca
- Peace
- Prairie/Parkland
- South Athabasca
- Special Area

Stage 3 Preliminary Field Trial/Pilot Study

- **Focused on Research Objective #1:** Investigate the factors that result in sustainable forest ecosystem development on padded sites in peatlands

  - De-risk the larger program

    - Better understand logistics & identify efficiencies that can be applied to a large-scale study

    - Test field sampling protocol and adapt

    - Provide preliminary results to inform the program

    A large-scale study is being designed to fully investigate objectives 1-4

Site Selection

➡ From Mapping

- Certified, padded sites abandoned >25 years ago

- In the Forested Green Zone of Alberta

- Within a 100 km radius of Slave Lake, Alberta (for logistics and efficiency)

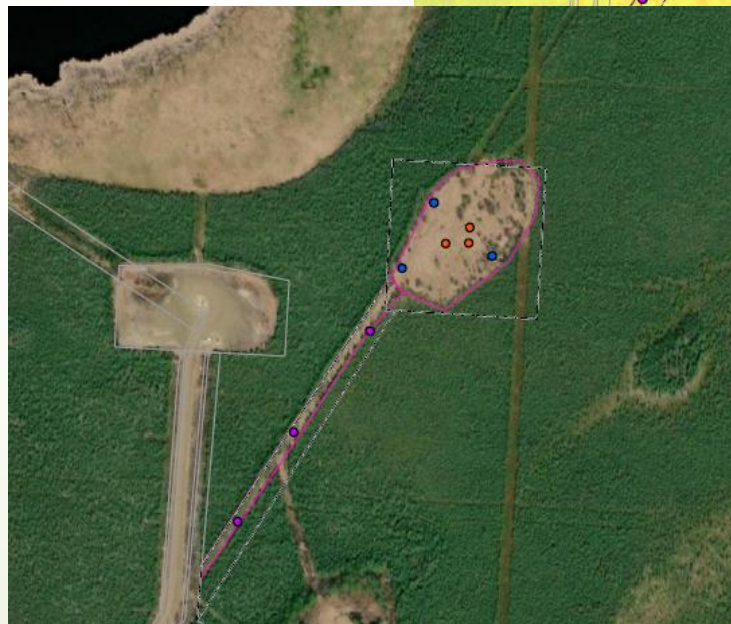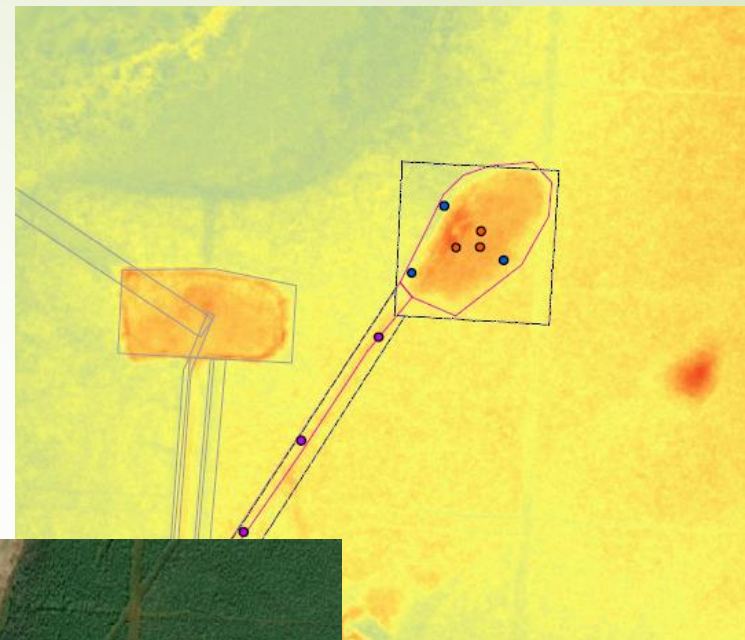- Encompassing a range of vegetation characteristics (outcomes)

Site Selection

- Planned for 13 sites
- Measured 8 sites
  - Late in season
  - Difficult access
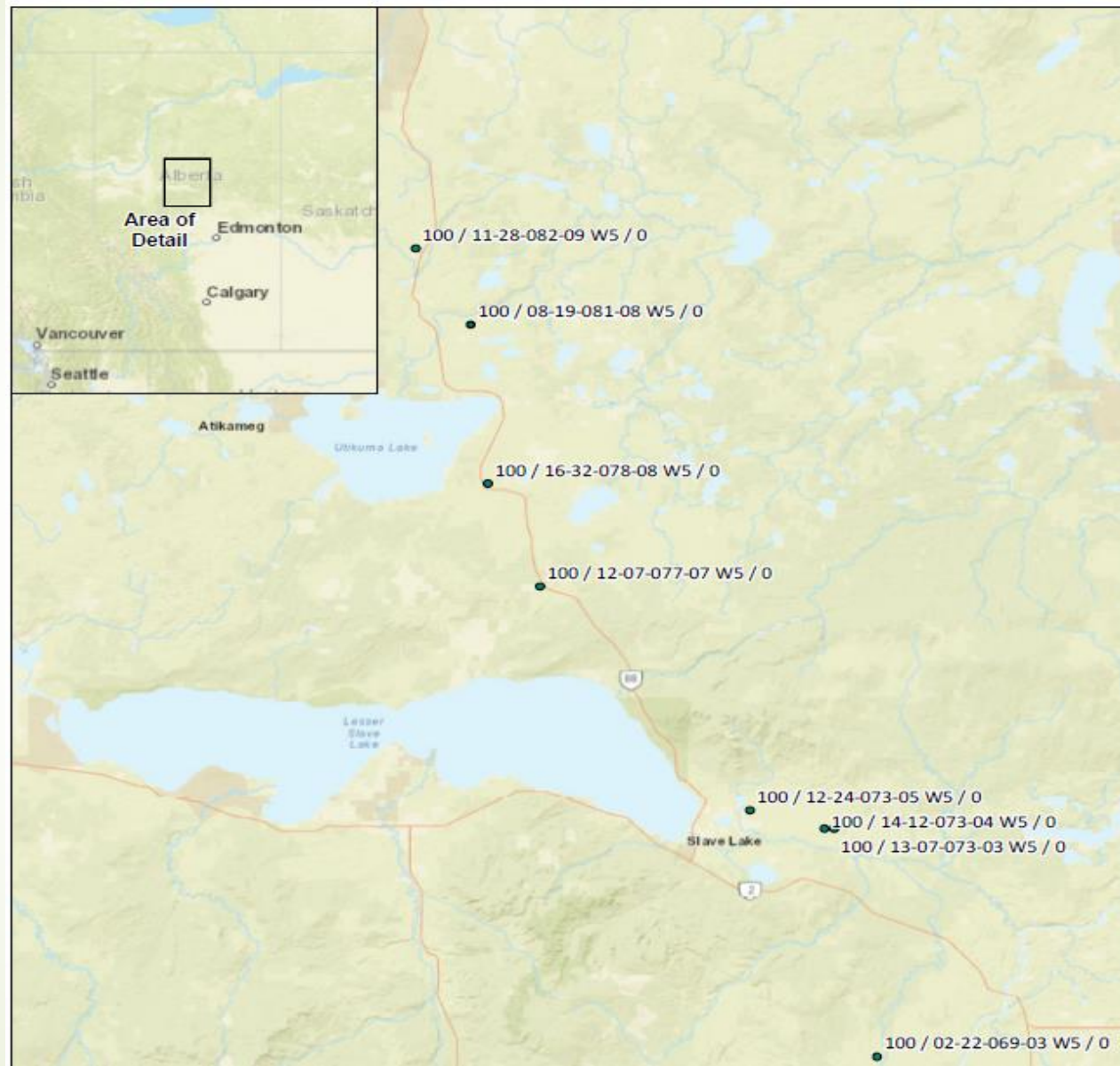
Sample Design

- Stratified into zones
  - Pad centre, pad periphery and access road
 - Three sample areas per zone

Data Collected

- **Predictive Variables**

  - Pad thickness, depth to water table, various physical and chemical properties of the pad material

  - Pad size, elevation, proximity to uplands, surrounding wetland type, time since construction/abandonment, construction and abandonment practices

- **Response Variables**

  - Cover by strata and species in 2 – 1 x 1 m plots

  - Tree density, height, DBH and age in 1 – 10 m^2 plot

Preliminary Results
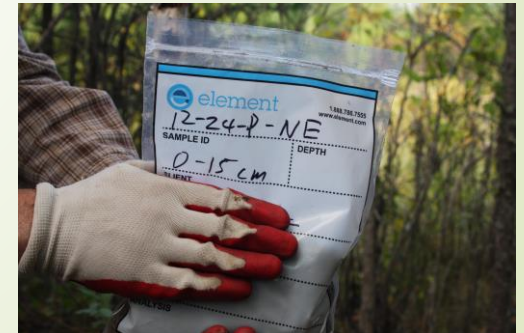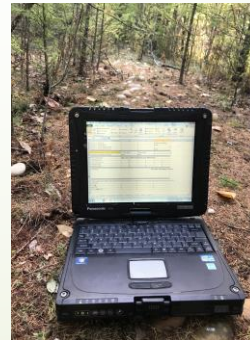
Site & Pad Characteristics

➡ **High variability between sites**

- Pad thickness: 0.8 to 1.8 m

- Elevation: 0.3 to 0.8 m above surrounding peatland

- Texture: sand to clay and organic material mixed with mineral

- Moisture: dry to saturated

- Surrounding wetland types were bogs and fens

- % Upland in surrounding area: 0 to >30%

- Material at all sites generally had a neutral pH, non-saline and non-sodic

- Slight variability in cations present (Ca, K, Mg, Na)

Preliminary Results

Influence of Pad Characteristics on Vegetation

➡ Predictive factors

– **Moisture characteristics**

– Cation concentrations

– Pad dimensions and elevation

– Distance to upland areas

– Bulk density / compaction

Dry

Moist

Wet

Research Program Next Steps

- **Fall 2022**
  - Consultation with industry and regulators to confirm research objectives & identify opportunities to leverage industry resources
  - Site selection (40 sites plus back-up)
- **Summer 2023**
  - Program execution
- **Fall 2023/Winter 2024**
  - Data analysis and reporting

Contact

Natalie Shelby-James

Sr. Researcher – Environmental Impacts

**InnoTech Alberta
ph. 587-777-0101**
e: Natalie.Shelby-James@innotechalberta.ca

Dean MacKenzie

Vice President – Environment

**Vertex Resource Group Ltd.
ph. 780-668-4519**
e: dmackenzie@vertex.ca

Acknowledgements

- **PTAC AUPRF – Tannis Such, Lorie Mayes**
- **RRRC and Technical Steering Committee Members**
- **AEP & AER participation**
- **Practitioner participants in consultation process and workshops**
- **Core Project team:**
  - **Enviro Q&A Services – Chris Powter**
  - **Vertex – Kevin Renkema, Heather Tokay, Vanessa Caron, Eduardo Loos**
  - **NAIT – Bin Xu**
  - **InnoTech – Bonnie Drozdowski**