Towards a Shared Foundation: Data/Innovation – From the Ground Up… Way Up (Supplemental Report)

June 16, 2025 Workshop

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Prepared for:

Canadian Land Reclamation Association (CLRA) – Alberta Chapter and

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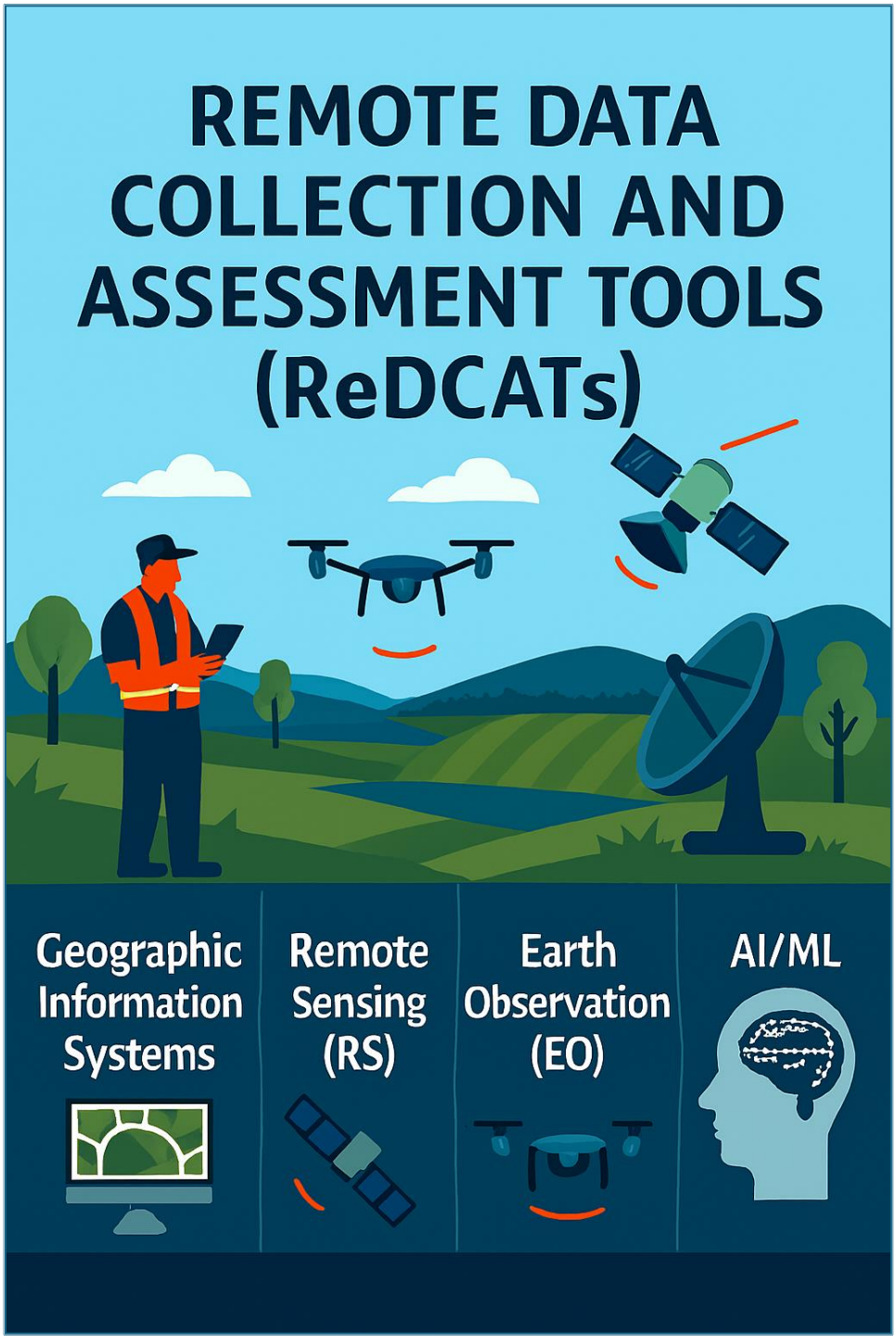

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List of Acronyms

AB – Alberta

ABMI – Alberta Biodiversity Monitoring Institute

ADP – Alberta Data Partnerships

AER – Alberta Energy Regulator

AESRD – Alberta Environment and Sustainable Resource Development (now Alberta Environment and Protected Areas)

AI – Artificial Intelligence

AHFMP – Alberta Human Footprint Monitoring Program

AITF – Alberta Innovates Technology Futures (now InnoTech Alberta)

AOI – Area of Interest

API – Application Programming Interface

AUC – Alberta Utilities Commission

AUPRF – Alberta Upstream Petroleum Research Fund

AWARE – Assessment of Wood Attributes from Remote Sensing

BC – British Columbia

BERA – Boreal Ecosystem Recovery and Assessment

C&R – Conservation and Reclamation

CARL – Conditional Adjustment of Liability

CCMEO – Canada Center for Mapping and Earth Observation

CER – Canadian Energy Regulator

CEOS – Committee on Earth Observation Satellites

CEOS, COVE - CEOS – Visualization Environment

CHM – Canopy Height Model

CLRA – Canadian Land Reclamation Association

COSIA – Canada's Oil Sands Innovation Alliance

CRR – *Conservation and Reclamation Regulation*

CRIN – Clean Resources Innovation Network

CRSS – Canadian Remote Sensing Society

CSA – Canadian Space Agency

DEM – Digital Elevation Model

DIDS – Digitally Integrated Disposition System

DND – Department of National Defence

DRAS – Digital Regulatory Assurance System

DSA – Detailed Site Assessment

DSM – Digital Surface Model

DTM – Digital Terrain Model

EAP – Environment and Parks (now Environment and Protected Areas)

EC – Electrical Conductivity

ECCC – Environment and Climate Change Canada

eDNA – Environmental DNA

EIA – Environmental Impact Assessment

ELC – Equivalent Land Capability

EnMAP – Environmental Mapping and Analysis Program

EM – Electromagnetic

EO4CE – Earth Observation for Cumulative Effects

EO4OG – Earth Observation for Oil and Gas

ERMP – Ecological Recovery Monitoring Program

ESA – Environmental Site Assessment

ESA – European Space Agency

ESAR – Environmental Site Assessment Repository

ESG – Environmental, Social, and Governance

ESRD – Environment and Sustainable Resource Development (now Environment and Protected Areas)

EO – Earth Observation

EPA – Environment and Protected Areas

EPEA – *Environmental Protection and Enhancement Act*

fCOVER – Fraction of Vegetation Cover

FOIP – *Freedom of Information and Protection of Privacy Act*

FRIAA – Forest Resource Improvement Association of Alberta

GEE – Google Earth Engine

GEO – Group on Earth Observation

GEOGLAM – Group on Earth Observation Global Agricultural Monitoring

GEOGLAM – RAPP: GEOGLAM – Rangeland and Pasture Productivity

GIS – Geographic Information Systems

GPR – Ground-Penetrating Radar

GPT – Generative Pre-Trained Transformer

GoA – Government of Alberta

GoC – Government of Canada

GPS – Global Positioning System

GVI – Grassland Vegetation Inventory

HQP – Highly Qualified Personnel

HSE – Hazardous Substance Exposure

HSI – Hyperspectral Imagery

InSAR – Interferometric Synthetic Aperture Radar

IMSA – Interim Monitoring Site Assessment

IOGC – Indian Oil and Gas Canada

ISC – Information Services Corporation (Saskatchewan)

LAI – Leaf Area Index

LiDAR – Light Detection and Ranging

LT – LandTrendr

m – metre

ML – Machine Learning

MOPRA – Monitoring Procedures for Reclamation in Alberta

MS – Multispectral

NDVI – Normalized Difference Vegetation Index

NDYI – Normalized Difference Yellowness Index

NRCan – Natural Resources Canada

NSERC – Natural Sciences and Engineering Research Council

ODAA – Open Data Areas Alberta

OM – Organic Matter

ON – Ontario

OSIP – Oil Sands Information Portal

PDA – Pre-Disturbance Assessment

PDSA – Pre-Disturbance Site Assessment

PGC – Provincial Geospatial Centre

PTAC – Petroleum Technology Alliance of Canada

ODAA – Open Data Areas Alberta

OSRIN – Oil Sands Research and Information Network

QA/QC – Quality Assurance / Quality Control

R&D – Research and Development

RC – Reclamation Certificate

RCM – Radarsat Constellation Mission

RCSA – Reclamation Certificate Site Assessment

ReDCAT – Remote Data Collection and Assessment Tools

RGB – Red, Green, and Blue

RIS – Reclamation Information System

RITL – Registered Interest on Titled Land

RoO – Record of Observation

RPAS – Remotely Piloted Aircraft Systems

RS – Remote Sensing

RSTAP – Remote Sensing Technology Action Plan

SAR – Synthetic Aperture Radar

SaaS – Software as a Service

SAVI – Soil Adjusted Vegetation Index

SED – Specified Enactment Direction

SME – Subject Matter Expert

SME – Small-to-Midsized Enterprise

TIFF – Tagged Image File Format

UAS/UAV – Unmanned Aircraft Systems / Unmanned Aircraft Vehicles

USGS – United States Geological Survey

Yr – Year

Executive Summary

Data, and the information generated, are foundational pieces supporting informed decision making within regulatory frameworks. Traditionally, data collection has consisted of a mix of field level observations supplemented with aerial imagery. However, there has been a rapid development of platform technologies such as geographic information systems (GIS), remotely piloted aircraft systems (RPAS), earth observation (EO), artificial intelligence (AI), and machine learning (ML) that can also be used to collect and process data.

In the workshop and this report, a new acronym was created: **Re**mote **D**ata **C**ollection and **A**ssessment **T**ools (ReDCATs). The term ReDCAT collectively refers to the following:

- Geographic Information Systems (GIS);
- Remote Sensing (RS): active and passive sensor types;
- Earth Observation (EO): ground-based, Remotely Piloted Aircraft Systems (RPAS; also known as drones), fixed or rotary wing aircraft, and satellites; and
- Artificial Intelligence (AI) and Machine Learning (ML).

Collectively, these technologies enable the collection, processing and analysis of much more data, at greater frequency, finer resolutions, and across much larger areas. However, the rapid pace of technology development has outpaced the ability for policy makers and regulators to evaluate current policy and practices, such as field-level measurements and observations, resulting in a delay in both uptake and adoption within policy. The impacts of this delay may include missed opportunities for efficiency, and a lack of incentive for the development of relevant tools and processes.

The Canadian Land Reclamation Association's (CLRA) workshop in 2024 highlighted the need to continue demonstrating, and clearly communicating, operational and regulatory applications of these technologies by: comparing the value and costs of using ReDCAT technologies against current methods; and, understanding the value of the data and information derived from these technologies within various business contexts, to support building the business case for their integration and adoption. To build on the success of the 2024 workshop, the Alberta Chapter of the CLRA and Alberta Innovates co-hosted a workshop in Calgary on June 16, 2025. The intent of the workshop was to continue the conversation by identifying project concepts that promote opportunities for uptake by industry, regulators, and policy makers while continuing to foster innovation in this space.

The 2025 workshop resulted in several high-priority project ideas that propose a clear path forward for innovation and regulatory collaboration. Key examples include establishing a cross-sector technical committee for developing a ReDCAT framework and launching a pilot project to develop ReDCAT criteria for cultivated lands.

This Supplemental Report provides a collated summary of the information collected throughout the course of the workshop by MeetGeek – a recording/note taking software run through AI. It contains the methodology, session summaries, and themes generated from transcripts of the MeetGeek recordings.

1. Introduction and History

In February/March 2011, a workshop involving government, regulators, and researchers took place in Edmonton, AB to discuss the potential for using Earth Observation (EO) to monitor various activities in Alberta's oil sands. A final report called *Earth Observation Monitoring of the Oil Sands in Alberta: Report on a Workshop* (Ryerson, 2011) was completed.

The 2011 workshop had six objectives:

1. To better understand the monitoring and surveillance requirements of the regulatory agencies with responsibilities in the oil sands in terms amenable to Remote Sensing (RS) and EO science;
2. To review the current capabilities of RS and EO technologies as they relate to the oil sands environment;
3. To better understand the potential for RS science and technology in the monitoring and surveillance of oil sands environmental performance;
4. To identify existing and proven technologies that can meet the regulatory information requirements now;
5. To develop concepts for potential operational projects; validation or demonstration projects; and research projects; and
6. To identify the gaps in information and the research and development needed to develop and demonstrate RS and EO technologies in the future to, where possible, fill these gaps.

Three categories of recommendations came from the workshop, summarized as follows (copied as written in the report):

1. Engagement – who else we recommend should be engaged, in what order, and why;
2. Data Assessment, Management and Delivery – the future success of any monitoring program will depend on a foundation of scientifically sound, complete, well managed and easily accessible data; and
3. Organizational Development – details the sort of organizational structure that began to emerge from the workshop.

The Remote Sensing Technology Action Plan (RSTAP) was a collaborative initiative led by Petroleum Technology Alliance Canada (PTAC) and LOOKNorth created to accelerate the development and adoption of innovative RS technologies in the oil and gas sector. Launched through a foundational workshop co-hosted by PTAC and LOOKNorth in May 2013, the RSTAP brought together industry, government, and service providers to identify high-priority applications. With advances in satellite, aerial, and ground-based sensing, reducing costs and improving performance, RSTAP sought to harness these innovations through structured engagement, technology screening, and demonstration projects. The program included industry-driven workshops, targeted outreach, and projects aimed at advancing practical solutions to enhance safety, reduce environmental impact, and increase operational efficiency. Through this initiative, PTAC and LOOKNorth created a neutral, collaborative platform to drive RS innovation forward and deliver measurable value to Canada's oil and gas industry.

In February 2015, another related workshop was sponsored by the Alberta Energy Regulator (AER), Alberta Environment and Sustainable Resource Development (AESRD), Alberta Innovates, Advanced Education, the Canadian Space Agency (CSA) and Natural Resources Canada (NRCan). The workshop brought together 57 participants from government, academia, and industry to explore the use of EO technologies in supporting Alberta's environmental monitoring and regulation, particularly in the oil sands region. The event showcased collaborative pilot projects by NRCan's Canada Centre for Remote Sensing demonstrating EO's potential for

tracking land disturbance, vegetation change, and water dynamics, and emphasized the need for standardized data infrastructure, continued investment in expertise, and integration of EO into regulatory frameworks.

Key recommendations included developing a business case for EO adoption, fostering multi-sector collaboration, and leveraging open satellite data to enhance Alberta's Integrated Resource Management System. A five-year roadmap was proposed to guide EO implementation, with the workshop marking a pivotal step toward operationalizing EO for responsible resource development. The resulting report called *Earth Observation for Improved Regulatory Decision Making in Alberta – Workshop Report* (De Abreu et. al, 2015) is available online.

In April 2016, Alberta Innovates Technology Futures (AITF; now called InnoTech), collaborating with the Government of Alberta, Alberta Data Partnerships, TECTERRA, and LOOKNorth, organized two workshops in Calgary and Edmonton. These events created an opportunity for government and industry stakeholders to identify environmental management challenges that could benefit from integrated approaches. Additionally, they served as a platform for technology providers and researchers to showcase tools that could address these challenges. As per the final report *Commercializing Remote Sensing Technology for Environmental Management: Moving from Data to Decision* (Powter et. al., 2016), one of "the desired outcomes of the Workshops was the identification of possible Research and Commercialization Challenges that could be issued by the Alberta Innovates Corporations, like AITF, and organizations such as Alberta Data Partnerships (Data and Data Accessibility), TECTERRA (Geomatics and Visualization), and LOOKNorth (Data Analytics and EO) to technology solution providers, and in particular Small- and Medium-Sized Enterprises (SMEs) to fill these gaps. Ultimately these Challenges would lead to one or more demonstration projects, while also supporting technology commercialization and economic diversification in the province."

Prior to the workshop a survey was sent out to collect information regarding the current use and future needs for EO/RS in environmental management. Several presentations were made at the workshops and based on the discussions and survey responses, seven recommendations were developed, as follows (see the report for the potential champions and supporting organizations proposed):

- The Alberta Open Data Areas (ODAA) proposal should proceed and there should be rapid communication of the opportunities associated with the project to ensure the widest possible uptake.
- Government should collate and publish all existing EO/RS standards associated with regulatory requirements. This will help ensure common and consistent standards, and provide SMEs with targets against which to assess, modify and create products and services
- Government should identify all existing public data sources and data collected pursuant to regulatory requirements with an eye towards increasing open, accessible and free data sources. A business case for making data more open and freely accessible should be developed.
- Government and industry should strive to better articulate and publish EO/RS needs. Ideally this would be made available in the least number of locations practicable and updated on an annual basis.
- Government, the resource industry, the EO/RS industry, and academia should work together to develop a formal Community of Practice to enhance communication, education, and awareness. Efforts should be made to include broad participation by companies, organizations, and individuals with interest in advancing EO/RS technology development and use in Alberta.
- Government, industry, and academia should work together with the EO/RS sector to explore the opportunity to create an innovation cluster or consortia – exploring different models and building on the work of existing organizations and centres – to enable and enhance collaboration across the commercialization spectrum from the support of basic and applied research to aiding in the adoption of EO technologies. A key function of this cluster/consortium may be to facilitate implementation of the other six recommendations.
- Government, the resource industry and the EO/RS industry should explore the concept of an approved body to vet existing and new EO/RS technologies.

2016 also presented us with the *PTAC Ecological Forum Panel: Remote Sensing and Emerging Technologies*. A panel exploring the use of remote sensing and emerging cross-sector technologies to support environmental monitoring and decision-making was hosted by PTAC. The panel featured perspectives from government, industry, and academia, highlighting the potential for integrated data platforms and non-traditional collaborations, particularly with the aerospace and defense sectors.

A key takeaway from the panel session was that while data handling remains a challenge, collaborative efforts across sectors - including regulators, researchers, and technology developers - can drive innovation by enabling shared platforms and open data approaches. These integrated efforts can help uncover new insights to better inform environmental decisions.

Canada's Strategy for Satellite Earth Observation (CSA, 2022) outlines a national vision to harness space-based technologies for addressing climate change, supporting sustainable development, and enhancing public services. Led by the CSA in collaboration with federal departments, industry, and academia, the strategy emphasizes open access to satellite data, end-to-end innovation, and multi-sector collaboration. It aims to integrate EO into decision-making across sectors such as environmental monitoring, emergency response, and resource management. Key priorities include building domestic capacity, leveraging international satellite missions, and ensuring EO data supports science-based policy and economic growth. The strategy positions Canada to lead in EO innovation while addressing pressing environmental and societal challenges.

In 2024 the Alberta Chapter of the Canadian Land Reclamation Association (CLRA) held the *Reclamation Workshop: Towards a Shared Foundation for Innovation and Evolution* (Powter, 2024) which brought together ~80 reclamation practitioners from government, industry, consulting, academia, and the services sector to discuss specific issues facing industry, share potential improvement opportunities, and propose action items to develop solutions. This included discussions on new technologies that could help reclamation programs including data and information management (e.g., Geographic Information Systems (GIS), remotely piloted aircraft systems (RPAS) and earth observation (EO), and artificial intelligence (AI).

The outcomes from the workshop in 2024 highlighted the need to continue demonstrating, and clearly communicating, operational and regulatory applications of these technologies by: comparing the value and costs of using GIS/EO/AI technologies against current methods; and, understanding the value of the data and information derived from these technologies within various business contexts, to support building the business case for the integration (and adoption) within regulatory frameworks (De Abreu, et. al, 2015; Powter, 2024). A panel session that took place at the CLRA's 50th anniversary conference in 2025 also highlighted the importance of technologies such as GIS, RPAS, EO and AI in reclamation (Powter, 2025).

RPAS and EO platforms (and sensors) have unique attributes allowing existing (or new) indicators to be derived to support, or directly offset, field-level metrics currently being collected. This increases the need for a common understanding of the capabilities and roles of these technologies by:

- **Industry**: to determine if their use can meet one or more regulatory requirements.
- **Researchers**: to focus efforts on the data and information required by industry, policy makers, and regulators.
- **Policy makers**: to allow for incorporation, where applicable, into provincial conservation and reclamation (C&R) policies and outcomes (and to leverage the knowledge for other programs).
- **Regulators**: to provide assurance that their use fits with regulatory requirements to meet C&R outcomes.

Alberta has several success stories where the government has worked collaboratively with industry in areas such as data governance (e.g., Alberta Data Partnerships) and standardization of data formats (e.g., Digitally Integrated Disposition System (DIDS) and the Reclamation Information System (RIS) for oil sands), as well as research initiatives involving the use of RPAS/EO for environmental monitoring, including pre-disturbance, disturbance, and reclamation. While Government may want to promote innovation and ensure policy does not encumber innovation, it's typically not the government's role to "approve" the use of any given technology including RPAS, EO platforms (and sensors), and AI. Government may establish standards and criteria that set goalposts, and as new technology becomes available these policies may need to be updated.

Alberta, and elsewhere in Canada, encompasses both a practicing and working landscape, including the development of natural resources across multiple: landcover types (e.g., native grasslands, forested lands, cultivated lands, peatlands and mineral wetlands (GOA, 2025)) and sectors including, but not limited to forestry, renewable energy, oil and gas, aggregates, and mining. For many of these activities, regulatory policy is established under the *Environmental Protection and Enhancement Act* (EPEA) (GOA, 2000) and underlying regulations, such as the *Conservation and Reclamation Regulation* (CRR) (GOA, 1993).

Alberta's regulatory framework provides an opportunity to serve as a testbed and evaluate against well-established policies and guidelines that have evolved overtime. Several indicators and criteria (AESRD, 2013; EAP, 2017; ESRD, 2010a,b,c) covering a suite of measured or visually assessed metrics have been developed which, in many cases, fall to one of the following assessment categories:

- Landscape Assessment: (e.g., drainage, contour);
- Soil Assessment (e.g., evidence of disturbance, topsoil depth, topsoil quality, erosion);
- Vegetation Assessment (e.g., crop health, plant heights, species composition, stems/ha); and,
- Surface Water Quality and Quantity (e.g., end pit lakes, wetlands).

Foundational to successful implementation of conservation and reclamation policy is the need for data collected in each of these four assessment categories. Data and the information generated become a foundational piece within this framework to support informed decision making on the return of disturbed land to equivalent land capability (ELC). Traditionally, the collection of data consists of a mix of field-level assessments and sample collection (where necessary), supplemented with aerial imagery. However, the rapid development of platform technologies such as GIS/RPAS/EO/AI enables the collection of much more data, at greater frequency, finer resolutions, and across much larger areas. The result is that technology development has outpaced the ability for policy makers and regulators to evaluate current policy and practices, such as field-level measurements and observations. While RPAS and EO are being used more frequently by environmental consultants to support/inform field-level assessments, these technologies are unlikely, at least in the near-term, to fully replace field-level assessments and sample collection using indicators to inform decisions such as determining whether ELC has been met.

As consideration is given to developing new, or updating existing C&R policy, the opportunity exists to incorporate the use of GIS/EO/AI technologies, while at the same time enabling different data collection and assessment methods to be developed and implemented. Examples of these approaches include enhanced assessments using GIS/EO/AI to directly monitor and assess reclamation success; or identification of areas of concern where site-specific interventions may be required to ensure reclamation progression. While this opportunity exists, there is also a need to recognize additional considerations, such as new metrics or thresholds for decision making, that may need to be included within the policy along with the need to develop evaluation criterion of these new metrics and thresholds.

To build on the success of the 2024 workshop, the Alberta Chapter of the CLRA and Alberta Innovates co-hosted a workshop in Calgary in June 2025. The intent of the workshop was to continue the conversation by identifying project concepts that promote opportunities for uptake by industry, regulators, and policy makers while continuing to foster innovation in this space.

2. Workshop Details

The workshop took place on Monday June 16, 2025, in Calgary, AB, one day prior to the 46th Canadian Symposium on Remote Sensing that took place in Lethbridge, AB. The alignment in timing was intended to allow for greater participation by those travelling from out-of-province.

The workshop was co-hosted by the Alberta Chapter of the CLRA and Alberta Innovates. Funding support was also provided by PTAC and the Land Environmental Priority Area (EPA) of Canada's Oil Sands Innovation Alliance (COSIA).

Tanya Richens, P.Ag. from TCR Environmental Consulting Ltd. provided facilitation services and has co-authored this report with Shane Patterson from Alberta Innovates. Amber Flamand, representing the Alberta Chapter of the CLRA provided introductory and closing remarks. Shane Patterson presented information regarding the context for the workshop and provided directions for the conversations.

2.1. Terminology and Acronyms

For this workshop, a new acronym was created: **Re**mote **D**ata **C**ollection and **A**ssessment **T**ools (ReDCATs). The term ReDCAT collectively refers to the following: Geographic Information Systems (GIS); Remote Sensing (RS) – active and passive sensor types; Earth Observation (EO) – ground-based; Remotely Piloted Aircraft Systems (RPAS; also known as drones), fixed or rotary wing aircraft, and satellites; and Artificial Intelligence (AI) and Machine Learning (ML).

2.2. Objectives

The objectives for the workshop were:

1. To better understand regulatory requirements for conservation, reclamation, and return of ELC in terms amenable to ReDCATs.
2. To review the current and emerging capabilities of ReDCATs as they relate to these requirements.
3. To identify the:
    a. Existing and proven ReDCATs that can meet the desired information requirements within the next 3 years where pilots or demonstrations are needed; or,
    b. Gaps in information where research and development (R&D) is needed to identify future use of ReDCATs.
4. To, where possible, fill these gaps by developing concepts for:
    a. Pilot/demonstration projects; and/or
    b. R&D projects.

2.3. Scope

In scope topics included:

- ReDCAT technologies, methodologies, or criteria that can or may be used to: identify, monitor, assess, and/or report on changes to infrastructure, landscape, soil, and vegetation at a given point in time or to show trends over time;
- Lands that have been reclaimed but not certified or are undergoing reclamation activities where the term 'land' refers to the following land cover types (as defined in *Alberta Public Lands Glossary of Terms*; GOA, 2025a): native grasslands, forested lands, cultivated lands, peatlands and mineral wetlands; and
- Activities in Alberta with conservation and reclamation obligations, referred to as specified land in EPEA (GOA, 2000), regardless of whether they require an approval or registration.

Out of scope topics included:

- ReDCAT technology, methodologies, or criteria for assessing spills and/or soil/water contamination/ remediation;
- Determining who is qualified to collect/interpret data acquired through ReDCAT;
- Changes to previous decisions for lands where a reclamation certificate has been issued; and
- Recommendations for specific changes not related to the use of ReDCAT, including but not limited to:
    - Data governance frameworks;

- Electronic submission platforms (e.g., Digital Regulatory Assurance System – DRAS; OneStop); and
- Liability management frameworks.

2.4. Participation

The list of participants is provided in *Towards a Shared Foundation: Data/Innovation – From the Ground Up... Way Up - Workshop Summary Report* (Richens and Patterson, 2025).

No comments have been attributed to any specific individual or organization within this report. The workshop was attended in-person by 79 participants from across Alberta and Canada. Participants represented a cross section of government, regulators, consultants, industry, industry associations, and data and service providers. Industry representatives from the coal mining, aggregates, and renewables sectors were not in attendance. Participants from the Canada Centre for Mapping and Earth Observation (CCMEO, Natural Resources Canada) presented one of their initiatives called Earth Observation for Cumulative Effects (EO4CE.

3. Documentation

Towards a Shared Foundation: Data/Innovation – From the Ground Up... Way Up - Workshop Summary Report (Richens and Patterson, 2025) contains a description of the workshop methodology as well as the summary and responses from the online questionnaire and workshop notes.

This Supplemental Report contains the methodology, session summaries and themes generated from transcripts of the MeetGeek (AI) recordings. While MeetGeek provides several default templates to use for transcript analyses, the 'Brainstorming Template' was selected for this workshop and descriptions of headings included in Table 1.

Table 1. Description of headings used in the "Brainstorming Template" provided in MeetGeek.

CATEGORY	DESCRIPTION
Key Questions	The most significant questions that arose during the meeting, which can guide further ideation or research.
Main Ideas	A list of the main ideas generated during the meeting, briefly described.
Next Steps	Next steps or action items.
Opportunities	Unexplored areas or avenues that were brought up during the discussion, which may lead to new possibilities.
Potential Roadblocks	Foreseeable challenges or issues that may hinder the implementation of the main ideas.
Supporting Facts	Information or data that supports or contradicts the main ideas discussed during the meeting.

Once transcription of a table discussion was completed, MeetGeek generated a summary email which included:

- Meeting Title
- Meeting Date and Time
- Meeting Summary and Next Steps: description of the meeting discussions
- AI Insights: description of how engaged / collaborative meeting participants were
- Topics and Highlights: a summary of discussion topics based on heading categories such as those in Table 1.

Like the results presented in Richens and Patterson (2025), Microsoft CoPilot (AI) was used to summarize the information produced from each of the individual table MeetGeek (AI) recordings and transcripts so the information could be presented in a more readable fashion in the next sections. The summary and key themes developed by AI for each of the 5 workshop components (represented as individual 'meetings' by MeetGeek) are outlined in the sections listed below (note that the written outcomes from AI have not been edited, except for acronyms and for integration into this report):

- Section 4.1 – Workshop Introduction
- Section 4.2 – Presentation by the Canada Centre for Mapping and Earth Observation
- Section 4.3 – Session #1 – Lifecycle (Temporal) Considerations and Reporting
- Section 4.4 – Session #2 – Remote Data Collection and Assessment Tools (ReDCAT)
- Session 4.5 - Session #3 – Project Concepts: Pilot (<2 yrs) and Research (+2 yrs) Projects

The unedited (except where names were included) MeetGeek transcripts and email summaries for each table and each session can be found in Appendix 1: MeetGeek Summaries.

4. Summary and Results

4.1. Workshop Introduction

4.1.1. SUMMARY

A recent workshop convened stakeholders to explore the integration of remote sensing technologies in reclamation and restoration efforts across Alberta. This portion introduced the potential of combining remote sensing data – such as LiDAR, multispectral imagery, and drone-based tools – with field-level validation to enhance environmental monitoring and land capability assessments. This included operational use of AI and ML to manage and interpret large datasets, while also acknowledging the need for standardized, technology-based criteria and the challenges posed by proprietary methodologies. Several key themes were identified which are outlined in Table 2.

Key topics included the ReDCAT tools for evaluating land capability, the pros and cons of using ReDCAT versus traditional assessment methods, and the implications of Alberta's evolving regulatory landscape, including a new code of practice for renewable energy operations. The workshop also highlighted funding opportunities through Alberta Innovates, particularly the Land Management Solutions program.

The meeting underscored the importance of Indigenous reconciliation, cross-sector collaboration, and innovation in reclamation practices. Participants were encouraged to develop project concepts leveraging remote sensing technologies, with a focus on implementation in future environmental initiatives.

4.1.2. MEETING INSIGHTS

This portion of the workshop highlighted strong cross-sector collaboration and a high level of participant engagement. Discussions were dynamic and creative, with a moderate to high volume of ideas and a diversity of perspectives contributing to a productive exchange. While some topics were explored in depth, others remained surface-level, indicating variability in discussion quality.

Despite the positive momentum and collaborative spirit, the meeting revealed a need for clearer articulation of actionable next steps. Post-meeting follow-up planning was inconsistent, with some sessions lacking specific outcomes. Enhancing the translation of dialogue into concrete actions will be key to maximizing the impact of future meetings.

Table 2. Key topics arising from the workshop introduction contained in either the MeetGeek summary email or generated by the CoPilot session summary.

TOPICS	KEY POINTS
MeetGeek Summary Email – Next Steps	
Innovation in Reclamation Practices	- Emphasis on exploring remote sensing technologies as tools for reclamation. - Encouraging participants to conceptualize new project ideas that integrate innovative approaches.
Strategic Planning and Action	- Focus on identifying and actioning project concepts over the next few years. - A clear intent to move from discussion to implementation and long-term planning.
Regulatory and Technical Considerations	- Future sessions will address reclamation obligations and data acquisition qualifications, indicating a need to align with regulatory frameworks and technical standards
Collaborative Engagement	- Use of table conversations and group sessions to foster collaborative ideation. - Participants are actively involved in shaping the direction of future work.
Differentiation Between Reclamation and Remediation	- Acknowledgement that remediation will be treated separately, suggesting a nuanced understanding of environmental processes and responsibilities.
Co-Pilot - Session Summary	
Innovation in Environmental Monitoring and Reclamation	- Use of remote sensing technologies and geo-based assessment tools. - Development of algorithms for global mapping and cumulative effects studies. - Interest in advancing the federal *Operation Improve Regulations for Geo-Based Assessment and Monitoring* for monitoring.
Collaborative Project Development	- Participants are encouraged to develop project concepts. - Focus on pilot demonstration projects involving regulators and policymakers. - Emphasis on actionable outcomes over the next few years.
Stakeholder Engagement and Networking	- Importance of table conversations, networking sessions, and community collaboration. - Facilitation of partnerships and connections among participants. - Encouragement to contact project advisors for support.
Regulatory and Policy Integration	- Projects should aim for better environmental outcomes in regulated activities. - Future discussions to address reclamation obligations and data acquisition qualifications. - Inclusion of regulators and policymakers in project planning.
Data Sharing and Accessibility	- Preparation of data sharing agreements. - Use of platforms like Google Earth Engine to make data and tools accessible.
Research and Knowledge Gaps	- Identification of areas requiring further research. - Continued work on cumulative effects.

4.2. Presentation by the Canada Centre for Mapping and Earth Observation

4.2.1. SUMMARY

The Remote Sensing and Impact Assessment Workshop [this presentation portion of the workshop] brought together experts and stakeholders to explore the latest advancements in remote sensing technologies for environmental monitoring, land reclamation, and impact assessment. Several key themes (Table 3) included the application of UAVs, LiDAR, and hyperspectral sensors for vegetation mapping, species diversity assessment, and infrastructure monitoring. The workshop emphasized the importance of annual vegetation surveys in the context of climate variability and highlighted the stabilization of vegetation cover following reforestation efforts.

Significant attention was given to the environmental impacts of fugitive dust and mining activities, underscoring the need for improved monitoring techniques and collaboration with academic institutions such as McGill University. The capabilities of the EnMAP hyperspectral sensor were showcased for its potential in assessing vegetation health.

The event also introduced Alberta's new Land Management Solutions program, aimed at integrating EO data with ground-level insights to enhance environmental monitoring. Discussions addressed challenges in defining reclamation, mapping land cover changes, and assessing cumulative environmental effects. Participants were encouraged to collaborate, share data, and develop innovative projects using emerging technologies.

This portion of the workshop included a presentation from the Canada Centre for Mapping and Earth Observation that provided an overview of the Earth Observation for Cumulative Effects (EO4OG). The presentation provided insight into how EO can be used to support environmental impact assessment frameworks, focusing on operational regulations, legal considerations, and the integration of EO data, while acknowledging capacity and implementation challenges.

4.2.2. MEETING INSIGHTS

The recent meeting on Remote Sensing and Impact Assessment [this presentation portion of the workshop] showcased a strong collaborative environment, marked by active stakeholder engagement and effective teamwork. Discussions were in-depth, particularly around sensor technologies, climate impacts, and environmental monitoring, with a consistent flow and smooth transitions between topics. While the meeting generated a productive volume of ideas and maintained solid momentum, the diversity of perspectives was moderate, indicating potential for broader input in future sessions. Key performance indicators reflected high engagement (average KPI of 80%) and substantial topic exploration (75% depth). However, clarity on post-meeting actions varied, with an average of 2.5 actionable items identified, suggesting a need for more structured follow-up to ensure continuity and implementation of insights.

Table 3. Key topics arising from CCMEO presentation contained in either the MeetGeek summary email or generated by the CoPilot session summary.

TOPICS	KEY POINTS
MeetGeek Summary Email – Next Steps	
Collaboration and Partnerships	- Working with McGill University, National Research Council of Canada, and local communities. - Encouraging participant engagement and networking. - Facilitating partnerships during workshops and sessions.
Environmental Monitoring and Data Collection	- Focus on fugitive dust and tailings monitoring. - Use of Earth Observation (EO) and advanced imaging systems. - Development of algorithms for global mapping and cumulative effects studies.

TOPICS	KEY POINTS
Technology and Innovation	- Exploring technological innovations in environmental applications. - Use of satellite imagery and Google Earth Engine. - Access to tools like the STAT API and EODMS system.
Policy and Regulatory Support	- Supporting impact assessments and regulated activities in Alberta. - Interest in initiatives like the federal *Operation Improve Regulations for Geo-Based Assessment and Monitoring*. - Involving regulators and policymakers in pilot projects.
Knowledge Sharing and Capacity Building	- Hosting workshops and networking sessions. - Encouraging discussion, idea generation, and pilot project development. - Preparing data sharing agreements to improve access and collaboration.
CoPilot Session Summary	
Remote Sensing Technologies in Environmental Monitoring	- Use of UAVs, LiDAR, hyperspectral sensors (e.g., EnMAP), and optical sensors. - Applications in vegetation mapping, species diversity assessment, and infrastructure monitoring. - Emphasis on spatial resolution, sensor capabilities, and data integration.
Vegetation and Land Reclamation	- Monitoring vegetation health, land cover changes, and reforestation outcomes. - Importance of annual surveys due to climate variability. - Discussion on the definition and scope of reclamation.
Environmental Impacts of Industrial Activities	- Focus on mining impacts, especially fugitive dust and contamination. - Need for improved monitoring methods and regulatory frameworks.
Technological Innovation and Integration	- Integration of Earth Observation (EO) data with ground-level data. - Use of GIS, AI, and open-source tools. - Introduction of new deformation datasets and terrestrial water storage monitoring.
Collaboration and Capacity Building	- Partnerships with academic institutions (e.g., McGill University). - Encouragement of participant engagement, project development, and data sharing. - Discussion of legal considerations and operational regulations.
Impact Assessment Frameworks	- Overview of Canada's impact assessment framework. - Emphasis on cumulative effects, implementation challenges, and capacity limitations

4.3. Session #1 – Lifecycle (Temporal) Considerations and Reporting

4.3.1. SUMMARY

The meeting [Session #1 of the workshop] centered on advancing the standardization of data reporting and collection tools for environmental and peatland assessments. Participants emphasized the need for consistent, geo-referenced data submission to regulators and explored the integration of remote sensing technologies, including hyperspectral imaging and AI-driven tools, to enhance data quality and operational efficiency.

Key challenges identified included outdated reporting systems, lack of regulatory mandates, data privacy concerns, and technological limitations – particularly in GPS accuracy and GIS affordability for smaller organizations. The reliance on Excel-based tools (e.g. the RoO tool in Alberta's wellsite criteria) was noted as a barrier to geospatial data integration.

Discussions highlighted the potential of centralized data portals, open standards, and machine learning to improve data accessibility, model training, and assessment accuracy. The importance of validating remote sensing data with ground truthing was stressed, alongside the need for standardized criteria and training datasets to build trust and ensure consistency across jurisdictions. Key themes that were identified during this session are outlined in Table 4.

Opportunities for collaboration were explored, including the use of drones, ReDCAT tools, and genomic data integration for ecological assessments. Participants also addressed economic feasibility, workforce skill gaps, and the role of government support in incentivizing data sharing and innovation.

The meeting concluded with a shared commitment to improving data compatibility, transparency, and collaboration across sectors to support regulatory compliance, enhance environmental monitoring, and reduce redundancy in land management operations.

4.3.2. MEETING INSIGHTS

The series of meetings [Session #1 of the workshop] on reporting tools, data standards, and remote sensing in land management showcased a strong collaborative spirit, with consistently high levels of participation and engagement among attendees. Discussions were generally in-depth, covering complex topics such as data integration, regulatory challenges, and remote sensing applications. Participants contributed a diverse range of ideas, although the breadth of perspectives varied across sessions.

Idea generation was productive, with moderate to high volumes of innovative suggestions, particularly in areas related to data sharing and standardization. Meeting momentum remained strong, characterized by smooth transitions and effective building on contributions. However, a recurring area for improvement was the clarity and specificity of post-meeting actions. While some sessions identified next steps, many lacked detailed follow-up plans, indicating a need for more structured action planning moving forward.

Table 4. Key topics arising from Session #1 contained in either the MeetGeek summary email or generated by the CoPilot session summary.

TOPICS	KEY POINTS
MeetGeek Summary Email – Next Steps	
Standardization and Data Quality Theme: Improving consistency, comparability, and credibility of data across projects and stakeholders.	- Establishing open standards for data collection and submission formats. - Developing standardized criteria for ReDCAT measurements. - Creating a standardized test set for consultants. - Implementing more thorough baseline data collection at the start of projects.
Integration of Technology and Innovation Theme: Leveraging advanced technologies (e.g., remote sensing, machine learning) to enhance environmental monitoring and decision-making.	- Integrating remote sensing data into reporting frameworks. - Applying machine learning algorithms to identify opportunistic wetlands. - Creating a public asset for training data to enhance model development. - Funding mechanisms for technology upgrades.

TOPICS	KEY POINTS
Accessibility and Infrastructure Theme: Building infrastructure and tools that support efficient, transparent, and user-friendly data access and use.	- Implementing a data portal for remote sensing data. - Enhancing access and reproducibility of data. - Engaging GIS teams to align technical requests with project needs.
Communication and Engagement Theme: Fostering inclusive communication and trust among diverse stakeholders, including Indigenous communities and regulators.	- Developing a communication strategy for Indigenous communities. - Addressing stakeholder concerns through regulatory assurance frameworks.
Bias Reduction and Methodological Rigour Theme: Ensuring objectivity and scientific rigor in environmental assessments	- Adapting methodologies to minimize human bias in data collection and assessment.
CoPilot Session Summary	
Standardization of Data and Reporting Tools	- Strong emphasis on the need for consistent data collection and reporting methods, especially for peatlands and reclamation assessments. - Calls for standardized criteria, tools, and formats to improve data quality, comparability, and regulatory compliance.
Integration of Remote Sensing and Geospatial Technologies	- Widespread discussion of remote sensing tools (e.g., ReDCAT, hyperspectral imaging, drones) to enhance environmental monitoring. - Importance of geo-referenced data and spatial resolution standards for accurate assessments.
Challenges in Data Sharing and Accessibility	- Barriers include confidentiality, outdated infrastructure, proprietary data, lack of centralized platforms, and economic disincentives to collaboration.
Role of AI and Machine Learning	- AI/ML seen as promising for data extraction, model training, and automated assessments. - Emphasis on the need for high-quality training data and human validation to ensure accuracy.
Regulatory and Compliance Considerations	- Discussions around regulatory acceptance of new technologies and inconsistencies across jurisdictions. - Need for real-time reporting, especially in contexts like fire mapping and wildlife monitoring.
Technological Limitations and Opportunities	- Limitations of current tools (e.g., Excel, low-resolution satellite imagery). - Opportunities to modernize systems, improve data synchronization, and reduce redundancy.
Economic and Operational Constraints	- Concerns about funding variability, staffing shortages, and cost-effectiveness of large-scale applications. - Need for affordable solutions for smaller organizations.

TOPICS	KEY POINTS
Collaboration and Cross-Sector Integration	- Encouragement of cross-sector collaboration, including between industry, government, and academia. - Suggestions for government support to incentivize data sharing and innovation.

4.4. Session #2 – Remote Data Collection and Assessment Tools (ReDCAT)

4.4.1. SUMMARY

A series of meetings [Session #2 of the workshop] on remote sensing applications in land reclamation and environmental monitoring brought together stakeholders to explore the integration of advanced technologies such as LiDAR, satellite imagery, and drone data into land management practices. The discussions emphasized the importance of data quality standards, ground truthing, and validated datasets to ensure accurate and cost-effective assessments. Key themes (also see Table 5) included:

- **Technology Integration**: Remote sensing offers significant potential for improving assessments of soil health, vegetation, erosion, and crop productivity. Tools like ReDCAT were highlighted for their role in site evaluations.
- **Regulatory and Methodological Challenges**: Participants identified outdated regulations, inconsistent data definitions, and the need for a defendable regulatory framework as barriers to adoption. The importance of standardized methodologies and training was repeatedly emphasized.
- **Data Access and Sharing**: Concerns were raised about proprietary data, licensing restrictions, and publication bias. Open-source data systems and collaborative research were proposed as solutions.
- **Stakeholder Engagement**: Landowner concerns, particularly around soil management and data ownership, were noted. The integration of traditional knowledge and the need for flexible, inclusive criteria were discussed.
- **Innovation and Future Directions**: Opportunities for AI in application reviews and decision-tree frameworks were explored (including uses in other sectors, such as precision agriculture and forestry). The need for pilot testing areas in Alberta and collaboration with organizations like PTAC was identified.

During the session, participants also identified several next steps which included:

- Compile a list of applicable remote sensing technologies.
- Develop standardized training and methodologies.
- Address landowner acceptance and data-sharing frameworks.
- Explore policy changes and collaborative research opportunities.

4.4.2. MEETING INSIGHTS

The meeting on Remote Sensing in Land Reclamation [Session #2 of the workshop] showcased a strong collaborative environment, with high levels of engagement and teamwork among participants. Discussions were in-depth, covering a range of complex topics including remote sensing applications, data quality, regulatory challenges, and landowner concerns. While idea generation was productive, averaging 5 to 6 ideas per session, the diversity of thought was moderate, with 4 to 5 unique perspectives typically shared.

Meeting momentum remained consistently strong, with a smooth and continuous flow of dialogue. However, a recurring challenge was the lack of clarity in defining specific post-meeting actions. Despite identifying some

next steps, actionable outcomes were often vague or insufficiently detailed, indicating a need for improved follow-up planning.

Overall, the session was effective in fostering collaboration and generating ideas, but future meetings would benefit from broader perspective inclusion and clearer articulation of actionable items.

Table 5. Key topics arising from Session #2 contained in either the MeetGeek summary email or generated by the CoPilot session summary.

TOPICS	KEY POINTS
MeetGeek Summary Email – Next Steps	
Remote Sensing Technology Evaluation & Integration	- Compiling and comparing remote sensing technologies. - Documenting limitations and capabilities. - Exploring LiDAR and satellite applications. - Investigating forestry criteria and integration opportunities.
Data Quality, Standards & Harmonization	- Harmonizing datasets for better analysis. - Establishing QA/QC processes. - Promoting open-source data and open standards for data reporting. - Standardizing data outputs for compliance and usability.
Assessment Methodology & Decision Support	- Developing decision trees for pass/fail criteria. - Clarifying references and application types. - Creating cost/time comparison matrices for assessment methods. - Conducting retrospective analyses and pilot programs.
Policy, Certification & Regulatory Alignment	- Aligning ReDCAT certificate applications with landowner sign-off. - Advocating for policy changes (e.g., weed management). - Preparing for DRS system implementation. - Exploring data licensing options for broader data access
Seasonal & Temporal Monitoring	- Identifying seasonal parameters. - Monitoring trends post-reclamation. - Following up on vegetation assessments in off-seasons.
Stakeholder Engagement & Industry Needs	- Clarifying client expectations from remote sensing. - Directing research funding to address industry concerns. - Ensuring methodologies are accepted by stakeholders.
Advanced Analytics & Machine Learning	- Applying ML models to assess growth trajectories. - Using decision tree algorithms for site assessments.
CoPilot Session Summary	
Remote Sensing Technologies and Applications	- Use of LiDAR, satellite data, drones, and AI for land reclamation and agricultural monitoring. - Emphasis on soil health, vegetation assessments, erosion, and crop productivity. - Integration of traditional knowledge with modern remote sensing tools.
Data Quality, Standards, and Validation	- Importance of data quality standards, validated datasets, and ground truthing. - Challenges in harmonizing data from different satellite systems and platforms. - Need for standardized methodologies and reporting practices.

TOPICS	KEY POINTS
Regulatory and Policy Frameworks	- Discussion of ReDCAT criteria, DSA methodology, and regulatory gaps. - Need for defendable regulatory frameworks and policy updates, especially in areas like methane measurement and weed management.
Collaboration and Stakeholder Engagement	- Importance of collaboration with organizations like PTAC and Alberta Environment and Protected Areas. - Engagement with landowners, farmers, and Indigenous communities. - Challenges in data sharing, proprietary data, and intellectual property.
Cost, Accessibility, and Adoption Barriers	- Remote sensing as a cost-effective alternative to traditional assessments. - Barriers include financial constraints, data licensing, and stakeholder resistance. - Need for training, capacity building, and clear value propositions for adoption.
Innovation and Future Direction	- Exploration of AI, decision trees, and open-source tools. - Interest in innovative funding frameworks and test areas in Alberta. - Potential for automated assessments, pipeline monitoring, and nutrient analysis.
Environmental and Ecological Considerations	- Focus on habitat suitability, biodiversity, wetland reclamation, and long-term monitoring. - Use of remote sensing to assess disturbed sites, species selection, and vegetation regeneration.

4.5. Session #3 – Project Concepts: Pilot (<2 yrs) and Research (+2 yrs) Projects

4.5.1. SUMMARY

The series of meetings [Session #3 of the workshop] centered on enhancing environmental monitoring and reclamation practices through the strategic application of remote sensing technologies, data standardization, and collaborative research. Key initiatives included classifying research and pilot projects by value and complexity, identifying funding opportunities (e.g., PTAC, Alberta Innovates), and conducting gap analyses to inform remote sensing criteria and data frameworks. The key topics identified by participants during this session are summarized in Table 6. Discussions emphasized the importance of:

- Ground-truth data for species identification and soil assessments.
- Remote sensing tools (e.g., drones, satellite imagery, ground-penetrating radar (GPR), electromagnetic (EM) surveys for monitoring peatlands, pipelines, and reclamation-certified sites.
- Standardized data formats and geo-referencing to improve regulatory acceptance and reduce costs.
- Collaborative partnerships with academic institutions and data providers to enhance research and data sharing.

Challenges identified included high costs of high-resolution data, coordination of data collection, andstakeholder resistance to new monitoring methods. Opportunities were noted in leveraging existing datasets, engaging the public through hackathons, and integrating AI and open-source tools for environmental assessments.

Next steps identified by participants involve:

- Conducting targeted gap analyses.

- Developing technical frameworks and pilot programs.
- Establishing new data collection sites.
- Engaging stakeholders through surveys and collaborative initiatives.

4.5.2. MEETING INSIGHTS

The series of meetings [Session #3 of the workshop] on remote sensing and AI applications for environmental monitoring showcased a high level of collaboration, active engagement, and productive ideation among participants. Discussions were generally in-depth, covering a wide range of topics including project concepts, environmental metrics, species identification, and regulatory challenges. While the collaborative spirit remained consistently strong – averaging around 75% to 85% – the depth and diversity of thought varied across sessions. Some discussions were richly detailed, while others lacked depth or broader perspectives.

Idea generation was robust, with an average of 4 to 6 ideas per session, reflecting effective brainstorming. Meeting momentum was well-maintained, with smooth transitions and sustained engagement, averaging around 70% to 80%. However, clarity on post-meeting actions was inconsistent. While some sessions identified clear next steps, others revealed gaps in follow-up planning, highlighting the need for improved definition of actionable outcomes.

Overall, the meetings demonstrated strong teamwork and a solid foundation for future collaboration, with opportunities to enhance diversity of perspectives and post-meeting clarity.

Table 6. Key topics arising from Session #3 contained in either the MeetGeek summary email or generated by the CoPilot session summary.

TOPICS	KEY POINTS
MeetGeek Summary Email – Next Steps	
Remote Sensing and Technology Integration	- Use of remote sensing to assess environmental parameters. - Differentiation of graminoid species in native grasslands. - Evaluation of drone technology for data collection. - Integration of aerial assessments into site evaluations. - Development of anomaly detection systems. - Exploration of satellite availability for monitoring.
Data Collection, Management, and Standardization	- Establishment of new data collection sites. - Updates to include geo-referencing requirements for data collection and reporting. - Standard procedures for collecting and reporting reclamation data. - Creation of open data areas and access to public records. - Integration of existing platforms for data analysis.
Collaboration and Stakeholder Engagement	- Engagement with researchers. - Coordination with drone operators and consultants. - Building trust with Indigenous groups. - Involvement of regulators in early project stages. - Formation of technical working groups and sessions.
Funding and Resource Identification	- Identification of funding partners (e.g., PTAC, Alberta Innovates). - Exploration of funding for comparative studies and drone projects. - Reaching out to data providers and EO companies.

TOPICS	KEY POINTS
Research and Development	- Gap analysis and literature review. - Development of frameworks and MVPs (e.g., RIS for All). - Assessment of technology readiness and limitations. - Exploration of REDCATS implementation and RCA audits.
Policy and Governance	- Updates to reforestation standards and practices. - Definition of outcomes and timelines for working groups.
CoPilot Session Summary	
Remote Sensing and Technology Integration	- Use of drones, satellites (e.g., Sentinel-2, Landsat), and AI for environmental monitoring. - Application of remote sensing in peatlands, pipelines, forestry, wetlands, and reclamation-certified sites. - Emphasis on standardization and data formats to improve regulatory acceptance and reduce costs.
Data Management and Accessibility	- Importance of geo-referencing, data sharing, and open data for collaboration. - Challenges in data oversight, collection coordination, and integration with field assessments. - Development of species recognition databases and technical frameworks for data collection.
Environmental Monitoring and Assessment	- Focus on vegetation health, soil assessments, wetland reclamation, and land capability evaluation. - Need for ground truth data to validate remote sensing outputs. - Exploration of new metrics and comparative studies between existing and more modern methods.
Funding and Collaboration	- Identification of funding sources like PTAC, Alberta Innovates, and potential federal engagement. - Discussion of project costs, especially for high-resolution LiDAR and weed detection. - Opportunities for collaboration with universities, data providers, and community engagement (e.g., hackathons).
Policy, Regulation, and Standardization	- Need for uniform practices and technical requirements documents to support policy development. - Emphasis on auditing and monitoring reclamation outcomes using standardized approaches.
Innovation and Future Planning	- Encouragement of pilot programs, technical working groups, and gap analyses. - Exploration of ReDCAT video-based assessments and new project ideas. - Use of GPR and EM surveys despite limitations.

5. Learnings – Use of a Virtual Note Taker

This workshop marked the first experience for both the authors and supporting organizations in using a virtual note taker – and overall, it was a positive one. The experience highlighted both the advantages and limitations of these tools compared to traditional methods of documenting discussions during workshops and breakout sessions. Additionally, the resulting transcripts and summaries offered a valuable starting point for preparing follow-up workshop reports.

Each group in the workshop was presented with the same set of questions; however, their discussions varied significantly due to the diverse mix of participants representing different sectors, educational backgrounds, and professional experiences. As a result, many conversations included specialized terminology and acronyms that may not be widely recognized outside of those groups. While the summaries generated for each table were not reviewed during the session itself, groups considering the exclusive use of a virtual note taker in future workshops should consider allocating dedicated time for participants to review and refine their summaries to ensure accuracy. The revised versions should then be shared with the workshop organizers.

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7. Appendix 1: MeetGeek Summaries From Each Table

Table 7. Introduction Session - Summary, AI Insights, and Next Steps from MeetGeek Summary emails

SUMMARY	AI INSIGHTS	NEXT STEPS
The meeting focused on the application of remote sensing technologies to improve reclamation and restoration efforts in Alberta, highlighting the potential for enhanced practices through the integration of remote sensing data with field-level data. Participants identified opportunities for partnerships across Canada to leverage these technologies effectively. The session concluded with plans for participants to engage in table discussions to brainstorm project concepts that utilize remote sensing technologies in reclamation initiatives.	The meeting on Remote Sensing and Reclamation Technologies demonstrated strong collaborative efforts among diverse sectors, fostering a productive environment for in-depth discussions on various aspects of the topic. While multiple perspectives were shared, indicating a range of approaches, the volume of ideas generated was notable, contributing to a smooth flow of conversation and creativity. However, the identification of actionable next steps was limited, suggesting room for improvement in translating discussions into concrete follow-up actions.	- Participants to discuss project concepts for utilizing remote sensing technologies in reclamation during table conversations.
The meeting focused on exploring remote data collection tools (REDCATS) for evaluating life capability, discussing the need for both single and multiple assessments to identify trends. It highlighted the operational use of drones and satellite imagery, particularly LiDAR and multispectral sensors, while acknowledging the advantages of AI and machine learning in data handling, alongside the necessity for field-level validation. The development of technology-based criteria for land capability and reclamation outcomes was emphasized, with opportunities for multiple assessments within a growing season, though challenges regarding proprietary criteria were noted. The discussion also covered the new code of practice for renewable energy operations and the complexities of Alberta's regulatory processes, including the potential for standardized reporting tools. Finally, the pros and cons of using RIDCAT for assessments compared to traditional methods were examined, with concerns about resolution discrepancies between regulators and companies.	The meeting demonstrated a strong collaborative spirit, with high levels of teamwork and engagement among participants, as evidenced by multiple high scores in collaborative spirit and meeting momentum. The depth of discussion varied, with some topics explored in detail while others remained superficial. Diversity of thought was present, showcasing a range of perspectives, although the overall volume of ideas generated was moderate. Post-meeting actions indicated some clarity on next steps, but specific actions were not consistently detailed, suggesting room for improvement in follow-up planning.	No Next Steps Generated

The meeting, led by Tanya Richens, focused on workshop objectives, emphasizing participant contributions and the importance of reconciliation with Indigenous communities. Discussions included funding opportunities from Alberta Innovates for environmental projects, particularly the new Land Management Solutions program, and the application of drones and remote sensing technologies for monitoring environmental disturbances and reclamation efforts. The integration of AI and machine learning into environmental monitoring practices was highlighted, with Alberta identified as a potential testing ground for new technologies. Participants were encouraged to explore innovative reclamation methodologies and identify project concepts for future action, with a focus on collaboration among practitioners and organizations. The meeting concluded with a call for participants to develop project ideas for implementation in the coming years.	The meeting exhibited a generally high level of collaborative spirit, with multiple instances of teamwork and collective ideation, reflected in values ranging from 10% to 85%. The depth of discussion was moderate to significant, with values between 10% and 75%, indicating thorough exploration of various topics, although some discussions lacked depth. Diversity of thought was present, with counts ranging from 1 to 5, suggesting a variety of perspectives were shared, though some sessions were limited in viewpoints. Idea volume varied, with counts from 1 to 8, indicating productive brainstorming in some areas while others were less fruitful. Meeting momentum was strong, with values between 10% and 85%, showing a generally smooth flow of ideas, although some points experienced stagnation. Post-meeting actions were identified with counts from 0 to 3, indicating varying levels of clarity on next steps, with some sessions lacking actionable outcomes.	- Future discussions will focus on reclamation obligations and the qualifications required for data acquisition, with a separate session planned on remediation. - Participants were tasked with coming up with project concepts to be identified and actioned over the next couple of years during the last session of the day.

Table 8. CCMEO Presentation - Summary, AI Insights, and Next Steps from MeetGeek Summary emails

SUMMARY	AI INSIGHTS	NEXT STEPS
The Remote Sensing and Impact Assessment Workshop covered a range of topics focused on the application of remote sensing technologies for environmental monitoring and reclamation. Key discussions included the effectiveness of various sensor types, such as UAVs and LiDAR, in vegetation mapping and assessing species diversity, while addressing challenges in complex environments. The impact of climate variability on vegetation necessitated annual surveys, with supporting data indicating stabilization of vegetation cover post-reforestation. The workshop also highlighted the significant environmental impacts of fugitive dust, emphasizing the need for improved monitoring methods and collaboration with institutions like McGill University. Additionally, the capabilities of the NMAP hyperspectral sensor were discussed, particularly its detailed spectral information for assessing vegetation health. The meeting concluded with an overview of Canada's impact assessment framework, focusing on cumulative effects and the integration of Earth Observation data, while acknowledging potential roadblocks in capacity and implementation.	The meeting on Remote Sensing and Impact Assessment demonstrated a strong collaborative spirit, with active participation from multiple stakeholders and a high level of teamwork. The depth of discussion was notable, covering various sensor types, climate impacts, and technologies in detail, reflecting thorough exploration of the topics. There was a rich diversity of thought, with unique insights and approaches presented, contributing to a productive exchange of ideas. The meeting maintained good momentum, with smooth transitions between topics and continuous flow of ideas. However, while some actionable next steps were identified, there were also segments where no specific actions were outlined, indicating a need for clearer follow-up on certain discussions.	- Collaborate with McGill University and the National Research Council of Canada to accumulate regular datasets for monitoring fugitive dust. - The organization plans to accelerate the use of Earth Observation in impact assessments to enhance processes in Canada.
The meeting commenced with an introduction and acknowledgments, where the speaker expressed gratitude to attendees and recognized the contributions of organizations and volunteers. The workshop focused on technological innovations in environmental monitoring, particularly drones, GIS, and AI, emphasizing the importance of participant input and shared history. Key discussions included the new Land Management Solutions program aimed at advancing monitoring technologies in Alberta, the integration of earth observation data with ground-level data, and the role of various technologies in environmental monitoring. The meeting also addressed the definition of 'reclamation,' the challenges of mapping land cover changes, and the environmental impacts of mining activities. Participants were encouraged to	The meeting demonstrated a strong collaborative spirit, with an average KPI value of 80% across multiple assessments, indicating effective teamwork and engagement among participants. The depth of discussion was notably high, averaging around 75%, reflecting thorough exploration of topics such as environmental monitoring and technology integration. However, the diversity of thought was moderate, with an average count of 4.5 unique perspectives shared, suggesting room for broader input. Idea volume was productive, averaging 5 ideas generated per session, while meeting momentum remained consistent at 75%, indicating a smooth flow of conversation. Post-meeting actions were identified with an average count of 2.5 actionable items, highlighting clarity on next steps for participants.	- The workshop will explore various technological innovations and their applications in the industry, facilitated by Tanya Richens and supported by various organizations. - Participants are encouraged to contact project advisors for assistance with the program and to engage during networking sessions for further discussions. - The intent is to develop project concepts that leverage these technologies for better environmental outcomes, particularly in regulated activities in Alberta. - Facilitate partnerships and connections among participants during the session. - Participants were encouraged to engage in discussions to identify pilot demonstration projects that involve

engage in discussions, explore collaboration opportunities, and develop project concepts leveraging new technologies. The meeting concluded with discussions on data sharing, legal considerations, and the importance of an impact assessment framework.		regulators and policymakers, as well as areas requiring further research. - The team is currently working on cumulative effects studies for the federal government, focusing on priority regions, and has developed algorithms that are now available on Google Earth Engine for global mapping. - Continue collaboration with local communities to monitor dust and its effects. - Prepare a data sharing agreement with interested parties in Canada to facilitate access to the dataset. - There is an interest in moving forward with the Operation Improve Regulations for Geo-Based Assessment and Monitoring, which was initiated before the current discussion.
The meeting provided a comprehensive overview of Earth Observation (EO) and remote sensing technologies, focusing on their applications in environmental monitoring, land reclamation, and vegetation assessment. Key discussions included the capabilities of various sensors, such as medium and high-resolution optical sensors, hyperspectral imaging, and LiDAR, highlighting their roles in infrastructure monitoring and ecological assessments. Challenges in accurately mapping land cover changes and the complexities of spatial resolution were addressed, along with the potential for new products to enhance understanding of vegetation dynamics. The meeting also emphasized the importance of collaboration with academic institutions and the use of open-source data tools for research. Additionally, the environmental impacts of mining activities, including fugitive dust and contamination, were discussed, alongside the need for improved monitoring methods and the assessment of cumulative effects in environmental impact evaluations. The introduction of new deformation data sets and the implications of terrestrial water storage changes were also highlighted, concluding with a focus on operational regulations for EO-based assessments.	The meeting demonstrated a strong collaborative spirit, with multiple contributions from participants leading to a high level of teamwork. The depth of discussion was generally high, with many topics explored in detail, although some areas lacked thorough exploration. A moderate diversity of thought was observed, with several unique perspectives presented. The volume of ideas generated was productive, indicating an effective brainstorming session. Meeting momentum was maintained well throughout the discussion, although clarity on post-meeting actions varied, with some actionable next steps identified but also instances of ambiguity regarding future directions.	- The speaker suggested potential solutions such as using satellites at different angles or capturing images in overcast conditions to mitigate shadow effects. - Participants were encouraged to contact the team for access to the STAT API and to explore the data products available through the EODMS system. - Collaborate with McGill University and the National Research Council of Canada to accumulate regular datasets for monitoring tailings. - Continue collaboration with local communities to understand dust impacts and improve mapping techniques using advanced imaging systems.

Table 9. Session #1 - Summary, AI Insights, and Next Steps from MeetGeek Summary emails

SUMMARY	AI INSIGHTS	NEXT STEPS
The meeting focused on the standardization of reporting tools, particularly for peatland assessments, emphasizing the need for consistent data submission to regulators and the integration of geo-referenced images to enhance data quality. Challenges in data sharing and compliance were discussed, highlighting the lack of regulatory requirements and outdated technology as significant roadblocks. The importance of accurate, georeferenced data for reclamation assessments was noted, along with the potential of AI and machine learning to improve data extraction and accuracy. Additionally, the need for standardized data collection methods and tools for environmental assessments was emphasized, with participants encouraged to explore open standards for data submission. The discussion also covered the use of remote sensing and hyperspectral data to improve assessments of vegetation health and yield productivity, addressing discrepancies between yield indicators and actual field assessments while identifying opportunities for technology integration to enhance data collection efficiency.	The meeting on Reporting Tools and Data Standards demonstrated a strong collaborative spirit, with active participation and idea sharing among multiple speakers. The depth of discussion was notable, as participants thoroughly explored various aspects of data collection, technology integration, and compliance challenges. A range of perspectives was presented, showcasing diversity in thought regarding the topics discussed. Idea generation was productive, with numerous suggestions for improvements in data standards and reporting formats. Meeting momentum was maintained throughout, with a smooth flow of ideas and effective building on each other's contributions. However, there was a lack of clearly defined next steps or actions, indicating an area for improvement in post-meeting follow-up.	- Participants to explore the possibility of establishing open standards for data collection and submission formats.
The meeting covered various topics related to updating reporting tools, remote sensing, data collection, and standardization across different sectors. Key discussions included the advantages and limitations of updating existing reporting systems, the challenges of ensuring accurate GPS data, and the need for validation of remote sensing data against ground data. Participants emphasized the importance of standardizing data collection processes to improve model training and outcomes, while also addressing the challenges posed by historical data resolution and variability in assessments from different contractors. Opportunities for collaboration, the use of AI, and the integration of new technologies like drones were highlighted, alongside concerns about funding variability, staffing levels, and the economic feasibility of large-scale audits. The meeting concluded with a	The meeting demonstrated a strong collaborative spirit, with high percentages indicating active participation and teamwork among speakers. The depth of discussion varied, with some segments showing thorough exploration of topics while others remained at a moderate level. Diversity of thought was evident, with multiple perspectives shared on various issues, contributing to a rich dialogue. Idea volume was generally productive, although some sessions yielded fewer ideas due to a focus on introductions. Meeting momentum was mostly positive, with smooth transitions between topics, although some areas lacked clear next steps, highlighting a need for follow-up actions.	- Consider adapting current methodologies to minimize human bias in data collection and assessment.

focus on enhancing data compatibility and collaboration to improve efficiency and reduce redundancy in operations.		
The meeting focused on the critical need for standardization in data reporting and collection within land management, emphasizing the integration of remote sensing data to enhance regulatory approval and assessment processes. Key discussions highlighted the limitations of current reporting tools, particularly their inability to effectively utilize remote sensing data, and the reliance on Excel sheets that restrict geospatial data integration. Participants identified opportunities for creating centralized data management systems and data portals to improve accessibility and reproducibility, while also addressing potential roadblocks such as data privacy concerns and economic motivations that may hinder collaboration. The application of remote sensing tools like RedCats was explored for their efficiency in land assessments, alongside the necessity for standardized criteria to build trust among stakeholders. Additionally, the complexities surrounding proprietary data usage and the role of intellectual property were discussed, with suggestions for government support to incentivize data sharing and improve public access to data resources.	The meeting on "Standardized Data and Remote Sensing in Land Management" demonstrated a strong collaborative spirit, with multiple speakers actively contributing and building on each other's ideas, indicating effective teamwork. The depth of discussion was notable, as participants thoroughly explored various aspects of remote sensing, data management, and standardization, reflecting a comprehensive examination of the topics. However, the diversity of thought was limited, with a narrow range of perspectives presented on key issues. Idea generation was active, with several innovative concepts discussed regarding data integration and management. Meeting momentum was maintained throughout, with a smooth flow of ideas and engagement among participants. Clear next steps were identified, although some areas lacked specificity, highlighting the need for further exploration in certain aspects of data management and government support.	- Participants to explore ways to integrate remote sensing data into existing reporting frameworks for comprehensive assessments. - Explore the implementation of a data portal for remote sensing data to improve access and reproducibility. - Consider developing standardized criteria for RedCat measurements to enhance regulatory acceptance.
The meeting covered various topics related to data accessibility, regulatory requirements, and the use of technology in environmental assessments. Key discussions included the challenges of standardizing data collection and sharing among producers, the need for higher data standards in wildlife monitoring, and the advantages and limitations of remote sensing compared to traditional assessments. Issues with GIS technology, including data synchronization and affordability for small organizations, were also addressed. The importance of human intervention in data interpretation and the integration of GIS into operational processes were highlighted. Additionally, concerns regarding data collection, management, and the implications of using AI tools were raised, along with the significance of real-time reporting in firemapping. Overall, the meeting emphasized the need for	The meeting demonstrated a strong collaborative spirit, with an average KPI value of 77.5% across multiple assessments, indicating effective teamwork and engagement among participants. The depth of discussion was notable, averaging 73.5%, reflecting thorough exploration of complex topics such as data accessibility and regulatory challenges. Diversity of thought was consistent, with a count of 5, showcasing varied perspectives on key issues. Idea volume was moderate, averaging 5.0, suggesting a productive brainstorming session. Meeting momentum was high, averaging 73.5%, indicating a smooth flow of ideas. However, post-meeting actions were less defined, with an average count of 1.8, highlighting a need for clearer next steps and follow-up actions.	- The meeting is officially concluding, and the recording is being stopped, indicating that no further discussion will take place.

improved standards, collaboration, and user-friendly data systems to enhance environmental monitoring and compliance.		
The meeting on "Data Sharing and Remote Sensing Challenges" addressed significant issues surrounding data accessibility and sharing, particularly due to confidentiality and infrastructure limitations. Participants discussed the inefficiencies in regulatory data submission, the complications of sharing land resource data due to private ownership, and the potential for a public platform to enhance collaboration. The advantages of remote sensing for regulatory audits were highlighted, alongside the need for spatial resolution standards tailored to different land types. The integration of high-resolution remote sensing with genomic data was explored for improved ecological assessments, while the importance of human validation in machine learning processes was emphasized to ensure accurate data interpretation. Additionally, the meeting examined the impact of varying provincial policies on professional qualifications and collaboration, raising questions about achieving consistency in reporting across jurisdictions.	The meeting on "Data Sharing and Remote Sensing Challenges" demonstrated a strong collaborative spirit, with active participation from multiple speakers contributing diverse ideas and perspectives. The depth of discussion was notable, as participants explored complex topics such as data sharing, machine learning, and remote sensing applications. A good volume of ideas was generated, reflecting productive brainstorming sessions. Meeting momentum was maintained throughout, with speakers effectively building on each other's contributions. However, clarity on post-meeting actions was inconsistent, with some next steps discussed but lacking specific definitions, indicating a need for further refinement in action planning.	- No Next Steps Generated
The meeting focused on the advantages and limitations of remote sensing technology, particularly RedCat, for landscape assessments in the oil and gas sector, highlighting cost savings and efficiency but noting resolution constraints of satellite imagery. Discussions emphasized the importance of transparency in sharing models for land reclamation, the need for regulatory acceptance of remote sensing techniques, and the effectiveness of prioritization tools in field monitoring to reduce costs. Challenges included the lack of trust in industry data, the complexities of soil and vegetation assessments, and the necessity for standardized training data for machine learning models. The conversation also addressed the role of beaver populations in reclaimed landscapes, the implications of land use changes, and the need for a regulatory framework to support technological innovation. Key opportunities identified included enhancing monitoring practices through	The meeting demonstrated a strong collaborative spirit with an average KPI value of 80%, indicating effective teamwork and engagement among participants. The depth of discussion was moderate to high, averaging around 75%, reflecting thorough exploration of various topics, particularly in remote sensing and regulatory challenges. Diversity of thought was consistent, with a count of 5 unique perspectives presented, showcasing a range of viewpoints. Idea volume was moderate, averaging 5 ideas generated, indicating productive brainstorming. Meeting momentum was generally good, with an average value of 75%, suggesting smooth transitions and continuous creativity. However, post-meeting actions showed some ambiguity, with an average of 2 actionable items identified, indicating a need for clearer next steps moving forward.	- Next steps involve applying the developed machine learning algorithm to different reclaimed areas to identify opportunistic wetlands for reporting purposes. - The discussion suggested that creating a public asset for training data could enhance model development and species detection capabilities.

public data availability and leveraging new technologies, while potential roadblocks involved financial challenges and workforce skill gaps in geospatial disciplines.		
The meeting on "Remote Sensing and Reclamation Standards" focused on the advantages and limitations of using REDCATS compared to traditional assessments, highlighting benefits such as larger area assessments, improved safety, and enhanced traceability through remote sensing. Key discussions included the need for standardized remote sensing data types and methodologies to ensure consistency and avoid proprietary techniques. Concerns were raised about the confusion among Indigenous communities regarding remote sensing, emphasizing the importance of clear communication to mitigate misconceptions. The necessity of geospatial data submission for reclamation certification was also addressed, alongside potential roadblocks related to current government technology limitations. The meeting concluded with a call for developing a communication strategy for Indigenous communities and exploring funding mechanisms for technology upgrades, while advocating for increased public access to regulatory data to enhance transparency and support scientific research.	The meeting on Remote Sensing and Reclamation Standards demonstrated a strong collaborative spirit, with active participation and teamwork among speakers. The depth of discussion was notable, as various aspects of the topics were thoroughly explored, reflecting a comprehensive examination of the issues at hand. While there was a moderate diversity of thought, multiple perspectives were shared, indicating varied insights into the challenges and implications discussed. A significant volume of ideas was generated, showcasing productive engagement among participants. The meeting maintained good momentum, with a smooth flow of dialogue and speakers effectively building on each other's contributions. However, the identification of post-meeting actions varied, with some clarity on future steps while others lacked specific next steps. Overall, the meeting was characterized by effective collaboration and engagement, though there is room for improvement in defining actionable outcomes.	- Develop a communication strategy to educate Indigenous communities about the role of remote sensing in reclamation. - Consider funding mechanisms for technology upgrades to support geospatial data collection and submission.
The meeting addressed the impact of REDCAT technology on the job market, emphasizing the need for retraining field workers and acquiring new data science skills. It highlighted challenges with outdated government legislation and the necessity for updated soil data to meet regulatory requirements. Discussions on crop density and reclamation monitoring underscored the shift towards remote technologies for data collection. The importance of clear communication of data needs from clients was noted to avoid inconsistencies, while the limitations of regulatory data for environmental monitoring were also discussed. The meeting explored the challenges of remote sensing for weed detection and the implications of weed presence on land capability. Additionally, it covered the need for standardized reporting tools, the potential adoption of AI in regulatory processes, and the	The meeting demonstrated a strong collaborative spirit, with an average KPI value of 75% indicating high levels of teamwork and engagement among participants. The depth of discussion was significant, averaging around 75%, showcasing thorough exploration of various topics, particularly in technology and regulatory challenges. Diversity of thought was also notable, with a consistent count of 5 unique perspectives shared, reflecting a rich exchange of ideas. However, the idea volume was moderate, averaging around 5 ideas generated, suggesting room for increased brainstorming. Meeting momentum was high, averaging 80%, indicating a smooth flow of ideas. Post-meeting actions were less defined, with an average of 2 actionable items identified, highlighting a need for clearer next steps moving forward.	- Consider implementing more thorough data collection at the beginning of reclamation projects to establish a baseline for future monitoring. - Engage GIS teams to ensure that technical requests align with actual project needs and avoid unnecessary complications. - There is a push for integrating regulatory assurance frameworks into the application process to address stakeholder concerns more effectively.

importance of stakeholder engagement in regulatory applications. Environmental factors affecting site assessments and the role of prior experience in regulated remote sensing roles were also examined, along with the challenges faced by GIS teams in task prioritization. Finally, the integration of AI with data analysis was discussed as a means to streamline insights extraction.		
The meeting focused on the challenges and limitations of current remote sensing methods in ecological restoration and species identification, highlighting gaps in technology, such as insufficient resolution for accurate species differentiation and the reliance on ground truthing. Discussions emphasized the need for standardization to resolve conflicts in data interpretation among consultants and regulators, while acknowledging that this could inhibit innovation. Challenges in reclamation assessments were addressed, particularly regarding liability concerns and the necessity for extended data collection periods. The importance of data authenticity and accountability was underscored, alongside the reluctance of companies to share data due to liability fears. The evolution of data submission requirements and the impact of regulatory changes were also discussed, with a call for a centralized data repository to enhance accessibility and transparency. Finally, the integration of new remote sensing technologies with existing systems was examined, identifying bureaucratic hurdles and the potential for a standardized app to improve compliance and data collection processes.	The meeting on Remote Sensing and Data Standardization demonstrated a strong collaborative spirit, with active participation from multiple speakers contributing diverse ideas and perspectives. The depth of discussion was notable, as participants explored complex topics related to technology integration and regulatory challenges. However, while a variety of viewpoints were presented, the diversity of thought was somewhat limited. The volume of ideas generated indicated a productive session, with a smooth flow of conversation that fostered creativity and engagement. Nonetheless, the clarity of post-meeting actions was lacking, with several next steps identified but not explicitly defined, suggesting a need for follow-up to ensure progress on discussed topics.	- Develop a standardized test set for consultants to validate their models based on known outcomes.

Table 10. Session #2 - Summary, AI Insights, and Next Steps from MeetGeek Summary emails

SUMMARY	AI INSIGHTS	NEXT STEPS
The meeting on Remote Sensing in Land Reclamation focused on establishing criteria and tools for remote sensing applications, emphasizing the importance of data quality standards and technologies like LiDAR and satellite-derived data for assessing land reclamation parameters. Key discussions included the necessity of ground truthing for accurate modeling, the cost-effectiveness of remote sensing compared to traditional site assessments, and the potential for remote sensing to enhance agricultural productivity by measuring soil and crop health. Challenges such as inconsistencies in current applications, landowner concerns regarding soil management, and the need for collaboration with organizations like PTAC were identified. Next steps involve compiling a list of applicable remote sensing technologies, addressing landowner acceptance, and exploring the impact of remote sensing on site readiness for assessments.	The meeting on Remote Sensing in Land Reclamation demonstrated a strong collaborative spirit, with multiple speakers actively contributing and building on each other's ideas, indicating effective teamwork. The depth of discussion was notable, as participants thoroughly explored various aspects of remote sensing, including its applications and implications for agriculture and landowner concerns. However, the diversity of thought was somewhat limited, with a narrower range of perspectives presented. Idea generation was robust, reflecting active brainstorming on remote sensing technologies and methodologies. The meeting maintained good momentum, characterized by a smooth flow of ideas and continuous dialogue among participants. While next steps were identified, there was some ambiguity regarding specific actions to be taken moving forward.	- Participants to compile a list of remote sensing technologies that can meet the criteria discussed. - Identify critical parameters achievable by remote sensing within specific seasons to indicate site failure. - Consider including a landowner sign-off in the REDCAT certificate application to ensure acceptance of methodologies used.
The meeting covered various topics, including the evaluation of REDCAT criteria, data quality standards in remote sensing, and the assessment of forest and agricultural productivity. Key discussions focused on the need for validated datasets, the challenges of harmonizing data from different satellite systems, and the importance of consistent definitions in data collection. Participants emphasized the necessity of a regulatory framework for precision agriculture, the integration of research and data sharing, and the challenges of intellectual property in commercial settings. Opportunities for collaboration, improved methodologies, and the development of standardized reporting practices were identified, alongside potential roadblocks such as data access issues and the reluctance to share proprietary information. The meeting concluded with discussions on the impact of REDCAT on environmental decision-making and the potential for incorporating additional datasets for comprehensive assessments.	The meeting demonstrated a strong collaborative spirit, with an average KPI value of 80% across multiple assessments, indicating high levels of teamwork and engagement among participants. The depth of discussion was consistently rated at 75%, reflecting thorough exploration of complex topics such as data quality and methodologies. Diversity of thought was notable, with an average count of 5 unique perspectives shared, showcasing a variety of viewpoints. Idea volume was productive, averaging around 6 ideas generated, while meeting momentum was generally good, averaging 75%, suggesting a smooth flow of ideas. However, post-meeting actions were less defined, with a low average count of 2, indicating a need for clearer follow-up steps to capitalize on the discussions held.	- Evaluate how much the data is predicting and ensure clarity on what clients want from remote sensing data. - Identify what data should be included in the analysis and how to harmonize datasets for better results. - Create a document outlining the limitations and capabilities of each technology and methodology discussed. - Investigate current forestry criteria and explore how remote sensing can be integrated into assessments for better data collection. - Explore how to better direct research funding to address industry concerns and improve reporting methods. - Outline the QAQC processes for data handling to ensure clarity and usability for users. - Encourage companies to adopt open standards for data reporting to facilitate easier review and validation of their data products.

		- Develop and promote open-source standards for data reporting in satellite observations to enhance transparency.
The meeting on Remote Sensing Applications in Reclamation addressed the use of remote sensing data for land reclamation, highlighting opportunities for innovative funding frameworks and the need for testing areas in Alberta. Key discussions included the effectiveness of remote sensing in assessments, the debate over an 85% threshold for data interpretation, and the challenges posed by outdated regulations in methane measurement. The conversation also covered pipeline monitoring difficulties, emphasizing industry resistance to change and the lack of a value proposition for adopting new technologies. Data accessibility issues were raised, particularly regarding ownership and proprietary data challenges. Additionally, the integration of traditional knowledge with remote sensing in agriculture was discussed, alongside the necessity for standardized training in land reclamation practices to bridge knowledge gaps.	The meeting on Remote Sensing and Land Reclamation Strategies demonstrated a strong collaborative spirit, with active participation and idea sharing among multiple speakers. The depth of discussion reflected thorough exploration of various topics, including remote sensing applications and regulatory challenges. However, while diverse perspectives were presented, the overall diversity of thought was limited. A significant volume of ideas was generated, indicating a productive brainstorming environment. Meeting momentum was maintained effectively, with participants building on each other's contributions. Nonetheless, the clarity and specificity of post-meeting actions were lacking, highlighting a need for follow-up on actionable items.	- No next steps provided
The meeting covered various topics, including the evaluation of rentsat criteria, where the necessity of peer-level assessments was questioned, and alternative frameworks like decision trees were proposed. Remote sensing technology's role in vegetation assessments was discussed, particularly the use of drones, alongside financial constraints that may limit their implementation. The need for standardized methodologies across different platforms for drone technology was emphasized, with references to NASA's lunar exploration investments. Data sharing and open-source requirements were highlighted, addressing challenges in accessing specific data for monitoring programs. The importance of soil assessments in relation to remote sensing technologies was noted, along with the application of REDCAT technology for site assessments. Concerns regarding data licensing and proprietary formats were raised, as well as the need for professional judgment in assessing site variability. The impact of human activity on vegetation and soil was discussed,	The meeting demonstrated a strong collaborative spirit, with an average KPI value of 78.5% indicating high teamwork and engagement among participants. The depth of discussion was moderate to high, averaging 70.5%, reflecting thorough exploration of various topics, particularly in technology applications. Diversity of thought was also notable, with an average of 4.5 perspectives shared, suggesting a healthy exchange of ideas. However, the volume of ideas generated was relatively low, averaging 4, indicating room for improvement in brainstorming. Meeting momentum was strong, averaging 75%, showing a smooth flow of conversation. Post-meeting actions were less defined, with an average of 1.5 actionable items identified, highlighting a need for clearer next steps moving forward.	- It was suggested to conduct assessments post-reclamation and monitor trends over time to determine the effectiveness of the evaluation criteria. - Follow up on the vegetation assessment during the off-season and determine the necessary REDCAT data for cultivated sites.

emphasizing the importance of long-term data. The application of data from RECAD for disturbed sites was highlighted, along with the potential of AI to expedite application reviews. The use of drones in agriculture for nutrient assessments was noted, alongside challenges in adoption. Assessments of reclaimed sites and pipeline integrity technologies were discussed, emphasizing the need for advanced monitoring methods. Finally, the importance of data processing and the challenges of using various software solutions were addressed, along with a brief mention of the GoHose application used in the APAC region.		
The meeting on "Remote Sensing and Data Sharing in Land Management" addressed several critical topics, including the evaluation of REDCAT criteria versus traditional assessments, emphasizing the need for a research phase for field verification before implementing remote sensing tools. Discussions highlighted the implications of weed management practices on policy, driven by Alberta Environment's findings, and the necessity of accessing farmers' data for yield predictions, with satellite data offering a potential alternative. Challenges related to data licensing and publication bias in scientific research were also noted, alongside the importance of standardized data systems for effective sharing among stakeholders. Additionally, the meeting underscored the difficulties in identifying grassland species and the need for flexible REDCAT criteria to enhance land management practices. Next steps include developing decision trees for assessments, advocating for policy changes, and exploring collaboration opportunities in forestry research.	The meeting on "Remote Sensing and Data Sharing in Land Management" demonstrated a strong collaborative spirit, with multiple speakers actively engaging and contributing ideas, reflecting effective teamwork. The depth of discussion was notable, as participants explored various complex topics related to remote sensing, data sharing, and land management, indicating thorough examination and understanding. While there was a good volume of ideas generated, the diversity of thought was somewhat limited, suggesting a need for broader perspectives. Meeting momentum was high, with a smooth flow of ideas and effective transitions between topics. However, clarity on post-meeting actions varied, with some next steps identified while others lacked specificity, highlighting an area for improvement in defining actionable outcomes.	- Develop a decision tree based on criteria for pass/fail assessments using remote sensing data. - Participants to advocate for policy changes based on the study's findings regarding weed management.
The meeting covered various aspects of Detailed Site Assessment (DSA) methodology, emphasizing the use of REDCAT and remote sensing technologies, particularly drone data, for ecological monitoring and site assessments. Key discussions included the importance of assessing erosion, soil depth, vegetation health, and the presence of invasive species, as well as the need for systematic approaches to site assessments based on geographical and operational	The meeting demonstrated a strong collaborative spirit with an average KPI value of 81.5% across multiple assessments, indicating effective teamwork and engagement among participants. The depth of discussion was notable, averaging 73.5%, reflecting thorough exploration of complex topics. Diversity of thought was consistent, with a count of 5, showcasing a range of perspectives. Idea volume varied, with an average of 5.5 ideas generated, indicating productive	- Clarify the references needed for different types of applications in environmental assessments. - It was suggested that a larger pilot program could help establish what methods and data types are reliable for assessments.

similarities. The conversation also highlighted the significance of utilizing publicly available data on vegetation regeneration and land disturbance, the challenges of submitting training data, and the complexities of wetland reclamation compared to other land types. Participants raised questions about the adequacy of current data capture requirements, the implications of water quality in reclamation standards, and the need for a defendable regulatory framework. The meeting concluded with discussions on habitat suitability assessments and the impact of species selection on biodiversity in forest reclamation efforts.	brainstorming. Meeting momentum was solid at 77.5%, suggesting a smooth flow of ideas. However, post-meeting actions were less defined, averaging 2.0, indicating a need for clearer next steps and follow-up actions.	
The meeting focused on the development of a REDCAT detailed site assessment reclamation certificate application system, emphasizing the need for comprehensive supporting information and multi-year assessment data. Discussions highlighted the utilization of remote sensing data, including a multi-resolution approach for site assessments, confidence interval determination, and licensing challenges. Participants identified opportunities to enhance transparency by requiring both raw and processed data submissions while acknowledging potential roadblocks such as funding issues and data transfer challenges. The integration of remote sensing technologies, including drones, was explored for optimizing site assessments and monitoring, with next steps involving the development of criteria for remote sensing applications and a comparative analysis of assessment methods.	The meeting on Remote Sensing in Site Reclamation demonstrated a strong collaborative spirit, with active participation and idea sharing among multiple speakers, indicating effective teamwork. The depth of discussion was notable, as participants explored various aspects of remote sensing and its applications in detail, reflecting a thorough examination of the topic. However, the diversity of thought was limited, with a narrower range of perspectives presented. Idea generation was productive, with several actionable concepts discussed regarding data needs and technology integration. Meeting momentum was maintained throughout, with a smooth flow of ideas and contributions. While clarity on next steps was established, there were some areas where specific actions could be better defined for future initiatives.	- Participants to explore the necessary data and criteria for a remote sensing reclamation certificate application. - CLRA to consider budgeting for a Class 2 license to allow broader access to remote sensing data. - Participants to consider retrospective analysis of forested reclamation over the last 15 years using remote sensing data. - Develop a matrix comparing costs and time for different assessment methods to inform decision-making.
The meeting covered various topics related to the use of technology in agriculture and environmental management, including the benefits of low-resolution satellite data for monitoring agricultural trends, the effectiveness of drones for data collection, and the need for standardized data collection criteria. Discussions highlighted the potential of remote sensing to enhance environmental inquiries, the limitations of AI and GIS technologies, and the importance of regulatory engagement in oil sands reclamation. The conversation also addressed challenges in municipal regulations affecting	The meeting demonstrated a strong collaborative spirit, with an average score of 77.5% across multiple assessments, indicating effective teamwork and engagement among participants. The depth of discussion was also notable, averaging 73.5%, reflecting thorough exploration of various topics, particularly in data collection and environmental impacts. Diversity of thought was present, with an average score of 4.3, showcasing a range of perspectives on key issues. Idea volume was moderate, averaging 5.1, suggesting a productive brainstorming session, while meeting momentum	- The discussion implied the need for further exploration of LiDAR applications in remote areas where traditional site visits are impractical. - Establish a standard for data output and reporting to ensure quality and compliance among service providers. - The group acknowledged the need to prepare for the upcoming implementation of the DRS system, which may require additional support for users unfamiliar with modern data entry methods.

renewable energy projects, the complexities of land acquisition for mining, and the integration of various data formats for compliance with the Water Act. Additionally, the meeting explored the implications of government regulations on small operators, the role of automation in operations, and the potential for technological advancements to improve efficiency while enhancing job roles.	was strong at 76.5%, indicating smooth transitions between topics. However, post-meeting actions were less clear, with an average score of 2.0, highlighting a need for follow-up to define specific next steps and ensure actionable outcomes.	
The meeting focused on the capabilities and limitations of REDCAT in providing evidence for land capabilities and monitoring, highlighting its partial effectiveness in soil assessment and the necessity of ground truthing for accurate data. Discussions emphasized the need for a shift in thinking regarding land reclamation standards and the integration of technology, such as drones and satellite imagery, to enhance data collection and environmental assessments. Key challenges included liability issues, data licensing restrictions, and the complexities of automated reporting, particularly in building trust with landowners. Participants identified opportunities in utilizing historical data and machine learning models to improve site recovery tracking and resource allocation, while also addressing the need for standardized data collection methods to manage environmental variability effectively.	The meeting on Remote Data Collection and Impact Assessment demonstrated a strong collaborative spirit, with multiple speakers actively contributing ideas and building on each other's points, indicating effective teamwork. The depth of discussion was notable, as participants explored various aspects of data collection methodologies and the implications of using specific criteria, showcasing thorough engagement with the topic. While there was a rich diversity of thought presented, the volume of ideas generated reflected a productive session focused on key themes such as technology integration and stakeholder trust. The meeting maintained good momentum, with a smooth flow of ideas throughout the discussion. However, clarity on post-meeting actions varied, with some next steps identified while others lacked explicit definition, suggesting a need for follow-up on certain topics.	- Participants to explore how machine learning models can be applied to assess growth trajectories based on collected data. - Consultants to apply decision tree algorithms to assess new sites based on previous training data.

Table 11. Session #3 - Summary, AI Insights, and Next Steps from MeetGeek Summary emails

SUMMARY	AI INSIGHTS	NEXT STEPS
The meeting focused on advancing environmental monitoring through the classification of research and pilot projects by value and difficulty, identifying funding sources such as PTAC and Alberta Innovates, and developing remote sensing criteria via a gap analysis to assess available parameters and technologies. Key discussions included the necessity of ground truth data for species identification, the importance of defining critical data parameters for effective monitoring, and the complexities of soil assessments and reclamation certifications. The potential of remote sensing technologies, including drones, was highlighted for applications in peatland ecosystems and pipeline assessments, with opportunities for collaboration with Canadian universities to enhance research efforts. Next steps involve conducting gap analyses, developing frameworks for data collection, and engaging with researchers for further collaboration.	The meeting on "Remote Sensing and AI for Environmental Monitoring" demonstrated a strong collaborative spirit, with participants actively engaging and building on each other's ideas, reflecting effective teamwork. The depth of discussion was notable, as various aspects of project concepts, remote sensing applications, and challenges were thoroughly examined. A rich diversity of thought was evident, with multiple perspectives shared on key topics, showcasing varied approaches. The volume of ideas generated was significant, indicating active brainstorming on project categorization and technology applications. Meeting momentum was maintained throughout, with a smooth flow of ideas and seamless transitions between topics. Clear next steps were identified, focusing on funding partnerships, project objectives, and further exploration of critical parameters, indicating actionable outcomes from the session.	- Identify funding partners such as PTAC and Alberta Innovates for project support. - Team to perform a gap analysis and identify key parameters for remote sensing by reviewing existing data and tools. - Develop a framework to determine critical parameters and establish a procedure for data collection and assessment. - Team to develop an objective to differentiate graminoid species within native grasslands using remote sensing technologies. - Identify and engage with researchers like Dr. Chris Henry and Dr. Chris Storey for collaboration on deep learning algorithms. -
The meeting covered several key topics, including project budget considerations, the application of technology in reforestation, and the need for improved data sharing among organizations for environmental projects. Participants discussed the implications of project costs, particularly for high-resolution lidar imagery and weed detection, and explored funding opportunities for reforestation efforts. The importance of geo-referencing data for wetland inventories and the integration of remote sensing with field assessments were emphasized, along with the need for public engagement through hackathons to address community concerns. Challenges in securing funding and coordinating data collection efforts were identified, alongside opportunities for collaboration and leveraging existing datasets in forestry research. Next steps included updating requirements for geo-referencing, establishing new data collection sites, and reaching out to data providers for partnerships.	The meeting demonstrated a strong collaborative spirit, with multiple speakers actively engaging and contributing ideas, reflected in high scores for collaborative spirit (80-85%). The depth of discussion varied, with several instances of thorough exploration of topics, achieving scores between 60-75%, although some discussions lacked depth, scoring as low as 20%. Diversity of thought was evident, with a consistent count of 5 unique perspectives shared, indicating a good range of ideas. Idea volume was productive, with counts ranging from 2 to 8 ideas generated, showcasing effective brainstorming. Meeting momentum was generally strong, with scores between 75-85%, although some moments showed limited flow. Post-meeting actions were identified, with counts ranging from 0 to 3, indicating varying levels of clarity on next steps, suggesting a need for follow-up on specific topics discussed.	- Update DSA requirements to mandate geo-referencing of all locations. - Establish new sites for data collection that utilize current best practices in remote sensing. - Identify the tools available for data extraction and outline their limitations for current measurements. - Evaluate the feasibility of incorporating drone technology into ongoing projects to improve data collection. - Identify a team to draft a proposal or document that outlines the discussed ideas and metrics for the research project. - The objective was set to evaluate the effectiveness of remote sensing in conjunction with field assessments, indicating a need for further exploration of this integration. - Next steps involve reaching out to data providers for collaboration and exploring additional funding sources to enhance data collection efforts.

The meeting on standardization in remote sensing highlighted the need for uniform practices to enhance regulatory acceptance and reduce costs, while addressing challenges in the DSA approval process, particularly regarding landowner complaints. Participants proposed comparative studies to validate the effectiveness of traditional versus new remote sensing methods and discussed improving data accessibility through shared resources. The conversation also emphasized the undervaluation of environmental work and the necessity for innovative academic approaches, alongside the importance of standardized data formats in environmental assessments to facilitate tracking and analysis. Additionally, the meeting explored the relevance of current metrics for land capability evaluation, advocating for the adoption of new metrics and the use of drone technology. Various data collection and mapping techniques were reviewed, with a focus on collaboration using open-source tools, leading to actionable next steps for further exploration and connection among participants.	The meeting on Remote Sensing and Land Management Insights demonstrated a strong collaborative spirit, with active participation and idea sharing among speakers. The depth of discussion was thorough, covering various aspects of metrics, technology, and environmental challenges, although the diversity of thought was somewhat limited, indicating a need for broader perspectives. A significant volume of ideas was generated, reflecting a productive dialogue. Meeting momentum was maintained effectively, with smooth transitions and engagement throughout. While clear next steps were identified, there were some areas where specific actions could be better defined to enhance future collaboration.	- Explore funding opportunities for comparative studies between traditional and new remote sensing methods. - Participants to explore the feasibility of implementing a bi-annual data submission process for environmental assessments. - Jesse to connect with the team to explore potential collaboration and data sharing opportunities.
The meeting covered several key topics, including data oversight and management for implementing REDCATS in forestry, emphasizing the need for remote assessments and field verification. Participants discussed building a species recognition database, the relationship between soil types and vegetation health, and the importance of utilizing updated data sources for research. The conversation also addressed the use of drones and satellite technology for agricultural monitoring, the complexities of wetland reclamation, and the potential for AI and remote sensing in environmental monitoring. Funding sources and the role of the meeting assistant were also discussed, with a focus on generating new project ideas and addressing existing challenges. The meeting concluded with a discussion on the use of Ground Penetrating Radar (GPR) and Electromagnetic (EM) surveys for data collection, noting the limitations in accuracy but recognizing their value.	The meeting demonstrated a generally high level of collaborative spirit, with multiple speakers engaging actively, reflected in an average collaborative spirit score of around 75%. The depth of discussion varied, with some topics explored in detail while others lacked depth, averaging around 65%. Diversity of thought was present, with an average of 5 unique perspectives shared, indicating a good range of ideas. Idea volume was moderate, with an average of 4 distinct ideas generated, suggesting productive brainstorming. Meeting momentum was relatively strong, averaging 70%, although some interruptions were noted. Post-meeting actions were less clear, with an average of 1.5 actionable items identified, indicating a need for follow-up on specific next steps.	- It was suggested to start with a few example sites to test the REDCATS implementation before broader application. - Conduct a literature review to identify existing data and resources that can be leveraged for ongoing projects. - Next steps include determining when satellites will be available for monitoring specific areas, which is crucial for effective agricultural assessments. - There was a suggestion to clarify the meeting assistant's role and how it can assist in future meetings. - There was a call for collaboration and further discussion to refine ideas and address the challenges presented.
The meeting focused on the application of remote sensing for auditing reclamation certified sites and assessing project	The meeting on "Remote Sensing for Reclamation and Monitoring" demonstrated a strong collaborative spirit, with	- Identify additional projects related to forested species and reclamation criteria for future discussion.

success over time. Key discussions highlighted the high-value opportunity of using remote sensing to identify problem sites and monitor vegetation health, although potential pushback from industry regarding its implementation was noted. Participants emphasized the need for effective data requirements, suggesting the use of existing imagery from platforms like Sentinel-2 and Landsat to enhance data collection efficiency. The meeting concluded with a call for the team to explore the integration of remote sensing for RCA audits to better determine project trajectories and success.	multiple speakers actively contributing ideas and perspectives, indicating effective teamwork. The depth of discussion was notable, as participants explored various aspects of remote sensing, species identification, and regulatory challenges, reflecting a thorough examination of the topics. However, the diversity of thought was limited, with a narrower range of perspectives presented. Idea generation was productive, with several actionable concepts discussed, and the meeting maintained good momentum, with a smooth flow of conversation and effective transitions between topics. Clarity on post-meeting actions varied, with some next steps clearly defined while others lacked specificity, indicating areas for improvement in follow-up planning.	- Team to explore the use of remote sensing for RCA audits to determine project trajectory and success. - Participants to explore the integration of existing platforms for data collection and analysis. - Policy updates are needed to address the current limitations in reforestation standards and practices.
The meeting focused on advancing the adoption of the REDCAT video-based assessment methodology by identifying key projects and addressing gaps in data, policy, and technology. Discussions included the challenges of assessing vegetation versus soil metrics, the creation of a technical requirements document for reclamation outcomes using remote sensing, and the potential for federal engagement in COSEA discussions. Participants emphasized the need for new open data areas for land reclamation, effective data utilization, and the importance of auditing RECCertified sites. The conversation also covered the impact of fire on site regeneration, the definition of ecotones, and the value of high-resolution data for monitoring and reclamation. Next steps included forming technical working groups, establishing pilot programs, and encouraging participants to complete an online survey to aid in final report preparation.	The meeting demonstrated a strong collaborative spirit, with an average KPI value of 82.5% indicating high levels of teamwork and collective ideation. The depth of discussion was also notable, averaging around 73.5%, reflecting thorough engagement on various topics. Diversity of thought was moderate, with an average of 5 unique perspectives shared, while the idea volume was productive, averaging 5.5 ideas generated. Meeting momentum was consistent, averaging 77.5%, suggesting a smooth flow of ideas. However, post-meeting actions showed some variability, with an average of 2.2 clear next steps identified, indicating a need for further clarity on actionable outcomes.	- Forming a technical working group around REDCAT criteria that is land cover specific to facilitate discussions and produce a report. - Identify specific outcomes and terms for the group to ensure the task is completed by a set date, rather than forming a permanent committee. - The team plans to explore the creation of new open data areas and engage with EO companies to gather relevant data for land reclamation. - Access public records of rec certified sites to facilitate the audit process. - A task was requested to be created regarding the assessment of reclamation sites, indicating a need for follow-up actions. - Propose the development of an anomaly detection system to an industry regulator or entity. - Participants are encouraged to complete an online survey by the end of the week to assist in the final report preparation.
The meeting focused on the development of project concepts, emphasizing the integration of historical pre-disturbance assessment data and remote sensing applications. Key discussions included defining pilot projects and responsibilities, assessing technology readiness against	The meeting on Remote Sensing and Data System Development demonstrated a strong collaborative spirit, with multiple speakers actively contributing and engaging in discussions, reflecting effective teamwork. The depth of discussion was notable, as various aspects of technology	- Team to evaluate the readiness matrix for existing technology and its application in different jurisdictions. - Team to create a task list for assessing technology readiness and identifying gaps.

established criteria, and identifying gaps in existing technologies. The team highlighted the need for standard operating procedures (SOPs) for data collection during reclamation to enhance monitoring accuracy, while also exploring the integration of remote sensing data with field-based monitoring. Additionally, the development of a standard schema leveraging existing data standards for remote sensing and GIS was addressed, alongside the challenges posed by policies and regulations. The meeting concluded with a discussion on airspace management protocols during VIP landings, particularly regarding the impact on civilian flights. Next steps include evaluating technology readiness, developing SOPs, and creating a minimally viable product for remote sensing applications.	readiness, data collection, and project concepts were thoroughly explored. However, the diversity of thought was somewhat limited, with a moderate range of perspectives shared. Idea generation was robust, indicating active brainstorming on project concepts and strategies. Meeting momentum varied, with periods of effective flow contrasted by moments of disjointed conversation. Post-meeting actions were identified, with clarity on next steps and specific tasks outlined for further development.	- Team to develop standard operating procedures for data collection during reclamation and ensure geospatial data is included. - Develop a minimally viable product (MVP) for RIS for All to demonstrate its capabilities.
The meeting focused on the development of a foundational framework for assessing REDCAT technologies, emphasizing the need for criteria and validation against current methods, and the early involvement of regulators. Key discussions included the necessity of demonstrating technology capabilities to regulators, establishing a project title and steering group, leveraging historical data for regulatory compliance, and addressing funding concerns for the project. Participants proposed a two-stage assessment process for site evaluation and highlighted the need for standards in data handling. The role of graduate students in projects was discussed, along with the cost implications of technology choices for data collection. The meeting also touched on the cost savings from using drones and satellites for assessments, the financial aspects of automated trucks, and the implications of REC certification. Next steps include forming working groups, identifying funding sources, and developing mentorship programs	The meeting demonstrated a strong collaborative spirit, with an average KPI value of 80% indicating high levels of teamwork and engagement among participants. The depth of discussion was moderate to high, averaging around 70%, reflecting thorough exploration of key topics. Diversity of thought was also notable, with an average of 5 unique perspectives shared, contributing to a rich dialogue. Idea volume was moderate, with an average of 4-6 ideas generated, suggesting productive brainstorming. Meeting momentum was good, averaging 75-80%, indicating a smooth flow of ideas. However, post-meeting actions were less clearly defined, with an average of 2 action items identified, suggesting a need for follow-up to clarify next steps.	- Form a working group to define the criteria and involve regulators in the early stages of project development. - Establish a working group or session focused on standardization development. - The discussion suggests the need to identify potential funding sources, such as PTAC or individual companies, to support the project
The meeting focused on comparing LiDAR and photogrammetry for vegetation assessment in remote areas, highlighting the potential to leverage existing regulatory frameworks for enhanced data collection. Discussions emphasized the advantages of using drones for tree counting	The meeting on Remote Sensing and Drone Assessment Strategies demonstrated a strong collaborative spirit, with multiple speakers actively contributing and building on each other's ideas, reflecting effective teamwork. The depth of discussion was thorough, covering various aspects of drone	- Identify funding sources such as PTAC and Alberta Innovates for drone assessment projects. - Consultants to coordinate with drone operators to integrate aerial assessments into existing site evaluations.

and site assessments, noting their ability to reduce on-ground risks and costs, while also addressing challenges in species identification. The integration of remote sensing with ground assessments for watercourse monitoring was explored, with key questions regarding the necessary sample size for effective validation. The importance of engaging Indigenous communities in drone assessment strategies was underscored, alongside the need to build trust to facilitate successful implementation. Next steps include identifying funding sources for drone projects and coordinating with drone operators for integrated assessments.	technology and regulatory frameworks, indicating a comprehensive examination of the topics. However, the diversity of thought was limited, with a narrow range of perspectives presented. Idea generation was robust, showcasing active brainstorming around project methodologies and community engagement. Meeting momentum was high, characterized by a smooth flow of ideas and effective transitions between topics. Actionable next steps were identified, focusing on project involvement, funding, and coordination efforts, although some areas lacked clarity. Overall, the meeting was productive, with clear outcomes and a collaborative atmosphere.	- Develop a foundation of trust with Indigenous groups before implementing drone assessments.

Table 12. Introduction Session – Topics and Highlights from the MeetGeek Summary Email.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Acknowledgment of Indigenous Lands and Reconciliation	(MI) | The speaker emphasizes the importance of recognizing the historical impact of colonization on Indigenous communities and expresses a commitment to reconciliation. Additionally, there is a shift towards discussing technological innovations such as drones, GIS, and AI in the context of industry advancements.					
Advantages and Limitations of RIDCAT for Assessments	(MI) | Technologies like RIDCAT may not replace field assessments in the immediate future, but they can supplement them.	(KQ) | What are the advantages or limitations of using RIDCAT for assessments compared to field bubble assessments?		(PRB) | Discrepancies in imagery resolution between regulators and companies could lead to disagreements in assessment outcomes, which need resolution.		
Discussion on Current Landscape and Opportunities		(KQ) | The discussion raised questions about the clarity and necessity of naming conventions for the meeting assistant.	(Opp) | The discussion highlighted numerous opportunities for pilot demonstration projects that could involve regulators and policymakers, as well as areas requiring further research.			(NS) | Participants were tasked with coming up with project concepts to be identified and actioned over the next couple of years during the last session of the day.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Exploring Remote Data Collection Tools		(KQ) | The discussion raised significant questions about how to effectively implement remote data collection tools and the implications of single versus multiple assessments over time.				
Funding and Support for Environmental Projects	(MI) | Alberta Innovates provides funding for environmental projects, focusing on innovative solutions for reclamation and restoration. The new Land Management Solutions program aims to support monitoring technologies and biodiversity efforts.		(Opp) | There is potential for projects funded by Alberta Innovates to be applicable not only in Alberta but also in other regions of Canada and internationally, expanding the impact of the initiatives.			
Innovative Approaches to Reclamation	(MI) | The meeting emphasized the need for innovative thinking in reclamation practices, particularly through the use of remote sensing data and AI technologies to enhance site assessments and monitoring.		(Opp) | There is potential to integrate AI and machine learning with existing data to improve reclamation monitoring and recovery processes, particularly in the context of environmental changes.			

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Integration of AI and Machine Learning in Environmental Monitoring	(MI) | The integration of AI and machine learning into environmental monitoring is a significant focus for the coming years, with potential applications across various operational stages.		(Opp) | Alberta presents an opportunity to serve as a testing ground for new technologies due to its diverse land cover types, which can facilitate field validation.			(NS) | Future discussions will focus on reclamation obligations and the qualifications required for data acquisition, with a separate session planned on remediation.
Partnership Opportunities in Environmental Monitoring			(Opp) | The discussion identified opportunities for collaboration between practitioners and organizations like CLRA to improve the application of technologies in environmental monitoring.			
Regulatory Processes and Reporting	(MI) | Different processes and application requirements exist based on regulatory authority, affecting how reclamation certificates are issued.	(KQ) | Discussion around the advantages or limitations of updating existing reporting tools like VARU or RIS for cross-sector use.				
Renewable Energy Operations Code of Practice			(Opp) | Potential to integrate reporting tools to standardize reporting across sectors, particularly in relation to disturbances and reclamation processes.			

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Technology-Based Criteria Development	(MI) | The meeting emphasized the importance of developing technology-based criteria for evaluating land capability and reclamation outcomes, particularly through the use of NDVI and soil moisture technologies.		(Opp) | There is an opportunity to utilize recent technologies for multiple assessments within a growing season, which could enhance reclamation assessments and policy development.	(PRB) | Challenges may arise if the criteria developed are proprietary and not accessible to all stakeholders, which could hinder their acceptance by regulators.		
Use of Drones and Remote Sensing Technologies	(MI) | The meeting discussed the operational use of drones and satellite imagery, emphasizing the application of LiDAR and multispectral sensors for various assessments. AI and machine learning were noted for their advantages in data handling and pattern recognition, but limitations regarding training data and model validation were also acknowledged.			(PRB) | The need for field-level validation and quality assurance was identified as a significant limitation in the application of AI and machine learning in remote sensing, indicating that these technologies cannot fully replace human expertise.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Utilization of Remote Sensing and Drones in Environmental Monitoring	(MI) | The meeting discussed the application of drones and remote sensing for monitoring environmental disturbances and reclamation outcomes, stressing the importance of integrating earth observation data with field-level data.					
Utilization of Remote Sensing Technologies	(MI) | The session aims to explore how remote sensing technologies can enhance reclamation practices in Alberta.		(Opp) | There are opportunities for partnerships across Canada to integrate remote sensing data with field-level data.			(NS) | Participants to discuss project concepts for utilizing remote sensing technologies in reclamation during table conversations.
Workshop Introduction and Objectives	(MI) | Tanya Richens emphasizes the importance of participant contributions for the workshop's success and mentions her role in writing the report post-workshop.					

Table 13. CCMEO Presentation – Topics and Highlights from the MeetGeek Summary Email.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Acknowledgment of Shared History and Introduction to Workshop	(MI) | The speaker emphasizes the significance of acknowledging shared history and the context in which learning and innovation occur, setting the stage for a workshop on technological advancements.					(NS) | The workshop will explore various technological innovations and their applications in the industry, facilitated by Tanya Richens and supported by various organizations.
Airborne Remote Sensing Campaign	(MI) | The campaign involved using airborne remote sensing to monitor ground deformation, water status in tailings ponds, and vegetation health. The merging of multiple images allowed for a comprehensive analysis of these factors.					
Automated Disturbance in Knowledge Mapping	(MI) | The automated disturbance in knowledge mapping is crucial for managing website portfolios, allowing for early detection of changes. There are significant challenges in cross-domain awareness and a lack of an integrated analytics platform.			(PRB) | There are capacity limitations within the team, which affects the ability to track and monitor projects effectively, as often there is a very small or non-existent team responsible for these tasks		(NS) | There is an interest in moving forward with the Operation Improve Regulations for Geo-Based Assessment and Monitoring, which was initiated before the current discussion.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Climate Impact on Vegetation	(MI) | Climate variability affects vegetation cover and requires annual climate surveys beyond just snow measurements.		(Opp) | Using multiple angles for imaging can help mitigate shadow effects in vegetation analysis.	(PRB) | Spatial resolution limits hinder the detection of small linear features in vegetation assessments.	(SF) | Data from Southern Ontario shows that vegetation cover stabilizes after approximately six years of reforestation efforts.	
Cloud Imaging and Data Display	(MI) | The speaker discussed the use of Google Earth Engine and other systems for cloud imaging and data display, highlighting the importance of open-source APIs for accessibility.		(Opp) | There is potential for collaboration with university researchers to develop free and open tools for data access and analysis in the field of imaging spectroscopy.			
Collaboration and Engagement	(MI) | Encouragement of cross-sector conversations to explore what regulators and data providers need in policy development.		(Opp) | Potential for learning and partnership development among participants from different sectors. (Opp) | Exploring new ways of conducting assessments without direct site access, potentially using remote sensing data.			(NS) | Facilitate partnerships and connections among participants during the session.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Collaboration and Innovation in Remote Sensing	(MI) | The meeting underscored the necessity of collaboration among passionate individuals in remote sensing and data collection to drive innovation and develop a common understanding of opportunities in the field.		(Opp) | The conversation revealed potential for utilizing AI and machine learning to enhance data analysis and landscape monitoring, particularly in restoration and recovery efforts.			(NS) | Participants were encouraged to engage in discussions to identify pilot demonstration projects that involve regulators and policymakers, as well as areas requiring further research.
Cumulative Attack Studies and Vegetation Mapping	(MI) | The project involves cumulative attack studies for the federal government, utilizing algorithms for vegetation mapping and analysis of reclamation sites over time.				(SF) | The algorithms developed allow for mapping vegetation density and analyzing time series data for reclamation sites, showing changes in vegetation over time due to various environmental factors.	
Cumulative Effects in Environmental Impact Assessment	(MI) | The discussion highlighted the necessity of better assessing cumulative effects in environmental impact assessments, as identified in a 2016 initiative. It emphasized the importance of having a robust definition and a comprehensive dataset to understand changes over time.				(SF) | The speaker referenced a definition from British Columbia regarding cumulative effects, which includes changes caused by past, present, and potential future human activities and natural processes, underscoring the need for a solid baseline condition for effective assessment.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Data Sharing and Legal Issues	(MI) | The dataset is currently federal only, and there is a willingness to share it with interested parties in Canada, pending legal agreements.	(KQ) | What are the legal implications of releasing the dataset and how can we engage with interested parties for data sharing?				
Deformation Data Sets	(MI) | A new national scale coverage of deformation data at 50 meters resolution has been released, marking a significant advancement in monitoring land movement in Canada.			(PRB) | There are current legal issues regarding the release of deformation data, which is presently limited to federal access only, affecting broader availability.		
Development of Measurement Methods	(MI) | The team collaborates with both American and EU partners to develop measurement methods, which are published and validated through field work across diverse North American landscapes. The discussion highlighted the importance of understanding scale-dependent biases in data collection, particularly in distinguishing between small and large trees in pixel data.					(NS) | The team is currently working on cumulative effects studies for the federal government, focusing on priority regions, and has developed algorithms that are now available on Google Earth Engine for global mapping.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Discussion on Reclamation	(MI) | The speaker discussed the etymology of 'reclamation' and its emotional weight, emphasizing the importance of evidence-based practices in reclamation efforts. They also mentioned the relevance of environmental monitoring in assessing vegetation and land cover.					
Dust Mapping and Environmental Impact	(MI) | Utilizing imaging systems to map dust dispersion and its effects on the environment, particularly in relation to the Inuit communities and local wildlife. (MI) | Employing Landsat and NMAP Hyperspectral Sensor for detailed environmental monitoring and dust mapping in mining regions.	(KQ) | What are the implications of dust from mining activities on the local environment and wildlife?	(Opp) | Utilize advanced remote sensing technologies to enhance understanding of environmental impacts from mining activities. (Opp) | Investigate similarities in dust effects on snow reflectance based on studies from other regions, potentially leading to new insights for Arctic Canada.		(SF) | Studies have shown that dust affects snow albedo similarly across different regions, which can be applied to the Arctic context.	(NS) | Continue collaboration with local communities to understand dust impacts and improve mapping techniques using advanced imaging systems.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Earth Observation and Cumulative Effects	(MI) | The use of multi-scale EO systems, including drones and satellite data, to assess cumulative effects in regions like the Ring of Fire, focusing on long-term landscape changes due to beaver activity.		(Opp) | Potential for improved impact assessments through new federal and provincial priorities aimed at streamlining the process, while considering cumulative effects as mandated by legal precedents.	(PRB) | Challenges in data availability and capacity limitations in monitoring and implementing recommendations for impact assessments, which may hinder effective management.	(SF) | Data sets from the National Air Photo Library and world view data illustrate the significant impact of beavers on habitat and landscape over a 50-year period.	
Earth Observation and Impact Assessment			(Opp) | The discussion pointed out the potential for using EO data to improve impact assessments, especially in light of new federal priorities and the need to consider cumulative effects.	(PRB) | The speaker mentioned challenges related to data gaps in high-resolution products and automated disturbance mapping, which could hinder effective impact assessments.		
Earth Observation for Cumulative Effects Project	(MI) | The Earth Observation for Cumulative Effects project is designed to enhance R&D through EO data products, improve existing systems with new sensors, and expand data offerings for impact assessments.					

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Earth Observation for Human Effects and Site Monitoring	(MI) | The project involves monitoring fugitive dust as a national scale issue related to infrastructure and mining activities. The speaker emphasized the importance of understanding different definitions of remediation across regions.					
Environmental Impact Assessment and Remediation	(MI) | The collaboration with McGill University and the National Research Council aims to collect data on environmental impacts from tailings and emissions. The assessment of tree health indicated that tailings caused branch mortality rather than tree mortality. Successful remediation efforts in Sudbury involved applying lime to improve forest health.					

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Environmental Impact Assessment Using Radiative Transfer Model	(MI) | The use of the Radiative Transfer Model to analyze the impact of tailings on forest health, specifically looking at branch mortality versus tree mortality, and the successful remediation efforts in Sudbury using lime to restore forest areas.				(SF) | The discussion included specific examples of environmental recovery in Sudbury, where lime was used to remediate sulfur dioxide emissions, leading to a denser forest canopy in previously barren areas.	
Environmental Impact of Dust from Mining Activities	(MI) | Mapping dust spread and understanding its environmental impact are crucial for mining activities.	(KQ) | What are the implications of dust on the environment and local communities?	(Opp) | Utilizing existing studies on dust effects from other regions to inform local practices.	(PRB) | Concerns from local communities regarding water usage and environmental degradation may hinder mining operations.	(SF) | Studies have shown that dust affects snow reflectance, which is relevant for understanding environmental changes in Arctic regions.	(NS) | Continue collaboration with local communities to monitor dust and its effects.
Environmental Impact of Mining Activities	(MI) | Utilizing geospatial technology to map and monitor the impact of mining tailings on the environment and public health.	(KQ) | What are the long-term environmental impacts of historical mining activities on local ecosystems?	(Opp) | Exploring the use of advanced sensors and algorithms to improve the mapping of environmental impacts from mining activities.		(SF) | Historical mining practices have led to significant contamination, including mercury and arsenic, affecting local vegetation and water sources.	(NS) | Collaborate with McGill University and the National Research Council of Canada to accumulate regular datasets for monitoring tailings.
Environmental Impact of Mining in Nova Scotia	(MI) | The speaker discussed the environmental concerns associated with abandoned mines in Nova Scotia, highlighting the contamination from mercury and arsenic, and the use of EO technology to map these issues.		(Opp) | There is potential for further research and application of EO technology to monitor and manage environmental impacts from mining activities.		(SF) | The speaker provided evidence of the environmental impact, mentioning that some mining sites are the size of football fields and have not recovered vegetation due to contamination.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Fugitive Dust and Environmental Impact	(MI) | The need for improved monitoring and reporting methods for fugitive dust, leveraging geomatics tools for better analysis.	(KQ) | What are the regulatory gaps in understanding and monitoring fugitive dust effects?	(Opp) | Utilizing freely available geomatics tools like Google Earth Engine and QGIS for environmental monitoring and analysis.		(SF) | A survey conducted in 2021 showed a 70% return rate from larger mining and industry sites, indicating a significant interest in addressing fugitive dust issues.	
Fugitive Dust Impact Assessment	(MI) | Fugitive dust has significant environmental impacts and requires improved monitoring and reporting methods.		(Opp) | Utilize freely available geomatics tools like Google Earth Engine and QGIS for environmental analysis.	(PRB) | Gaps in understanding and monitoring fugitive dust effects hinder effective regulatory enforcement.	(SF) | MimeWatch Canada estimates $200 billion in cleanup costs related to orphaned fugitive dust sources.	(NS) | Collaborate with McGill University and the National Research Council of Canada to accumulate regular datasets for monitoring fugitive dust.
Future of O-Impact Assessment	(MI) | New federal government priorities may streamline impact assessments, while legal cases emphasize the need for considering cumulative effects.			(PRB) | Capacity limitations in monitoring and implementing recommendations for impact assessments may hinder effectiveness.		
Google Earth Engine and Stack API Integration	(MI) | The Google licensing allows free use for research purposes, and there is a production tool available that uses stack APIs for data access from NASA and ESA. Integration into Python applications is straightforward without IP restrictions.					

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Ground Deformation Monitoring	(MI) | The dataset can measure ground deformation rates and provide site-specific terrain stability assessments, with various data acquisition options available.		(Opp) | Potential for using the dataset to monitor reclamation efforts and assess terrain stability in specific areas.		(SF) | The dataset describes an average deformation rate of 8 meters per year and can achieve vertical resolution down to 10 centimeters with appropriate data collection.	(NS) | Prepare a data sharing agreement with interested parties in Canada to facilitate access to the dataset.
Ground Deformation Monitoring	(MI) | The discussion highlighted the average deformation rate of 8 meters per year with a spatial resolution of 40 meters, and the potential to achieve higher resolution down to 10 meters for specific areas. The costs for acquiring radar data were also discussed, indicating a range of $4-5k per scene for RCM or R2 data, and $10k for two acquisitions.					
High-Resolution Optical Sensors and Their Applications	(MI) | The discussion highlighted various high-resolution optical sensors, including WorldView, PLEADES, and GOI, and their applications in monitoring vegetation, infrastructure, and environmental conditions such as erosion and tailings.					

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Impact Assessment Framework in Canada	(MI) | The framework aims to better assess cumulative effects and improve data accessibility for practitioners in impact assessments.					(NS) | The organization plans to accelerate the use of Earth Observation in impact assessments to enhance processes in Canada.
Impact Assessment Framework	(MI) | The discussion highlighted the need for improved assessment of cumulative effects in environmental impact assessments, as recommended by a 2016 expert panel report. The speaker emphasized the interrelation of cumulative effects with monitoring and reclamation efforts.					
Impact of Fugitive Dust on Regional Environment	(MI) | The need for improved understanding and monitoring of fugitive dust effects, leveraging geomatics tools for better data analysis.	(KQ) | What are the cumulative effects of fugitive dust and how can they be effectively monitored and reported?	(Opp) | Utilizing freely available geomatics tools like Google Earth Engine and QGIS to enhance data collection and analysis regarding fugitive dust.		(SF) | Mindwatch Canada estimates a $200 billion liability related to fugitive dust, indicating a national scope of the issue.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Integration of Earth Observation Data in Environmental Impact Assessment	(MI) | The main ideas discussed included the need for a large amount of data to build effective datasets and the importance of understanding this data for evidence-based decision-making.	(KQ) | The meeting raised the question of how to accelerate the use of Earth Observation in impact assessments to improve processes in Canada.	(Opp) | There is an opportunity to enhance environmental monitoring through the development of new Earth Observation data products and the operationalization of data production frameworks.	(PRB) | The identified barriers to effective use of Earth Observation data include data availability, technological solutions, and the need for increased awareness and analytics expertise.	(SF) | The speaker mentioned that the organization found gaps in the State of Earth Observation and Environmental Impact Assessment both domestically and internationally.	
Integration of Earth Observation Data	(MI) | The integration of earth observation data with field-level data is crucial for improving environmental monitoring and outcomes. There are opportunities for organizations like CLRA to facilitate partnerships across Canada.		(Opp) | There are unexplored opportunities for collaboration between provincial and national partners to enhance the use of technologies in environmental practices.			(NS) | The intent is to develop project concepts that leverage these technologies for better environmental outcomes, particularly in regulated activities in Alberta.
Introductions and Casual Conversation	(MI) | The conversation included light-hearted exchanges about family and recent experiences, contributing to team bonding.	(KQ) | Participants inquired about each other's names and roles, fostering a friendly atmosphere.				

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Job Role and Responsibilities	(MI) | The job role was created in response to significant financial investment, indicating a need for dedicated management. The speaker outlined their responsibilities, which include science, research, data management, and project management, along with leading a geospatial team.					
Land Cover Change Challenges	(MI) | The need for accurate mapping of land cover changes and the limitations of existing land cover products were discussed, along with the importance of understanding ecological variables beyond land cover.	(KQ) | How do we systematically quantify the variations in structure, function, and species composition in land cover?	(Opp) | There is potential for new products that can enhance the understanding of green vegetation cover and leaf area density, which could improve land cover assessments.	(PRB) | Caution is required when using existing change detection systems, as they may not fully capture the complexities of land cover changes.	(SF) | The speaker referenced studies indicating that species mapping accuracy can vary significantly based on disturbances, with accuracy rates between 55% to 75%.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Land Management Solutions Program	(MI) | The Land Management Solutions program is designed to promote innovative technologies for environmental monitoring and landscape reclamation in Alberta, replacing the previous biodiversity program. It aims to collaborate with partners who have specific challenges and to explore the applicability of solutions in other regions.		(Opp) | There is potential for applying Earth observation technologies, including drones, for reclamation and restoration efforts, which could be expanded to other areas in Canada and internationally.			(NS) | Participants are encouraged to contact project advisors for assistance with the program and to engage during networking sessions for further discussions.
Land Use and Land Cover Change	(MI) | The importance of accurate mapping of land cover and the challenges associated with land cover change, particularly in reclamation efforts.	(KQ) | What methodologies can be employed to systematically quantify land cover changes, especially in reclamation sites?	(Opp) | Exploration of new methodologies and systems, such as the LEAF Toolbox, to enhance land cover mapping and understanding of vegetation parameters.	(PRB) | The challenge of achieving low uncertainties in land cover change mapping compared to standard land cover mapping.	(SF) | Historical context provided by the speaker regarding the development of land cover mapping techniques since 1978, including the use of Landsat 3.	
Mapping Biophysical Variables	(MI) | The discussion emphasized the importance of mapping biophysical variables like height and species diversity using advanced technologies such as UAVs and LIDAR. The potential for new products like green vegetation covering and leaf area index was also mentioned.		(Opp) | There is an opportunity to improve species mapping using UAVs and hyperspectral imagery, particularly in areas where traditional methods face challenges due to disturbances.	(PRB) | Challenges in mapping species accurately in disturbed areas were noted, with species maps relying on indirect observations rather than direct measurements.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Mapping Vegetation Cover Intensity	(MI) | The speaker discussed the importance of mapping all green vegetation surface area and the challenges of sampling in disturbed conditions. They emphasized the need for a systematic approach to assess vegetation cover intensity using satellite data.			(PRB) | The speaker noted that the methodology is sensor and region-specific, indicating that similar work would need to be repeated in different locations, which could be a significant challenge.	(SF) | The speaker provided data on the statistical relationship between Landsat Spectral Vegetation Index and in situ measurements, indicating that the signal is species-independent and can be used to create maps, although it is sensor-specific.	
Methodology for Vegetation Assessment	(MI) | The methodology for assessing vegetation involves using digital hemispherical photographs processed with specialized software, and the importance of including disturbed conditions in sampling. The discussion also highlighted the use of Landsat and Sentinel sensors for long-term assessments of vegetation changes, which allows for mapping leaf area index and green vegetation cover without needing to identify specific land cover types.					

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Operational Approval of Regulations	(MI) | Operationally approved regulations for EO-based assessment and monitoring were created before Shane's inquiry, indicating prior planning and initiative.					
Overview of Earth Observation (EO)	(MI) | The speaker discussed the different types of Earth Observation sensors, including medium and high-resolution optical sensors, and their applications in environmental monitoring and reclamation efforts.		(Opp) | The discussion highlighted the potential for using high-resolution optical sensors for infrastructure monitoring and identifying species growth dynamics, which could lead to improved environmental management.		(SF) | Medium resolution optical sensors like Landsat and Sentinel provide free and publicly accessible data, which is crucial for environmental monitoring.	
Overview of Remote Sensing Technologies	(MI) | Various sensor types including medium resolution optical, high resolution optical, hyperspectral, radar metrics, light air sensors, and unmanned aerial vehicles were discussed for environmental monitoring.					

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Reclamation and Vegetation Analysis	(MI) | The reclamation polygon's leaf area index is comparable to the reference area, indicating successful reclamation over time despite differences in vegetation species. Seasonal variability affects vegetation density, necessitating long-term data analysis.			(PRB) | Spatial resolution limits the ability to detect small linear features in the imagery, which can hinder accurate analysis of reclamation efforts.	(SF) | The reclamation was initially done in 2013 and redone in 2015, with observations showing that vegetation density has stabilized over time, although some sites did not comply with afforestation programs.	
Regional Assessment of Vegetation	(MI) | The speaker emphasized the importance of using remote sensing for regional vegetation assessment, highlighting its ability to identify spatial patterns, monitor changes in climax communities, and analyze long-term trends over time.				(SF) | The speaker referenced Alberta's historical work in remote sensing and vegetation assessment, including the 1998 publication on reclamation and the development of systematic land cover maps since 1978.	
Remote Sensing Applications	(MI) | The discussion highlighted various applications of remote sensing, such as high-resolution sight mapping, thermal monitoring, and the detection of anomalies like leaks and seepage in pipelines.				(SF) | Remote sensing can effectively analyze spatial patterns and land cover, as well as monitor changes in ecosystems over time, particularly in disturbed areas.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Remote Sensing Technologies and Applications	(MI) | The meeting covered several remote sensing technologies, detailing their capabilities and applications in environmental monitoring and infrastructure assessment.					
Satellite Simulation and Spectral Analysis	(MI) | The speaker detailed the creation of computer simulations that represent satellite observations influenced by canopy structures and soil properties. They highlighted the generation of synthetic scenes and the significance of spectral characteristics in these models, which are validated through systematic methodologies in collaboration with international partners.					
Scope of Discussion on Specified Lands	(MI) | The meeting will focus on reclamation rather than remediation, and discussions will involve various stakeholders including regulators and data providers.	(KQ) | What does the governance framework look like as data becomes more available?				

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Shadow Impact on Vegetation Retrieval	(MI) | The impact of shadows on vegetation retrieval algorithms was highlighted, emphasizing the need for solutions such as using satellites at different angles or during overcast conditions to mitigate shadow effects.		(Opp) | There is potential for further development of machine learning algorithms tailored for vegetation analysis, as current systems require custom solutions.		(SF) | The speaker noted that even major companies like Google would need significant development to implement effective vegetation analysis algorithms, indicating a gap in current capabilities.	
Spatial Resolution and Image Analysis Challenges	(MI) | The discussion highlighted the challenges of using high-resolution imagery for detecting small linear features due to spatial resolution limits and shadows cast by surrounding vegetation.			(PRB) | The presence of shadows in high-resolution imagery can hinder the accurate retrieval of data, particularly for small linear features like seismic lines.		(NS) | The speaker suggested potential solutions such as using satellites at different angles or capturing images in overcast conditions to mitigate shadow effects.
Technological Advancements in Environmental Monitoring	(MI) | The discussion covered a broad range of technologies such as GIS, remote sensing, and AI, focusing on their application in identifying and monitoring environmental activities throughout their lifecycle.					

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Technological Advances in Phenotyping and Mapping	(MI) | The use of advanced technologies like hyperspectral drones and lidar can improve species diversity mapping and canopy height estimation, particularly in complex environments like reclamation sites.					
Terrestrial Water Storage and Surface Water Dynamics	(MI) | The GRACE satellite measures gravitational anomalies to detect water changes, with a resolution of around 10 kilometers. The discussion included patterns of glacier and snowmelt in BC and precipitation events affecting water storage in eastern Canada and Alberta, particularly post-drought recovery.					
UAV and LiDAR Technology in Vegetation Mapping	(MI) | UAV and LiDAR technologies can effectively estimate canopy height and vegetation density, though challenges remain in complex environments.					

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Use of Open Source Data Tools	(MI) | The LEAPT toolbox utilizes free and open data, including the Google Reclamation API and STAT APIs from NASA and the European Space Agency, for research and mapping.	(KQ) | A question was raised about the availability of data from the LEAPT toolbox and whether it can be accessed publicly like other streaming services.			(SF) | The discussion highlighted that the Google licensing allows free use of their API for research purposes, and there are various data products provided by CCMEO.	(NS) | Participants were encouraged to contact the team for access to the STAT API and to explore the data products available through the EODMS system.
Use of Open Source Tools for Vegetation Mapping	(MI) | The speaker highlighted the use of open source APIs for vegetation mapping, comparing Calgary to Ottawa, and emphasized the need for tools to be free and open for better accessibility and feedback.		(Opp) | There is an opportunity for university researchers to contribute to the field by making their tools free and open, which would enhance collaboration and feedback.		(SF) | The speaker mentioned that the data used for mapping is free and open, which is essential for mapping the entire country without incurring costs.	
Use of Satellite Imagery for Land Cover Mapping	(MI) | The use of satellite imagery, especially Sentinel-2, enhances the ability to map land cover and vegetation characteristics without needing to classify land types. Radiative transfer models and machine learning algorithms are employed to analyze satellite data effectively.					

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Utilization of NMAP Hyperspectral Sensor	(MI) | The NMAP hyperspectral sensor provides detailed spectral information at a 30-meter area, useful for assessing ground deformation and vegetation status.				(SF) | The sensor has smaller coverage than Landsat but offers detailed insights into water status and vegetation health.	
Water Dynamics in Canada	(MI) | The discussion highlighted the decrease of water in British Columbia due to glacier and snowmelt patterns, while Alberta is experiencing an increase in water levels as a recovery from a severe drought in 2002.				(SF) | The speaker provided evidence of water dynamics, indicating that most of Canada is either consistently wet or dry, with specific patterns observed in lakes and the Mackenzie Delta.	
Workshop Introduction and Acknowledgements	(MI) | The speaker emphasizes the importance of participant input for the workshop's success and acknowledges the support from organizations like CLRAE and Alberta Innovates, as well as volunteers who facilitated the event.					

Table 14. Session #1 – Topics and Highlights from the MeetGeek Summary Email.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Adoption of AI in Regulatory Processes	(MI) | The conversation highlights the potential of AI to process data and generate reports, but also points out the existing mistrust and regulatory policies that hinder its use.	(KQ) | The discussion raises the question of whether regulators are considering the adoption of AI technologies in their processes, especially given the raw data available for analysis.	(Opp) | There is an opportunity to streamline the permitting process and improve the alignment of land use plans with current developments, potentially through the use of AI.	(PRB) | Mistrust in AI tools and outdated regulatory criteria are identified as significant challenges that may hinder the effective adoption of AI in regulatory processes.		
Advantages and Limitations of REDCATS	(MI) | REDCATS allows for larger area assessments and improved safety compared to traditional methods.	(KQ) | Should there be standards for remote sensing data types?	(Opp) | Potential for hybrid approaches combining remote sensing and ground assessments for better data accuracy.	(PRB) | Current remote sensing products may not provide sufficient soil data for reclamation certification.	(SF) | Remote sensing can enhance traceability and standardization in assessments, reducing human error.	
Advantages and Limitations of Remote Sensing for Assessments	(MI) | Remote sensing can effectively assess landscape features and provide data for better polygon definitions in assessments.	(KQ) | What are the advantages or limitations of using red stats for assessments compared to field-level assessments?	(Opp) | Utilizing remote sensing data for pre-disturbance assessments to enhance understanding of land conditions.			
Advantages and Limitations of Remote Sensing in Landscape Assessments	(MI) | Remote sensing offers cost-effective, efficient, and repeatable assessments over large areas, but is limited by resolution constraints of available data.	(KQ) | What are the advantages and limitations of using RedCat for assessments compared to field level assessments?	(Opp) | Exploring the differentiation between publicly available and commercially available data for monitoring reclaimed landscapes.	(PRB) | The resolution limitations of free satellite imagery may hinder detailed assessments compared to higher resolution commercial data.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Advantages of Remote Sensing	(MI) | Remote sensing offers broader spatial coverage, repeatability, cost-effectiveness, and safety in remote areas.					
Beaver Populations in Reclaimed Areas	(MI) | Beavers can enhance biodiversity in reclaimed areas, but their impact on infrastructure must be managed.			(PRB) | Beavers may interfere with important water systems, necessitating management strategies in reclaimed landscapes.		
Capability and Workforce Challenges	(MI) | The need for skilled workers in geospatial disciplines and the challenges in hiring qualified personnel were discussed.		(Opp) | The presence of capable companies that can perform the required work was noted as a positive aspect for the industry.	(PRB) | The lack of geospatial skills in the current labor pool was identified as a significant challenge for the industry.		
Challenges in Remote Sensing Assessment	(MI) | Current methods can identify total ground cover but struggle with species differentiation; public interpretation of data can lead to misunderstandings.	(KQ) | What are the gaps in current technology for assessing ecological restoration?	(Opp) | Exploration of new technologies like drones and AI for better data collection and analysis in ecological assessments.	(PRB) | Current technology lacks the resolution needed for accurate species identification, leading to reliance on ground truthing.		
Challenges in Remote Sensing Data Interpretation	(MI) | The importance of considering environmental factors such as temperature and moisture when training data for different regions.	(KQ) | What are the fundamental questions we should ask regarding the changes observed in remote sensing data?		(PRB) | The challenge of applying remote sensing data at a broader scale due to regional variations in environmental conditions.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Challenges in Remote Sensing Integration	(MI) | The current system is outdated and needs to embrace new technologies for better data assessment and monitoring.	(KQ) | What comes first, regulations or process changes, in adapting to new remote sensing technologies?	(Opp) | There is potential for a standardized app to streamline data collection and improve compliance with regulations.	(PRB) | Bureaucratic red tape may hinder the implementation of new regulations and processes.		
Challenges with Environmental Criteria and Regulatory Communication	(MI) | Understanding the exact technical requirements from clients can save time and resources by preventing over-specification of data resolution. (MI) | The need for better communication with regulators and understanding of their requirements to avoid unnecessary complications in projects.	(KQ) | What specific environmental criteria are being imposed by regulators, and how can we effectively communicate our concerns?	(Opp) | There is a potential to streamline the process by clarifying the specific needs of clients and aligning them with regulatory expectations.	(PRB) | Frequent changes in staff at regulatory bodies lead to inconsistent communication and project delays.		(NS) | Engage GIS teams to ensure that technical requests align with actual project needs and avoid unnecessary complications.
Collaboration and Overlap in Operations	(MI) | The need for better coordination among teams to avoid redundancy in operations and reduce costs.	(KQ) | What are the implications of overlapping operations on costs and efficiency?		(PRB) | Challenges in achieving effective collaboration among different teams and stakeholders.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Commercially Available Analysis Products	(MI) | The main idea discussed was the ambiguity surrounding the classification of commercially available products and the necessity for clear policy definitions to address this gray area. (MI) | The main idea highlighted was the difficulty in detecting specific plant species using multispectral imagery due to mixed pixel challenges, and the limitations of current technology in achieving accurate species-level classification.	(KQ) | The conversation raised significant questions about the classification of commercially available analysis products and their status as publicly available data, emphasizing the need for policy definitions.				
Complexity in Redcap Products and Learning Mechanisms	(MI) | The conversation highlighted the importance of making Redcap products capable of learning from submissions and each other, emphasizing the need for standardized training data sets and a regulatory framework to facilitate this process.					

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Concerns Regarding Remote Sensing and Communication	(MI) | Clear communication is essential to address misconceptions about remote sensing and its role in reclamation processes.	(KQ) | What are the implications of using remote sensing for reclamation without proper communication to stakeholders?		(PRB) | Confusion and misinformation among stakeholders may hinder effective implementation of remote sensing technologies.		(NS) | Develop a communication strategy to educate Indigenous communities about the role of remote sensing in reclamation.
Cost-Effective Field Monitoring	(MI) | The main idea discussed was the importance of targeting field monitoring efforts to areas that require attention, rather than visiting sites with healthy trees, which is costly and unnecessary. (MI) | The idea was presented that different companies use various techniques for vegetation analysis, but the results can be similar, emphasizing the need for shared datasets.	(KQ) | A question was raised about whether the prioritization tool was accepted and continued to be used in the industry.	(Opp) | There is an opportunity to improve cost-effectiveness in field monitoring by utilizing data to direct efforts to problematic sites, enhancing efficiency.		(SF) | The discussion highlighted that making datasets publicly available can foster innovation and improve monitoring practices across the industry.	
Crop Density and Reclamation Monitoring	(MI) | The need for a shift in monitoring tools to focus on actual outcomes rather than traditional surrogates, and the potential of remote technologies to reduce site visits.	(KQ) | How can we adapt our monitoring tools to better reflect the outcomes we want to achieve in reclamation?	(Opp) | Exploring the use of machine learning and sensors to analyze vegetation and canopy height, which could improve reclamation monitoring.	(PRB) | The lack of agreed-upon standards for resolution in remote data capturing may hinder effective monitoring and analysis.		(NS) | Consider implementing more thorough data collection at the beginning of reclamation projects to establish a baseline for future monitoring.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Data Access and Interpretation	(MI) | Data should be shared among companies, but access should be restricted to those who can interpret it properly.	(KQ) | How do we determine cumulative effects without access to all relevant datasets?	(Opp) | Integrating reclamation liability costs into datasets could enhance understanding of environmental impacts.	(PRB) | Public access to data may lead to liability concerns for companies.		
Data Accessibility and Challenges	(MI) | Data submitted for regulatory purposes is often not easily accessible or standardized, hindering its use for comparisons and updates.	(KQ) | Why is reclamation activity data considered confidential?	(Opp) | Improving data sharing infrastructure could enhance collaboration and data accessibility across sectors.	(PRB) | Confidentiality and liability concerns prevent the sharing of certain data, complicating access for industry partners.		
Data Accessibility and Regulatory Requirements	(MI) | The need for standardization in data collection and the challenges of sharing data among producers were emphasized.	(KQ) | Is the data available electronically and publicly accessible?		(PRB) | Challenges in standardizing data collection methods and the limitations of sharing information due to proprietary restrictions were identified as significant hurdles.	(SF) | The quality and resolution of publicly available data may not meet the needs for comprehensive assessments, indicating a gap in data utility.	
Data Accessibility and Sharing	(MI) | Data collected for regulatory purposes is public and should be made accessible to enhance transparency and scientific research.	(KQ) | Should data access be expanded to the public?	(Opp) | Sharing data could provide insights into culturally sensitive areas and enhance scientific research in Alberta.	(PRB) | Concerns about data disappearing after submission and the lack of visibility for others to analyze it.	(SF) | Long-term data sets are available publicly, including satellite data dating back to the 1970s.	
Data Accessibility and Standards in Wildlife Monitoring	(MI) | The need for higher data standards in wildlife monitoring and the challenges of regulatory compliance were emphasized.	(KQ) | How can we improve access to blue data for wildlife monitoring?	(Opp) | There is potential for integrating various data sources to improve wildlife monitoring efforts across Canada.	(PRB) | The inconsistency in data standards and privacy concerns regarding data sharing were identified as challenges.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Data Accuracy and Collection Methods	(MI) | The conversation highlighted the need for accurate geolocation data in field surveys and the potential limitations of using cell phones for this purpose compared to dedicated GPS devices.	(KQ) | Participants questioned the reliability of geolocation data collected through different devices, particularly cell phones versus GPS locators, and how this affects data accuracy in field surveys.			(SF) | It was noted that while cell phones can be sufficient for some applications, dedicated GPS devices provide more accurate location data, which is crucial for precise field assessments.	
Data Assessment and Variability	(MI) | The necessity of starting with a common framework to ensure that different assessments are at least in the same context, even if they differ in results.	(KQ) | What should be done when different consultants provide varying assessments of the same site, despite both being reputable?	(Opp) | Exploring the integration of different data sets and recording systems to enhance the accuracy and reliability of assessments.	(PRB) | The challenge of ensuring continuous feedback and improvement in data sets, which can lead to dependency if not managed properly.		
Data Assessment Methods	(MI) | There are trade-offs between using imagery acquired less frequently at higher spatial resolution versus more frequent imagery at lower spatial resolution.	(KQ) | What are the advantages or limitations of using REDACs for assessments compared to field-level assessments?				
Data Authenticity and Accountability	(MI) | The need for accountability in data reporting to prevent falsification and ensure authenticity in environmental assessments.			(PRB) | Concerns about the reluctance of companies to share data due to liability issues and the fear of being held responsible for inaccuracies.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Data Availability and Regulatory Support				(PRB) | A challenge identified was the need for clarity on what data is necessary to meet regulatory requirements, which can complicate the relationship between consultants and producers.		
Data Collection and Comparability	(MI) | Using remote sensing and hyperspectral data can improve assessments of vegetation health and yield productivity.	(KQ) | What technology can bridge gaps in assessing yield on and off-site?	(Opp) | Exploring the integration of various sensors to enhance data collection efficiency in agricultural assessments.	(PRB) | Challenges in reconciling yield data from landowners with existing criteria for comparability.		
Data Collection and Management	(MI) | The main idea discussed was the importance of data aggregation and the potential risks associated with using AI tools for data handling, emphasizing the need for organizational policies.	(KQ) | There was a question raised about whether there are existing policies regarding the use of AI tools like ChatGPT within the organization, highlighting a need for clarity on data security and legal issues.		(PRB) | Concerns were expressed about the legal liabilities and data security risks associated with using AI tools, particularly the free versions that may send data to external servers.		
Data Collection and Regulatory Compliance	(MI) | The need for a more user-friendly data collection system that allows for easier access and comparison of data across different sites.	(KQ) | How is the data provided to regulators and how can it be shared effectively?		(PRB) | Current data formats and systems may hinder effective data retrieval and comparison, making it difficult for users to find relevant information.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Data Collection Standards and Tools	(MI) | The importance of electronic data collection and the need for standardized formats for data submission to regulators was emphasized.	(KQ) | Are there any standards that could be considered for REDCATS regarding data availability and accessibility?		(PRB) | Current lack of standardization in data collection methods across companies may hinder effective data sharing and analysis.		
Data Compatibility and Uncertainty Management	(MI) | The discussion highlighted the significance of revisiting previous assumptions in light of new data and the role of improved modeling in understanding uncertainties.	(KQ) | The main question raised was about the compatibility of different data sets and how they can be effectively utilized together.	(Opp) | There is an opportunity to enhance data sharing and collaboration among agencies to improve data utilization and mapping efforts.	(PRB) | Challenges may arise from the need for clear specifications and governance in data management and sharing.		
Data Interpretation and Qualifications	(MI) | The need for human intervention in data analysis was emphasized, as robots currently lack the capability to interpret data effectively.	(KQ) | The discussion raised questions about the qualifications of individuals conducting assessments and the implications of data interpretation.		(PRB) | Resource constraints and the qualifications of personnel conducting assessments were identified as potential challenges.		
Data Interpretation Conflicts	(MI) | Standardization could help resolve conflicts in data interpretation, but it may inhibit innovation among consultants.	(KQ) | Have you ever run into situations where you have conflicting data?		(PRB) | Standardization may block innovation in the use of new machine learning and AI tools.		(NS) | Develop a standardized test set for consultants to validate their models based on known outcomes.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Data Management and Integration Challenges	(MI) | The current reliance on Excel sheets limits the potential of geospatial data integration in land management.	(KQ) | Is there a company that does field-based assessments without using spatial mapping?	(Opp) | There is potential to create a centralized data management system that consolidates various data sources for better accessibility.	(PRB) | Data privacy concerns may hinder the sharing of pre-disturbance data among industry members.		
Data Models and Transparency in Land Reclamation		(KQ) | The discussion raised the question of whether sharing models is more critical than sharing data, highlighting the need for clarity on what regulators will accept as requirements.				
Data Quality and Standards in Commercial Data Products	(MI) | The conversation highlighted the inconsistency in data quality across different commercial data products and the necessity for improved standards and reference materials to enhance data applicability.		(Opp) | There is an opportunity to establish reference sites for testing and calibrating new data tools and sensors, which could improve the quality and applicability of data products.			

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Data Requirements and Consistency Issues	(MI) | Different software platforms handle data in unique ways, which can complicate data sharing and usage. (MI) | Establishing a standard baseline for data to improve clarity and usability across different clients and projects.	(KQ) | What specific data do clients need, and how can we ensure they understand how to use it?	(Opp) | Creating a standardized data format could simplify the process and enhance client satisfaction.	(PRB) | Clients often do not know exactly what they want, leading to miscommunication and delays in project timelines.	(SF) | The discussion highlighted that varying software capabilities can lead to challenges in data visualization and analysis.	
Data Resolution Challenges in Historical Contexts	(MI) | The resolution of data must be appropriate for the size of the footprint, especially when dealing with historical data.	(KQ) | What data resolution is necessary for effective analysis of pipelines and seismic activities?		(PRB) | Challenges arise when using historical data from the 1950s, which may not meet current resolution standards.	(SF) | Recent data from the last five years is more manageable compared to older data sets, which complicate analysis.	
Data Sharing and Compliance Challenges	(MI) | The importance of having accurate, georeferenced data for reclamation assessments and the potential of AI to improve data extraction from existing documents.	(KQ) | Is there a hesitancy to provide information within a database that possibly fails? .	(Opp) | Utilizing AI and machine learning to extract information from PDFs and improve data accuracy in reclamation processes.	(PRB) | The lack of regulatory requirements for data sharing hinders the availability of comprehensive data for reclamation assessments		(NS) | Participants to explore the possibility of establishing open standards for data collection and submission formats.
Data Sharing Challenges	(MI) | Creating a public platform for research projects could reduce costs and improve collaboration among companies.	(KQ) | Is sharing information about land resources an issue due to conflicts of interest?		(PRB) | Private land ownership may complicate the sharing of valuable resource data.	(SF) | Every borehole does not necessarily have coordinates attached, complicating data comparison with remote sensing.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Data Usage and Proprietary Challenges	(MI) | The importance of incentivizing data collection and the potential for government support to make data public.	(KQ) | How does IP play a role here in the data environment?	(Opp) | The existence of province-wide LIDAR data in Manitoba as a model for other regions.	(PRB) | Industry reluctance to spend money on data and the slow movement of government in making data available.		
Data Utilization in Regulatory Contexts	(MI) | The idea was proposed that regulatory data could be utilized to update publicly available geospatial datasets, enhancing their relevance and accuracy.	(KQ) | The meeting raised significant questions about the accessibility and electronic availability of regulatory data for comparison purposes.				
Digital Twin Concept and Data Challenges	(MI) | The idea of a digital twin is proposed to provide a live view of environmental conditions, highlighting the importance of data resolution and validation.	(KQ) | Is there misalignment on the state level regarding data accuracy and appropriateness?		(PRB) | Challenges with data resolution and the need for validation at the site level may hinder effective implementation of the digital twin concept.		
Drone Utilization and Economic Implications	(MI) | The need for industry to innovate solutions to scale drone usage economically and effectively.	(KQ) | What are the economic implications of requiring personnel to be within a certain vicinity of drones?	(Opp) | Exploring the use of VR technology in conjunction with drones for quality assurance and data processing.	(PRB) | Government regulations and costs associated with drone operations may hinder broader adoption and innovation.		
Experience and Regulation in Remote Sensing Roles	(MI) | Prior experience can be beneficial but may also lead to detrimental outcomes if individuals stray too far from established guidelines.	(KQ) | What is the impact of prior experience on performance in regulated roles?	(Opp) | There is potential to leverage technology for data analysis in remote sensing, which could enhance decision-making processes.	(PRB) | There may be hesitancy in utilizing new technologies due to concerns about validation and reliability of the data.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Funding and Reporting Structures	(MI) | The need for a reporting structure that can withstand funding variations and indicate the relevance of projects as funding changes.			(PRB) | The risk of funding being cut after elections, which could lead to project discontinuation and loss of staff.		
Geospatial Data and Pre-Disturbance Assessments	(MI) | The need for comprehensive geospatial data collection and governance was emphasized, with examples from other countries illustrating effective practices in data utilization.	(KQ) | The Alberta government is considering whether to seek support from private industry or manage the process independently, raising questions about collaboration and resource allocation.	(Opp) | There is potential for collaboration with companies that have expertise in geospatial data and technology, particularly those operating in conflict zones.	(PRB) | Challenges arise from proprietary data ownership, which can hinder collaboration and validation of data across different stakeholders.		
Geospatial Data Submission for Reclamation	(MI) | Geospatial data should be a requirement for reclamation certification to facilitate future assessments.			(PRB) | Current government technology limitations hinder the implementation of modern data systems for geospatial data submission.		(NS) | Consider funding mechanisms for technology upgrades to support geospatial data collection and submission.
GIS Team Challenges and Organizational Structure	(MI) | The need for better integration of GIS teams with project requirements and the importance of having subject matter experts to enhance task execution.	(KQ) | How can we improve the prioritization of tasks within GIS teams?		(PRB) | Organizational challenges in task prioritization and the varying structures of GIS teams may hinder effective collaboration and project delivery.		

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GIS Technology and Limitations	(MI) | GIS technology is powerful but has limitations such as hardware support and pricing that may affect small organizations.	(KQ) | What are the limitations of the current GIS technology in terms of hardware support and data synchronization?		(PRB) | Data synchronization issues can lead to inconsistent updates for users, which may hinder effective use of the technology.	(SF) | Different user account types incur varying costs, making it difficult for smaller organizations to afford the technology.	
Government Legislation and Data Criteria	(MI) | The need for updated legislation criteria and adaptable frameworks to incorporate new technologies was highlighted.	(KQ) | What are the implications of using outdated legislation criteria on current data reporting?		(PRB) | Rigid government policies may hinder the incorporation of new technologies and data validation processes.	(SF) | Current reliance on 2010 data makes it difficult to meet modern regulatory requirements, as emphasized by multiple speakers.	
Groundwater Issues and Professional Meetings	(MI) | The need for professionals to meet on-site to discuss literature and similar sites was highlighted, indicating a collaborative approach to problem-solving.					
Impact of Environmental Factors on Site Assessment	(MI) | The main ideas discussed included the importance of considering environmental factors in site assessments and the debate over the relevance of weeds in remote locations.	(KQ) | The conversation raised questions about the significance of weeds in remote areas and their potential impact on agriculture, particularly regarding how they might be introduced to farms by wildlife.		(PRB) | A challenge identified was the difficulty in determining the actual risks posed by weeds and the tendency to engage in 'what if' scenarios that may not be feasible.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Impact of REDCAT on Job Market and Skills	(MI) | The introduction of REDCAT may necessitate retraining of existing field workers and the need for new skill sets in data science, which could be in high demand across various industries.	(KQ) | What are the potential changes in job market dynamics due to the introduction of REDCAT technology?	(Opp) | There is an opportunity to rethink DSA requirements and explore the use of AI and machine learning for predictive capabilities in land use without needing to physically establish it.	(PRB) | Challenges may arise in measuring certain criteria, such as topsoil depth, using remote sensing technology, which could affect the assessment process.		
Importance of Systems and Models	(MI) | The conversation touched on the overlap of previous discussions, particularly regarding the interpretation of AI advancements and their implications for systems and models.	(KQ) | A question was raised regarding the secondary issues and consequences related to RedCat certification results, indicating a need for further exploration of this topic.		(PRB) | Challenges in interpreting AI advancements and their application in systems were noted, suggesting that while improvements are being made, there are still hurdles to overcome.		
Inconsistencies in Reporting Tools and Standards	(MI) | The need for standardized reporting tools and criteria to facilitate better data interpretation and collaboration among staff.	(KQ) | What standards can be established to ensure consistency in reporting tools among staff members?	(Opp) | The potential to improve stakeholder engagement and data reporting through the establishment of clear reclamation criteria and standards.	(PRB) | Resistance from some stakeholders to adopt new reporting standards and the challenge of educating them on the necessity of these changes.		
Integration of AI with Data Analysis	(MI) | The integration of AI with databases could simplify data analysis, allowing users to query data directly and receive insights without manual report generation.		(Opp) | There is potential for AI to provide insights on trends and patterns in data, which could lead to improved decision-making and efficiency in data handling.			

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Integration of GIS in Operations	(MI) | The integration of GIS technology can enhance operational efficiency, but there are challenges in ensuring that it is user-friendly for operators.	(KQ) | What are the advantages or limitations of updating existing reporting tools such as the Record of Observations or the Reclamation Information System for use across those sectors?		(PRB) | There is a disconnect between physical measurements and the capabilities of GIS tools, which may hinder the adaptation of these technologies in operations.		
Integration of Remote Sensing and Genomics	(MI) | Combining high-resolution remote sensing with eDNA assessments can enhance ecological understanding and habitat evaluation.		(Opp) | There is potential for integrating genomic data into habitat assessments, which is currently underutilized in remediation efforts.	(PRB) | Challenges exist in ensuring accurate data interpretation from models, which can lead to misidentification of features like trees and trampolines.		
Investment in Data and Remote Sensing	(MI) | The need for industry investment in data and the importance of confidence in adopting evidence-based practices were highlighted.			(PRB) | The conversation acknowledged that not all necessary investments come for free, indicating potential financial challenges for the industry.		
Land Cover Assessment for Reclamation Processes	(MI) | The importance of a land cover-based approach for reclamation processes was discussed, noting the different tolerances for grasslands versus forests and the role of machine learning in species identification.	(KQ) | The need for standardized training data submissions for effective model development was raised, questioning how to ensure data quality and origin.		(PRB) | Challenges in obtaining sufficient training data for machine learning models were identified, with a mention of the inadequacy of small sample sizes for effective training.	(SF) | Data from NAIT sites indicated that classification maps could help identify risks in grassland areas, despite not specifically identifying species like Canada thistle.	(NS) | The discussion suggested that creating a public asset for training data could enhance model development and species detection capabilities.

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Land Use Modification and Wetland Formation	(MI) | The main ideas included the importance of reporting and monitoring opportunistic wetlands, the use of advanced technologies for identification, and the need to align scientific findings with regulatory policies.	(KQ) | The discussion raised questions about the regulator's acceptance of land use modifications, particularly when a forest area is converted into a wetland.	(Opp) | There is an opportunity to enhance the understanding of wetland formation through the integration of field validation and remote sensing data, potentially leading to improved regulatory acceptance.		(SF) | The speaker mentioned successful validation of remote sensing data against field measurements, indicating a strong correlation between the two methods for identifying wetlands.	(NS) | Next steps involve applying the developed machine learning algorithm to different reclaimed areas to identify opportunistic wetlands for reporting purposes.
Limitations of Remote Sensing for Weed Detection	(MI) | High-resolution imagery(5cm or 2cm) provides significantly better data than low-resolution(20m) satellite imagery for weed detection.	(KQ) | What resolution imagery is most effective for accurately identifying weeds?		(PRB) | The limitations of remote sensing technology may hinder accurate weed detection, leading to misclassification and ineffective monitoring.	(SF) | Ground truthing is essential to verify remote sensing results, as demonstrated by the misclassification of reeds as thistles.	
Machine Learning Validation Methods	(MI) | Human validation is essential in machine learning to ensure accurate classification and avoid misinterpretation of data.	(KQ) | How did you guys find out about the trampolines?	(Opp) | There is potential to improve machine learning models by incorporating field validation methods to enhance accuracy.	(PRB) | Challenges arise when machine learning models are trained on data that does not accurately represent the field conditions, leading to misclassification.	(SF) | The AI and Python code used in analysis may not recognize specific objects like trampolines, necessitating field validation.	
Peer Review Methodology for Regulatory Applications	(MI) | The necessity of a formal dispute resolution process for differing assessments by field personnel.	(KQ) | What happens if two field assessors provide different evaluations?		(PRB) | Differences in assessments may lead to conflicts, especially if one assessor's evaluation contradicts another's.	(SF) | Assessors have discretion in evaluations, which can lead to variability in outcomes.	
Politeness to AI and Resource Usage	(MI) | The need for a balance between traditional methods and new technologies like REDCAT in assessments.	(KQ) | Is there a criteria developed for using REDCAT that differs from traditional methods?	(Opp) | Exploring the potential of using AI to augment field data collection and improve efficiency.			

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Provincial Policy Differences	(MI) | Policies differ significantly across provinces, affecting professional qualifications and collaboration opportunities.	(KQ) | How can consistency in reporting be achieved given the subjective nature of assessments across provinces?		(PRB) | Lack of harmonization in policies creates challenges for collaboration and consistency in reporting.	(SF) | Professional qualifications vary by province, requiring additional certifications for work across borders.	
Reclamation Assessment and Site Mapping	(MI) | The current reclamation assessment involves a 9x9 assessment method, allowing for variances in soil quality across different quadrants of a well site, indicating a structured approach to evaluating reclamation success.	(KQ) | A question was raised about the requirements for site mapping in reclamation assessments, specifically whether a gravel pit must be 100% reclaimed or if minor pockets of impacted soil are permissible.				
Reclamation Assessment Challenges	(MI) | Operators want to eliminate reclamation liability, complicating the need for extended data collection periods.	(KQ) | What level of data is required for reclamation assessments?		(PRB) | Operators may resist extended data collection due to liability concerns, impacting reclamation assessments.		
REDCAT Assessment Challenges		(KQ) | The group raised questions about the implications of REDCAT assessment failures due to increased resolution and the disagreements that may arise between different REDCATs.		(PRB) | Concerns were expressed about the costs associated with hiring external imagery services, which could hinder the implementation of REDCAT assessments.		

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Regulatory Acceptance and Remote Sensing	(MI) | The idea that regulatory acceptance is crucial for determining the models and data inputs used in remote sensing assessments was emphasized, suggesting that without clear guidelines, practices may vary significantly.					
Regulatory Application Process and Stakeholder Engagement	(MI) | The idea was presented that engaging with regulators early in the application process can help clarify expectations and improve the quality of submissions.	(KQ) | The question was raised about whether the Alberta Energy Regulator conducts pre-application meetings, indicating a need for clarity on their current practices.	(Opp) | The potential for using advanced GIS tools and imagery in regulatory reporting was discussed, which could enhance the quality of submissions and compliance tracking.	(PRB) | Challenges related to the historical compliance of older sites and the complexity of integrating new technologies into existing frameworks were highlighted.		(NS) | There is a push for integrating regulatory assurance frameworks into the application process to address stakeholder concerns more effectively.
Regulatory Challenges in Oil and Gas	(MI) | Remote sensing is being utilized for environmental monitoring, with industry projects providing satellite imagery to assess site conditions and identify problematic areas.	(KQ) | The main question raised is whether new technologies will be accepted and supported in regulatory decisions, indicating a concern about the future of innovation in the sector.				

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Regulatory Requirements and Data Utilization	(MI) | The main idea discussed was the limitation of RIS as a historical record and the need for more detailed data to validate environmental outcomes and trajectories towards closure certification.	(KQ) | The participants questioned whether data submitted as a regulatory requirement could be effectively used for comparisons of similar disturbance types, highlighting the need for clarity on this issue.	(Opp) | There was an opportunity mentioned regarding the use of large amounts of regulatory data for AI and machine learning training to better relate remote sensing criteria to eventual outcomes.	(PRB) | A potential roadblock identified was the inability to compare regulatory data effectively due to varying inputs and conditions across different sites, which complicates the analysis of environmental impacts.		
Remote Sensing and Data Collection	(MI) | The need for open-source data that everyone can access and the importance of metadata in scientific data publication were highlighted.	(KQ) | How can we ensure that data collected in the field is accurate and standardized to avoid discrepancies?	(Opp) | Exploring the use of machine learning to analyze diverse datasets and improve data collection methods.	(PRB) | Challenges in getting practitioners to report accurate GPS locations and the variability in data collection methods were noted.	(SF) | The discussion included specific examples of GPS inaccuracies and the implications for data reliability.	(NS) | Consider adapting current methodologies to minimize human bias in data collection and assessment.
Remote Sensing and Fire mapping	(MI) | The discussion highlighted the significance of real-time reporting in fire mapping and the utilization of satellite imagery to monitor hotspots, which can enhance data collection efficiency.		(Opp) | There is potential for improved collaboration in remote sensing efforts, as many organizations are working on similar problems but in isolation, leading to duplicated efforts.			(NS) | The meeting is officially concluding, and the recording is being stopped, indicating that no further discussion will take place.
Remote Sensing and Soil Measurement	(MI) | Remote sensing can indicate soil conditions but should be balanced with field measurements for accuracy.	(KQ) | Is remote sensing the final metric for soil condition measurement?	(Opp) | Exploring new methodologies for assessing reclamation without relying solely on existing criteria.	(PRB) | The challenge of changing mindsets from traditional soil measurement to a more integrated approach with remote sensing.		

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Remote Sensing for Auditing Efficiency	(MI) | Remote sensing allows for more efficient audits by identifying problem sites without the need for physical site visits.		(Opp) | There is potential for improved data sharing and joint land use planning strategies to enhance remote sensing applications.	(PRB) | Challenges exist in applying remote sensing effectively in forested environments due to accessibility and disturbance issues.		
Remote Sensing in Reclamation Assessments	(MI) | The main idea presented was that remote sensing allows for more frequent assessments of land recovery, which could be beneficial for reclamation success. (MI) | The speakers emphasized the need for established standards regarding spatial resolution and data accessibility for red card assessments.	(KQ) | The discussion raised questions about the necessity of multiple assessments when using remote sensing technology compared to field assessments.		(PRB) | A challenge mentioned was the current regulations that do not allow for a broader view in justifying the presence of undesirable species in reclamation assessments.		
Setting Standards and Compliance Challenges	(MI) | The need for a standardized template for data submission that is adaptable to different facilities and jurisdictions was discussed.	(KQ) | How can we enforce compliance with the established standards given the variability in data submission practices?	(Opp) | There is an opportunity to improve communication and understanding of terminologies between engineers and practitioners to enhance data submission accuracy.	(PRB) | Variability in data collection methods across different jurisdictions poses a significant challenge to standardization.		

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Site Assessment and Liability	(MI) | The conversation included ideas about the economic feasibility of auditing a large number of sites and the need for appropriate spatial resolution in assessments.	(KQ) | The discussion raised questions about the readiness of tools for assessment versus screening, and what standards should be considered for RE-DAC assessments.		(PRB) | Challenges were identified regarding the economic feasibility of conducting detailed audits on a large number of sites, which may hinder effective assessments.	(SF) | It was noted that clients are often unwilling to pay for high-resolution assessments, which impacts the feasibility of implementing recommended standards.	
Soil Management in Forest Environments	(MI) | The discussion focused on the challenges of soil management in forested areas, particularly the need to maintain natural soil distribution rather than artificially restoring it.					
Soil Structure and Quality Assessment	(MI) | Hyperspectral systems have untapped potential for soil assessment, and satellite approaches may surpass field assessments for terrain stability.	(KQ) | What aspects of soil structure or quality can be evidenced in the ecosystem?	(Opp) | Exploring the use of radar for soil moisture detection and its application in reclamation and agriculture.	(PRB) | Soil moisture detection is limited under heavy canopy, which poses a challenge for remote sensing methods.		
Spatial Resolution Standards in Remote Sensing	(MI) | Different land types require different spatial resolutions for effective remote sensing, with agriculture being more advanced than forestry.	(KQ) | Should there be standards for spatial resolution in remote sensing, and how does it vary by land type?	(Opp) | High-resolution remote sensing could support biodiversity assessments and habitat protection in forestry.			

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Staffing and Resource Allocation	(MI) | The team size is currently around 100, which is considered small for the tasks at hand. There is a suggestion that a private company could manage with a larger team.	(KQ) | How many people are currently on the team and is it sufficient for the workload?	(Opp) | There is potential for growth in staffing to improve efficiency and effectiveness in operations.	(PRB) | Limited budget and resources may hinder the ability to expand the team as needed.		
Standardization and Data Utilization	(MI) | Standardization of data collection processes can enhance model training and improve outcomes. The RAMI model was mentioned as a relevant framework for testing and improving models.	(KQ) | What other initiatives could benefit from a standardized approach to data collection and model training?	(Opp) | Exploration of other systems that could utilize the standardized approach, such as Alberta Data Partnerships and registered interests on titled land.			
Standardization in Data Collection	(MI) | Standardization in data collection is essential for consistency across different projects and regions.		(Opp) | There is potential for creating a data portal for sharing raster data and assessment points to enhance reproducibility.	(PRB) | Economic motivations may hinder data sharing among companies, impacting collaboration.		(NS) | Explore the implementation of a data portal for remote sensing data to improve access and reproducibility.
Standardization of Data Reporting	(MI) | Standardization of data reporting is crucial for effective regulatory approval and data processing using AI tools.			(PRB) | Current reporting tools may not accommodate remote sensing data effectively, limiting their utility in assessments.		(NS) | Participants to explore ways to integrate remote sensing data into existing reporting frameworks for comprehensive assessments.

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Standardization of Reporting Tools	(MI) | Standardizing the Record of Observation is crucial for consistent data submission to regulators.	(KQ) | What are the limitations preventing updates to the reporting procedures?	(Opp) | Implementing geo-referenced images in reporting could enhance data quality and accessibility.	(PRB) | Current regulatory processes and outdated technology hinder the implementation of improved reporting formats.		
Standardization of Restoration Efforts	(MI) | The necessity of standardizing data input and assessment methods to facilitate better comparisons and evaluations of restoration efforts.	(KQ) | What standardized tools can be implemented to ensure consistency in restoration assessments across different regions?	(Opp) | Utilizing AI technology to automate the standardization of data input and improve the efficiency of restoration assessments.	(PRB) | The challenge of integrating various standards from different contractors and ensuring that the standardized approach is accepted by all stakeholders. (PRB) | The variability in data collection methods among different contractors poses a challenge for achieving consistent assessments.		
Standards for Remote Sensing	(MI) | Standards should ensure consistency and repeatability in remote sensing methods, avoiding proprietary techniques.	(KQ) | What should be the standards and resolutions for remote sensing measurements?	(Opp) | There is potential to develop standards based on existing global geospatial standards and biophysical measurements.			
Technology Implementation and Regulatory Framework	(MI) | The need for a hybrid monitoring approach as technology evolves, and the importance of balancing excitement for new technologies with operational reliability.	(KQ) | What parameters and data types can be trusted for remote sensing applications, and how can we identify areas of concern effectively?	(Opp) | There is potential to leverage new data sources and technologies that may surpass current capabilities, but this requires a flexible regulatory framework.	(PRB) | Challenges include the uncertainty of data reliability and the need for inspectors to understand and trust new technologies.		

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Trends and Environmental Impact Assessment	(MI) | The need to assess environmental trends over multiple years rather than at a single point in time, particularly in relation to drought conditions.	(KQ) | How do we evaluate trends over a longer time frame to understand their impact on local environments?	(Opp) | Identifying and analyzing trends across a province can lead to better environmental assessments and site evaluations.			
Updating Reporting Tools	(MI) | The discussion included considerations for potential updates or changes to reporting systems, emphasizing the need for input on what changes might be necessary.	(KQ) | The main question raised was about the advantages or limitations of updating existing reporting tools for use across other sectors, which sets the stage for further exploration of this topic.				
Use of Earth Observation Methods	(MI) | The use of Earth Observation methods can lead to positive effects and increased transparency in monitoring. Citizen scientists can contribute to monitoring efforts, particularly in identifying emission sources like methane leaks.			(PRB) | Challenges include the need for continuous monitoring and the difficulty in reconciling different models and definitions over time, which complicates data consistency and interpretation.		
Use of Remote Sensing in Environmental Monitoring	(MI) | The discussion emphasizes the complexity of assessing problematic sites, particularly in remote areas, and the need for reliable data to inform regulatory decisions.		(Opp) | There is an opportunity to enhance the understanding of remote sites through observation and data collection, which could lead to better management practices.	(PRB) | A significant roadblock identified is the lack of trust in the data provided by the industry, which may hinder the acceptance of new technologies.		

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Utilization of Remote Sensing in Land Management	(MI) | RedCats can facilitate quick assessments and comparisons of land types without extensive field visits.			(PRB) | There is a lack of standardized methods and trust in remote sensing data among stakeholders.	(SF) | Historical data from oil and gas sectors can be leveraged to improve reclamation assessments.	(NS) | Consider developing standardized criteria for RedCat measurements to enhance regulatory acceptance.
Validation of Remote Sensing Data vs. Ground Data	(MI) | The need for location-specific evaluations and the comparison of remote sensing data with farmer yield maps to determine validity.	(KQ) | How do we validate remote sensing data against ground data, and which data source holds more validity in specific contexts?		(PRB) | Discrepancies between remote sensing data and ground data may lead to confusion and undermine trust in data sources.		
Vegetation Analysis and Landowner Perspectives	(MI) | The main ideas included the need for multiple assessments throughout the growing season and the subjective nature of landowner expectations regarding land productivity.	(KQ) | The discussion raised questions about the importance of stem count and how it relates to the end goals of vegetation analysis, particularly in terms of species diversity.		(PRB) | Challenges include the subjective opinions of landowners, which can vary significantly, and the historical data quality that complicates site certification.	(SF) | The discussion referenced the effectiveness of using helicopters for vegetation analysis and the importance of having consistent data resolution for accurate assessments.	
Vegetation and Soil Reclamation	(MI) | Healthy vegetation may reduce the need for detailed soil measurements, as it can indicate successful reclamation.				(SF) | Rangeland specialists prioritize vegetation outcomes over soil measurements in reclamation assessments.	

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Vegetation Measurement Challenges				(PRB) | A potential roadblock identified was the challenge of mixed pixels in training datasets, which complicates the identification of specific species like Canada Thistle, affecting the accuracy of vegetation monitoring.		
Weed Management and Land Capability	(MI) | The idea that the presence of weeds does not necessarily indicate a lack of land capability was discussed, along with the need for ongoing management to maintain certification. (MI) | The benefits of using LIDAR for large area coverage and reduced field exposure hours were discussed, along with the challenges of accurately counting stems in different conditions.	(KQ) | The participants questioned whether adaptive management is required after certification if weeds are present.	(Opp) | The potential use of LIDAR technology for regeneration surveys was highlighted as a way to improve efficiency in monitoring tree performance.	(PRB) | Challenges related to the accuracy of stem counts due to canopy cover and the resolution of the LIDAR system were identified as potential issues.	(SF) | It was noted that audits by the AER could lead to certification cancellation if weed issues are not reported, emphasizing the importance of accurate reporting.	
Yield Measurement Discrepancies	(MI) | The health of crops and various parameters are measured, but discrepancies exist between field assessments and yield monitors.	(KQ) | What remote sensing tools can support yield conclusions when field assessments and yield monitors disagree?	(Opp) | Exploring remote sensing as a method to improve yield assessment accuracy.	(PRB) | Sampling design errors may lead to inaccurate yield assessments.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
	(MI) | Clients often prefer not to share their data with regulators due to concerns over misinterpretation.		(Opp) | There is a need for a centralized repository for data to improve accessibility and transparency.	(PRB) | Regulatory bodies may lack the expertise to interpret complex data accurately, leading to potential misinterpretations.		

Table 15. Session #2 – Topics and Highlights from the MeetGeek Summary Email.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
AI and GIS Limitations		(KQ) | The discussion raised questions about the limitations of AI and GIS technologies and how the industry can address these challenges.				
AI Review of Applications	(MI) | The main idea discussed was the possibility of using AI to streamline the application review process, potentially eliminating the 30-day waiting period if no submissions are made.	(KQ) | Participants questioned whether AI could effectively replace the current review process and what specific criteria would be used in such a system.		(PRB) | Concerns were raised about the lack of formal AI review processes and the complexities involved in implementing such a system.		
Application of Data from RECAD	(MI) | The main idea discussed was the importance of using tools to address the colonization of weeds in disturbed areas to prevent further delays in recovery.	(KQ) | The discussion raised questions about the resilience of sites after disturbances and the potential for weeds to colonize disturbed areas if action is delayed.		(PRB) | A potential roadblock identified was the delay in addressing the colonization of weeds, which could lead to further complications in site recovery.	(SF) | Supporting facts included the observation that areas previously disturbed are more prone to weed colonization, which could hinder recovery efforts.	
Application of REDCATS in Reclamation	(MI) | The main idea discussed was the potential economic advantages of applying REDCATS in both remote and populated areas, and the importance of addressing trust issues in the application.	(KQ) | The discussion raised questions about the appropriateness of using REDCATS for reclamation sites, particularly in low-risk areas and how regulators assess these risks.	(Opp) | There is an opportunity to streamline the reclamation process by using satellite-derived products for certification in low-risk areas, which could enhance efficiency.	(PRB) | A potential roadblock identified was the backlog on audits and certification processes, which could hinder the implementation of REDCATS.	(SF) | The discussion highlighted that many wells in Southern Alberta were drilled post-2000, indicating a significant volume of reclamation work needed, which supports the need for effective reclamation strategies.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Application of Research and Data Sharing	(MI) | There is a need for a common tool that can be used across different sites, and research funding should be directed towards answering specific industry questions.	(KQ) | What formal mechanisms exist for Alberta to address the concerns raised by local communities and industries regarding reporting methods?		(PRB) | The uncertainty in reporting methods and the lack of data to support changes in practices may hinder progress.	(SF) | There is significant R&D work that has been done, indicating that certain methods can measure specific outcomes, but there is a need for consensus on what works.	(NS) | Explore how to better direct research funding to address industry concerns and improve reporting methods.
Assessment Methodology and Performance Metrics	(MI) | The need for a comprehensive list of metrics for eco-site assessments and the potential for different REDCAT procedures to yield varied results.	(KQ) | What are the specific performance measures that need to be assessed for eco-sites, and how do they relate to current policies?	(Opp) | Exploring the use of REDCAT techniques to potentially replace traditional field assessments and improve efficiency in eco-site evaluations.	(PRB) | Challenges in determining which metrics can be effectively assessed using REDCAT techniques compared to traditional methods.		
Assessment Methodology for Environmental Monitoring	(MI) | The MOFRA algorithm compares NDVI values to assess environmental conditions, and the need for different references in the absence of controls was highlighted.	(KQ) | What references do you use when there are no suitable controls for environmental assessments?				(NS) | Clarify the references needed for different types of applications in environmental assessments.
Assessment of Reclaimed Sites	(MI) | The main idea discussed was the need for retrospective assessments of reclaimed sites to evaluate their current conditions and compliance with modern standards.	(KQ) | The discussion raised questions about the effectiveness of past reclamation efforts and whether the current standards are being met by older sites.	(Opp) | There is an opportunity to utilize new technologies for monitoring reclaimed sites, which could enhance understanding and management of these areas		(SF) | It was noted that many sites reclaimed under the 1995 policy are still performing well, despite not meeting current requirements, indicating a potential for further research and assessment.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Assessment of Site Variability	(MI) | The need for regulation on assessing anomalies and the importance of professional judgment in site evaluations.	(KQ) | How far out can one look for similar anomalies to a site without misrepresenting the data?		(PRB) | Bias in assessment may lead to overlooking significant areas of the site, focusing only on negative aspects.		
Assessment of Traditional Methods	(MI) | The need for a framework that inspectors can use for evaluations was emphasized, suggesting that the current methods may not be adequate due to a lack of trust and understanding.	(KQ) | The question of whether a comparative assessment has been conducted was raised, indicating a gap in current practices.		(PRB) | The lack of policy and mechanisms for approval was identified as a significant barrier to effective assessment.	(SF) | The discussion noted that inspectors are uncertain about what data to trust, indicating a need for clarity and structure in the assessment process.	(NS) | It was suggested that a larger pilot program could help establish what methods and data types are reliable for assessments.
Assessment of Wetland Reclamation	(MI) | The conversation highlighted the importance of classifying land by risk, particularly in relation to reclamation success and the differences in risk profiles between various land types.	(KQ) | The need to compare traditional field level assessments with new methods was raised, questioning how this comparison could enhance trust among stakeholders.	(Opp) | There is potential for improved trust and collaboration among industry, landowners, and regulators through comparative assessments of reclamation methods.	(PRB) | Challenges in determining the duration and statistical relevance of impaired assessments were discussed, indicating potential difficulties in implementing new assessment methods.		
Automation in Data Processing	(MI) | The emphasis is on developing an automated system that processes imagery data and alerts users to changes without manual intervention.					
Automation in Operations	(MI) | The main idea discussed was the benefits of automation in operations, particularly in	(KQ) | The conversation raised questions about the effectiveness of human operators in automated	(Opp) | The discussion identified opportunities for further integration of GIS technology in mining		(SF) | The speakers provided examples of successful automation in mining operations, such as	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
	reducing human error and improving communication among automated systems.	systems and the potential risks involved.	operations to enhance automation and monitoring capabilities.		the use of drones for survey data collection, indicating a trend towards increased automation in the industry.	
Calibration of REMOTO System	(MI) | The calibration of the REMOTO system involves using field data and expert judgment to improve accuracy, with a target accuracy above 80%.	(KQ) | How can professional judgment be standardized in remote sensing assessments?	(Opp) | Exploring methods to standardize professional judgment in remote assessments could enhance the reliability of the calibration process.		(SF) | The accuracy of the REMOTO system is claimed to be above 80%, which is considered a good threshold for assessments.	
Challenges in Data Collection and Assessment	(MI) | A shift in thinking is needed regarding reclamation standards and the use of drones for data collection. o(MI) | Technology can provide valuable historical data and support evidence of environmental impacts.	(KQ) | Is there enough understanding around what is required to meet equivalent land capability?	(Opp) | Using historical data and spectral recovery to track site recovery over time.	(PRB) | New criteria from 2010 have complicated the understanding of land capability assessment.	(SF) | Landsat and Sentinel data can show spectral recovery and track environmental changes over time.	
Challenges in Data Harmonization				(PRB) | The lack of harmonization among different satellite systems creates challenges in data processing, as each entity is working on its own harmonization efforts.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Challenges in Grassland Species Identification	(MI) | Identifying species level in grasslands is a significant challenge, requiring extensive research and development.	(KQ) | Which REDCAT criteria would require additional R&D?	(Opp) | There is a need for more flexible criteria in REDCAT to accommodate the complexities of grassland management.	(PRB) | The difficulty in achieving species-level identification in grasslands poses a major challenge for land management.		
Challenges in Pipeline Monitoring	(MI) | There is a significant portion of the industry resistant to change, particularly in pipeline monitoring practices.		(Opp) | Encouraging companies to utilize remote sensing technology for better monitoring and data collection.	(PRB) | The lack of a value proposition for companies to adopt remote sensing technology is a major barrier.		
Comparison of REDCAT and Traditional Assessment Criteria	(MI) | It was suggested that REDCAT might provide better measurements for certain criteria, such as canopy cover, while traditional methods may still be relevant for others, like soil assessment.	(KQ) | The need to compare REDCAT assessments to traditional field-level assessment criteria was questioned, particularly regarding how pass/fail decisions would be made using REDCAT criteria.	(Opp) | The discussion highlighted the potential for technology to emulate traditional measurement criteria, suggesting a need to explore how REDCAT can measure productivity effectively.			

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Comparison of Remote Sensing Methods	(MI) | The main idea presented was that helicopter-based remote sensing provides much better resolution and accuracy compared to satellite imagery, which often has limitations in smaller areas. (MI) | LiDAR is utilized for erosion control by identifying areas needing intervention and analyzing water flow patterns, which can be crucial for environmental management.	(KQ) | The speaker questioned the differences in quality between various remote sensing methods, specifically asking how flying a line or sight compares to using satellite imagery.	(Opp) | The discussion highlighted the potential for using LiDAR technology to gather detailed information about soil structure and erosion, suggesting it could outperform traditional site visits.		(SF) | The speaker provided supporting facts about the limitations of satellite imagery, such as the inability to achieve high resolution and the common misconceptions about the quality of platforms like Google Earth.	(NS) | The discussion implied the need for further exploration of LiDAR applications in remote areas where traditional site visits are impractical.
Cost Comparison of Remote Sensing	(MI) | Remote sensing can reduce costs and improve efficiency in site assessments compared to traditional methods.	(KQ) | What is the cost comparison between using consultants and remote sensing technologies for site assessments?	(Opp) | Collaboration with organizations like PTAC could enhance remote sensing initiatives for land reclamation.		(SF) | Remote sensing can provide comprehensive data over large areas, which is more efficient than individual site visits.	
Criteria for Remote Sensing in Land Reclamation	(MI) | Remote sensing technologies like LiDAR and satellite-derived data can be used for assessing land reclamation parameters.	(KQ) | Are there equivalent REDCAT criteria for existing criteria, and should new criteria be developed?		(PRB) | Inconsistencies in current remote sensing applications make it difficult to evaluate the validity of technologies and criteria.		(NS) | Participants to compile a list of remote sensing technologies that can meet the criteria discussed.

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Criteria Variances in Data Evaluation		(KQ) | Are there certification criteria that cannot be technically implemented versus those that should not be implemented due to preference or bias?				
Data Access and Challenges	(MI) | The need for enhanced title mapping and the challenges posed by proprietary data access.	(KQ) | Who owns the data and who is responsible for its creation?	(Opp) | Potential use of various remote sensing technologies for environmental monitoring and reclamation efforts.	(PRB) | The complexity and cost associated with accessing and utilizing proprietary data for land reclamation.		
Data Access and Yield Prediction	(MI) | Accessing farmers' data could eliminate the need for certain research efforts, as yield predictions can be made using satellite data.	(KQ) | Why wouldn't we need access to farmers' data if we can do it ourselves?	(Opp) | Utilizing open data sources could help streamline research and reduce costs in land management.	(PRB) | Regulators have no incentive to approve changes in processes, which hinders the adoption of new data practices.		
Data Collection and Assessment Techniques	(MI) | The need for consistent data collection methods across different technologies was emphasized.	(KQ) | Is the raw data provided to regulators or just conclusions?	(Opp) | Utilizing remote sensing data for comprehensive site assessments could enhance auditability and reliability.	(PRB) | Data storage costs and the challenge of managing large datasets were identified as significant issues.		
Data Collection and Processing	(MI) | The need for standardized software for data processing was emphasized, as different users are employing various tools leading to inconsistencies in data output.	(KQ) | Is data processing also part of the data collection process?		(PRB) | The lack of a unified software solution for data processing may hinder effective data analysis and integration.	(SF) | Different software like Pix4D and EASRI have varying capabilities, which affects the quality of data outputs such as NDVI and digital surface models.	

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Data Collection Challenges	(MI) | The need for standardized data collection methods to address variability in environmental data.		(Opp) | Exploration of integrating various data sets like LiDAR and satellite imagery for comprehensive analysis.	(PRB) | Lack of models to analyze small-scale variances between seasonal changes and climate change over time.	(SF) | Georeferencing data has improved significantly, allowing for more precise measurements in data collection.	
Data Collection Criteria Development	(MI) | The need for tailored data collection criteria based on land use types, such as agricultural versus forested areas, to ensure appropriate data quality for specific applications.	(KQ) | What specific criteria should be developed for different land types to ensure data quality and relevance?	(Opp) | There is potential for collaboration between GIS experts and reclamation specialists to develop effective data collection criteria.	(PRB) | Challenges may arise in validating the equivalency of new data collection methods with existing field assessments, which could complicate the approval process for reclamation certificates.		
Data Collection Methods and Challenges		(KQ) | What are the reliability and effectiveness of remote sensing data in assessing difficult sites?	(Opp) | Utilizing algorithms for better resource allocation in site audits could enhance regulatory efficiency.			
Data Integration and Database Management	(MI) | The team discussed the integration of various datasets using license IDs to append geographic data, enabling AI queries on a comprehensive database.	(KQ) | Questions arose regarding the accuracy of data collection methods for specific land types, particularly peatlands and wetlands, and how land cover influences data quality.	(Opp) | There is potential for utilizing free government data to enhance the existing database, which could improve data accuracy and accessibility.	(PRB) | Challenges were identified regarding the accuracy of remote data collection in wet conditions and the need for multiple site visits to gather reliable data.		
Data Licensing and Accessibility	(MI) | Open-source data availability is a concern, as it may reduce the incentive to pay for proprietary data.			(PRB) | Data licensing and financial barriers may prevent access to high-resolution satellite imagery and drone data.		

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Data Licensing and Proprietary Formats	(MI) | The conversation highlighted the frustration with proprietary file formats from companies like Trimble and DJI, which complicate data sharing and integration.	(KQ) | Participants raised questions about whether the data uploaded is open source and how this could affect companies providing the data.				
Data Ownership and Access Control	(MI) | The main idea presented was the necessity for asset owners to manage their data effectively and the potential for developing tools that enable easy data transfer between different systems.	(KQ) | The discussion raised questions about whether larger companies would allow access to their digital systems for external users, depending on their account status and contractual agreements.	(Opp) | There is an opportunity to create a platform that allows regulators and consultants to view data for specific sites without transferring all data, enhancing collaboration while maintaining security.	(PRB) | A potential roadblock identified was the reluctance of companies to share raw data with regulators unless necessary, which could hinder transparency and collaboration.		
Data Processing and Quality Assurance	(MI) | The need for both raw and processed data to be included in applications, with an emphasis on providing clear information on how data applies to specific problems.	(KQ) | What level of raw data is necessary for effective analysis, and how can it be processed to ensure meaningful information is derived?		(PRB) | Most users may not understand raw data without proper processing and explanation, which could hinder effective use of the data.	(SF) | The discussion highlighted the importance of providing imagery and datasets like LiDAR and DEM to support analysis and verification processes.	(NS) | Outline the QAQC processes for data handling to ensure clarity and usability for users.
Data Quality and Standards in Remote Sensing	(MI) | The need to differentiate between qualitative and quantitative assessments in remote sensing data, and the importance of validated datasets for client satisfaction.	(KQ) | What standards should be applied for data quality and reporting in remote sensing?		(PRB) | Challenges in measuring soil quality and wildlife, as well as the inherent uncertainty in remote sensing data.		(NS) | Evaluate how much the data is predicting and ensure clarity on what clients want from remote sensing data.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Data Quality and Transparency in Satellite Observations	(MI) | The need for companies to provide clear methodologies and data sources in their reports to enhance trust and validation of their data products. (MI) | The importance of having a standardized, open-source method for data reporting to facilitate validation and review processes.	(KQ) | How can companies demonstrate the quality of their data products and the methods used to derive them?	(Opp) | There is an opportunity to create standardized methods for data reporting that can enhance transparency and trust in satellite data products.	(PRB) | Companies may be hesitant to share detailed methodologies due to concerns about losing competitive advantage.	(SF) | The discussion referenced a specific example where a company failed to mention the use of satellite observations in their data products, highlighting a gap in transparency.	(NS) | Encourage companies to adopt open standards for data reporting to facilitate easier review and validation of their data products. (NS) | Develop and promote open-source standards for data reporting in satellite observations to enhance transparency.
Data Sharing Agreements for Environmental Monitoring	(MI) | Establishing a single data sharing agreement where all stakeholders contribute financially and access the same dataset, similar to successful models in Australia.	(KQ) | How do we secure funding for a unified data sharing model that benefits all stakeholders?	(Opp) | The potential to implement a collaborative data sharing model in Alberta, inspired by successful practices in Australia.	(PRB) | The current bureaucratic processes and hurdles in accessing data may hinder the implementation of a unified data sharing agreement.		
Data Sharing and Open Source Requirements	(MI) | The idea that data should be open source in test areas was discussed, along with the challenges of accessing specific data for monitoring programs.	(KQ) | The need for open sharing of information was raised, questioning how to facilitate this among companies.	(Opp) | There are opportunities to utilize remote sensing for soil analysis, which could enhance understanding of soil conditions and improve monitoring efforts.			
Data Standardization and Sharing	(MI) | There is a significant amount of data being collected, but it is not being shared effectively due to various challenges.	(KQ) | What are the data quality standards that need to be set for remote sensing?	(Opp) | Exploration of remote sensing projects for archival imagery and the potential for public data availability.	(PRB) | Concerns about sharing data with competitors and the need for regulatory frameworks to ensure fair data sharing.		

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Data Submission Requirements and Challenges	(MI) | The need for a repeatable and reproducible data system was emphasized, along with the importance of defining criteria for site assessments.	(KQ) | The question arose about whether the current data capture requirements are excessive, which could lead to a reevaluation of the data needed for assessments.	(Opp) | There is potential to explore the use of REDCAT for additional important functions if current data capture is deemed excessive.			
Data Utilization for Vegetation Regeneration and Land Disturbance	(MI) | Combining vegetation regeneration data with other metrics can provide more informative insights for site assessments.	(KQ) | What data would be needed to support applications related to vegetation regeneration and land disturbance?	(Opp) | There is potential value in submitting training data to help build out training models for applications.	(PRB) | Concerns about sharing high-resolution imagery due to licensing restrictions and readiness to report on certain areas.		
Demonstrable Technology and Methodology	(MI) | Technologies must be proven before being included in discussions; each data set has its limitations based on application.	(KQ) | What constitutes a demonstrable technology or methodology for soil moisture and compaction applications?		(PRB) | The challenge of overlapping technologies and methodologies that may lead to confusion in application.		(NS) | Create a document outlining the limitations and capabilities of each technology and methodology discussed.
Detailed Site Assessment (DSA) Methodology	(MI) | Main ideas included the importance of assessing erosion, soil depth, vegetation health, and the presence of invasive species as part of the DSA methodology.	(KQ) | The discussion raised significant questions about what a DSA should consist of and how to effectively assess a site using remote sensing.			(SF) | Supporting facts included specific metrics for assessing vegetation health, such as the number of plants, their height, and the diversity of species present.	
Differentiation of Software in Drone Data Processing	(MI) | The output quality and data standards are crucial in differentiating software solutions in the drone data processing market.	(KQ) | What are the criteria for selecting a company that meets data standards for drone services?		(PRB) | Regulatory constraints may limit the ability to recommend specific companies for data processing.	(SF) | The discussion highlighted that many companies have not executed drone data processing correctly, leading to distorted outputs.	(NS) | Establish a standard for data output and reporting to ensure quality and compliance among service providers.

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Discussion on GoHose Application for APAC	(MI) | The GoHose application has different parameters for logging in, which is a point of interest for the team. Additionally, there was a humorous anecdote shared about a company event during a critical phase of work.					
Discussion on Highway Visibility in Sundry	(MI) | The discussion highlighted the dual nature of community feelings towards the highway, where residents appreciate the economic benefits but are also concerned about noise and dust.	(KQ) | A question was raised about which highway in Sundry was being discussed, indicating a need for clarity on specific locations.		(PRB) | Concerns were expressed about the political implications and community dissatisfaction regarding the highway's impact, which could hinder future developments.		
Discussion on NDVI and Sensor Selection	(MI) | The main idea was the consensus on a specific sensor for NDVI analysis and the acknowledgment of variations in data that still lead to similar results.	(KQ) | The discussion raised questions about how to handle variations in NDVI values from different sensors and whether these differences affect the final results of the analysis.	(Opp) | There was an opportunity identified for creating an open-source data purchasing model to allow shared access to satellite imagery data, which could reduce costs and improve data availability.	(PRB) | The complexity of end-user licensing agreements was highlighted as a potential roadblock to sharing large datasets effectively.		

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Discussion on Resource Management and Environmental Impact	(MI) | Participants noted the variety of data collection methods, including drones, satellites, and ground-based approaches, and discussed the importance of selecting the right technology based on specific project needs. (MI) | The participants discussed the need for environmental impact assessments(EIAs) and the complexities involved in land use and resource extraction, highlighting the importance of innovative solutions like conveyor belts to minimize environmental disruption.	(KQ) | The discussion raised questions about the feasibility and political implications of coal mining versus reclamation efforts, indicating a preference for less politically charged projects.	(Opp) | There is an opportunity to explore reclamation projects as a less contentious alternative to active mining, which could lead to new initiatives in environmental restoration.	(PRB) | The conversation identified potential challenges in navigating the political landscape associated with mining projects, suggesting that reclamation may be a more straightforward path.		
Drone Technology and Methodologies	(MI) | The potential of drone technology to collect environmental samples was discussed, highlighting advancements in both aerial and ground-based robotic systems.	(KQ) | The need to establish methodologies on different platforms was raised, questioning how to standardize practices across various institutions.	(Opp) | The discussion mentioned unexplored avenues in drone technology, particularly in the context of lunar exploration and groundwater analysis.		(SF) | Reference was made to a NASA presentation regarding investments in lunar drilling technology aimed at groundwater analysis, indicating ongoing research and development in this area.	
Drone Utilization in Data Collection	(MI) | The use of drones is becoming common among consultants for data collection, providing		(Opp) | There is potential for expanding drone programs to enhance data collection capabilities, as indicated by			

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	valuable imagery and chemistry data for analysis.		the success of the current drone program.			
Drones and UAVs in Monitoring	(MI) | Drones are currently used for monitoring operational issues like spills, and there is interest in integrating drone and satellite data for better monitoring.	(KQ) | Is the Open Data Area Alberta initiative still ongoing, and is there newer data available?	(Opp) | There is potential for a broader program utilizing heavily instrumented research sites across Canada for validation and calibration of sensing measurements.			
Equivalent Line Capability and Reclamation	(MI) | The main idea discussed was that equivalent line capability is determined by regulatory acceptance, and that reclamation can lead to different ecosystems as long as they are deemed acceptable by regulators.	(KQ) | The participants questioned the definitions and guidelines surrounding acceptable environments for reclamation, particularly how equivalency is measured and what constitutes a viable natural environment.	(Opp) | There is an opportunity to develop a matrix of acceptable environments and their corresponding signatures for vegetation health, which could aid in evaluating reclamation success.			
Establishing Common Ground for Technical Specifications	(MI) | The need for a collaborative approach involving multiple stakeholders to define technical specifications and the role of Earth observations in assessments.	(KQ) | What technical recommendations can be established to build confidence in the specifications?	(Opp) | Exploring the use of Earth observations to enhance data collection and assessment processes beyond traditional methods.	(PRB) | Challenges in aligning the expectations and capabilities of industry and regulators regarding technical specifications.	(SF) | The discussion highlighted the importance of time series data and signature convergence as supporting evidence for assessments.	

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Evaluation Criteria for Data Analysis	(MI) | The need for a structured approach to data evaluation and the importance of methodology in achieving consistent results.	(KQ) | What data do we have to support our analysis, and what improvements are needed?				(NS) | Identify what data should be included in the analysis and how to harmonize datasets for better results.
Evaluation of Rentsat Criteria	(MI) | The idea of stepping back from traditional views and considering a decision tree framework for evaluating rentsat was proposed, emphasizing a clearer process.	(KQ) | The main question raised was whether to utilize peer-level assessment criteria in the evaluation of rentsat and the implications of such a decision.				(NS) | It was suggested to conduct assessments post-reclamation and monitor trends over time to determine the effectiveness of the evaluation criteria.
Forest and Agricultural Productivity Assessment	(MI) | The main ideas included the importance of measuring tree productivity and growth over time, and the need for tools that can accurately assess these metrics in both forest and agricultural settings.	(KQ) | The discussion raised questions about the appropriate timeframes needed to assess tree growth and productivity in forests and agriculture, considering the long-term nature of forest growth.	(Opp) | There is an opportunity to utilize new tools for measuring productivity and growth in forests and agriculture, which could lead to better management practices and outcomes.			
Forest Reclamation and Biodiversity	(MI) | The main ideas discussed included the importance of species selection in reclamation efforts and the potential for habitat suitability assessments to provide objective data on ecological recovery.	(KQ) | The conversation raised significant questions about the ecological path being followed in forest reclamation and whether the chosen species support biodiversity.	(Opp) | There is an opportunity to utilize advanced assessment methods like REDCAT to better understand habitat suitability and support evidence for equivalent land capability.			

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Funding and Research in Forestry	(MI) | FREA funds from timber companies support forestry research and operations, leading to increased collaboration and innovation.	(KQ) | How can remote sensing data be effectively integrated into forestry assessments?	(Opp) | There is potential for collaboration between different sectors and the use of open-source tools for research.		(SF) | The Tree AI Box plugin for Cloud Compare is an open-source tool that allows users to extract tree metrics from point clouds.	
Government Regulations and Economic Impact	(MI) | The idea that small operators may prefer to pay fines rather than delay work due to government regulations, and the need to consider economic sustainability when enforcing these regulations.	(KQ) | What are the implications of government regulations on small operators and their economic sustainability?		(PRB) | The challenge of enforcing regulations without harming the livelihoods of small operators, which could lead to economic instability.		
Ground Truth and Assessment Recommendations	(MI) | The need for a tiered approach to assessments, starting from high-level evaluations and drilling down into specifics as necessary.	(KQ) | What additional areas can REDCAT address beyond vegetation assessments?	(Opp) | Exploring the integration of IoT sensors with traditional ground truth methods to enhance data collection and assessment efficiency.	(PRB) | Challenges in ensuring that soil moisture measurements are relevant and useful for vegetation growth assessments.		
Ground Truthing and Data Requirements	(MI) | Ground truthing is essential for accurate modeling in remote sensing, particularly for nitrogen management and yield assessment.	(KQ) | Can remote sensing effectively measure soil parameters like organic matter and fluoride?	(Opp) | Identifying dead spots in crops can lead to better understanding of soil compaction and contamination issues.		(SF) | Remote sensing can filter and target resources effectively, reducing the number of sites needing assessment.	
Habitat Suitability and Biodiversity	(MI) | The importance of vegetation structure and species-specific needs in habitat suitability assessments.	(KQ) | What are the key parameters for assessing habitat suitability?	(Opp) | Utilizing remote sensing and ground reference data to assess functional diversity and biodiversity.		(SF) | Moose require access to forests for protection, and clear cuts can negatively impact species connectivity.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Historical Data and Leaf Area Index Challenges	(MI) | The speakers emphasized the need for consistent definitions in data collection and the potential for discrepancies in leaf area index measurements due to varying methodologies.	(KQ) | The discussion raised questions about the accuracy of historical data in assessing leaf area index, particularly in relation to ground truthing and remote sensing methods.	(Opp) | There is an opportunity to explore the impact of land cover changes over time on forest assessments and to fill gaps in understanding tree growth and survival rates in different environments.			
Impact Evidence for ELC Decisions	(MI) | The conversation highlighted the potential use of datasets for various environmental assessments, including watershed evaluations and monitoring of asset deposition.	(KQ) | The question was raised about the ability of REDCAT to produce supporting evidence of impacts influencing ELC decisions, specifically regarding climate change and other environmental factors.	(Opp) | There is an opportunity to incorporate wildfire data into the research, which could provide insights into landscape recovery and planning.			
Impact of Human Activity on Vegetation and Soil	(MI) | The conversation highlighted the importance of long-term data in justifying environmental changes and the need for awareness of human impacts on natural areas.	(KQ) | The participants raised questions about the existence of equivalent criteria for assessing environmental impacts, particularly in relation to red cat criteria and whether new criteria should be developed.	(Opp) | There is potential for utilizing satellite imagery to monitor changes in vegetation and human activity in remote areas, which could enhance environmental assessments.			
Inquiry Process and Remote Sensing	(MI) | The need for a robust application for remote inquiries and the importance of changing the current inquiry process to include remote assessments.	(KQ) | What are the implications of using remote sensing for site inquiries, and how can it be integrated into current practices?	(Opp) | Exploring the use of remote sensing technology to improve the efficiency and effectiveness of environmental inquiries.	(PRB) | The current regulations may limit the interpretation of inquiries, which could hinder the adoption of remote sensing methods.	(SF) | The regulations specify that inquiries must be on the ground, which presents a challenge for implementing remote sensing as a valid method.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Integration of Datasets in Research	(MI) | The integration of datasets from drones and satellite imagery can enhance research outcomes, but it is crucial to recognize the distinct data products generated by each sensor.	(KQ) | How can different datasets from various sensors be effectively integrated and utilized in research?	(Opp) | There is potential for establishing methodologies that clarify expectations for using drones versus Earth observations in research.	(PRB) | The reluctance of the industry to publish findings that highlight the differences in data products may hinder the advancement of research.		
Intellectual Property and Capitalism in Industry	(MI) | The speakers discuss the tension between sharing methodologies and retaining competitive advantages, emphasizing that while basic algorithms are available, the unique configurations create proprietary products.	(KQ) | The discussion raises questions about the reproducibility of results when different companies use similar methodologies, highlighting the variability in outcomes based on proprietary configurations.		(PRB) | The challenge of sharing IP without losing competitive edge is identified as a significant barrier to collaboration in the industry.	(SF) | The conversation references the European Union's approach to IP sharing as a model that could potentially work, suggesting that it is feasible under certain regulatory frameworks.	
Interoperability of Vector Data Formats	(MI) | The conversation highlighted the ease of converting vector data formats for use in different software applications, ensuring that engineers can access necessary information regardless of the platform used.	(KQ) | The discussion raised questions about the training and standards expected from applicants under the Water Act, particularly regarding the acceptance of data formats.	(Opp) | There is potential for improved training and standards for data submission in environmental applications, particularly regarding the use of shape files for compliance with the Water Act.			

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Land Reclamation and Appeals Process	(MI) | The importance of building confidence in users regarding reclamation outcomes and the need for clear communication about data products like NDVI. (MI) | The need to communicate NDVI as a vegetation health indicator rather than using technical jargon, making it relatable to stakeholders.	(KQ) | Questions arose about who might appeal the reclamation process and the role of the AER in such cases.		(PRB) | Skepticism from landowners about the effectiveness of satellite monitoring compared to on-ground assessments may hinder acceptance of new methods.		
Landowner Concerns in Reclamation	(MI) | Landowners may be hesitant to accept remote sensing technologies if they feel their soil management is overlooked.	(KQ) | How would we deal with landowner complaints regarding soil and vegetation in reclamation applications?		(PRB) | Landowners may object to reclamation methods if they feel their soil management is not adequately addressed.		(NS) | Consider including a landowner sign-off in the REDCAT certificate application to ensure acceptance of methodologies used.
LiDAR Technology in Remote Sensing	(MI) | LiDAR imagery is beneficial for precise site assessments and is more cost-effective than physical site visits. Drone LiDAR can produce useful data if processed correctly.	(KQ) | Can drones do LiDAR effectively?	(Opp) | There is potential for improved collaboration between different GIS systems to enhance data accessibility and usability.	(PRB) | Many users do not know how to process LiDAR data properly, which can lead to noisy or unusable datasets.		
Municipal Regulations and Wind/Solar Farms	(MI) | Municipalities often prioritize property tax values over renewable energy projects, leading to conflicts in land use decisions.	(KQ) | How can municipalities be educated on the benefits of renewable energy projects?	(Opp) | There is potential for better collaboration with municipalities to align interests in renewable energy development.	(PRB) | Municipal regulations and the desire to maximize property tax values hinder the development of wind and solar farms.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Oil Sands Reclamation and Regulatory Engagement	(MI) | The need for regulatory engagement to facilitate oil sands reclamation processes was emphasized, along with the industry's reluctance to invest in necessary practices.		(Opp) | There is potential for improved stakeholder sessions to enhance communication and understanding between the industry and regulators.	(PRB) | Challenges were identified regarding industry reluctance to fund reclamation practices, which could stall progress in certification processes.		
Pipeline Integrity Assessment Technologies	(MI) | The conversation highlighted the importance of integrating advanced technologies, such as glidar sensors, into pipeline integrity assessments to improve monitoring accuracy.	(KQ) | The group questioned whether stress-corrosion tracking assessments are currently being utilized in pipeline integrity programs.	(Opp) | There is potential for applying stress tracking technologies in various sectors beyond pipelines, which could lead to innovative assessment methods.	(PRB) | The discussion indicated that existing procedures may be outdated, which could hinder the adoption of new technologies in pipeline assessments.		
Publication Bias in Scientific Research	(MI) | There is significant pressure to publish only successful research, leading to a lack of transparency in scientific findings.	(KQ) | Is there a bias against publishing research that shows negative results?	(Opp) | Creating a database for both successful and unsuccessful research could enhance transparency and learning in the scientific community.	(PRB) | The current publication culture discourages sharing negative results, which may hinder scientific progress.		
REDCAT Criteria Development	(MI) | The need for a focused collective effort in R&D to address the challenges of developing REDCAT technologies and criteria, rather than individual companies working in isolation.	(KQ) | What are the costs or degree of effort needed to develop REDCAT criteria using current technologies and practices? Which REDCAT criteria would require additional R&D?	(Opp) | There is potential for collaboration among companies to expand their capabilities and improve outcomes in REDCAT technology development.			

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
REDCAT Criteria Discussion		(KQ) | The main question raised was whether existing criteria have equivalent REDCAT criteria and if new criteria should be developed, considering their application in decision-making and data quality standards.				
REDCAT Criteria Evaluation	(MI) | A research and development phase is necessary for field verification before implementing remote sensing tools.	(KQ) | Is there a need to compare REDCAT assessments to traditional field level assessments?		(PRB) | The existing system lacks transparency around uncertainty and risk factors in decision-making processes.		(NS) | Develop a decision tree based on criteria for pass/fail assessments using remote sensing data.
REDCAT Criteria Evaluation	(MI) | The need for human interpretation in remote sensing data to ensure meaningful outcomes.	(KQ) | How would a pass or fail decision be made using REDCAT criteria?		(PRB) | Concerns about the potential replacement of professionals with automated systems in assessments.		(NS) | Consultants to apply decision tree algorithms to assess new sites based on previous training data.
REDCAT Data and Assessment Tools	(MI) | The importance of various data types(raw, processed, interpreted) in assessing reclaimed sites was emphasized.	(KQ) | What changes to existing reclamation criteria might be needed to support the REDCAT application?		(PRB) | Data licensing may restrict certain data from being provided in applications.		(NS) | Participants to explore how machine learning models can be applied to assess growth trajectories based on collected data.
REDCAT Detailed Site Assessment	(MI) | A detailed site assessment requires supporting information on how the site was reclaimed and multiple years of assessment data.	(KQ) | What would a REDCAT detailed site assessment reclamation certificate application system consist of?				(NS) | Participants to explore the necessary data and criteria for a remote sensing reclamation certificate application.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
REDCAT Technology Application	(MI) | The importance of using REDCAT technology for site assessments and the need for field visits to gather accurate data on cultivated sites.	(KQ) | How does the REDCAT data include indicators for vegetation compared to eco-phase controls?		(PRB) | Challenges in obtaining accurate data without field visits, particularly for cultivated sites.		(NS) | Follow up on the vegetation assessment during the off-season and determine the necessary REDCAT data for cultivated sites.
REDCAT's Capabilities and Limitations	(MI) | REDCAT can provide partial information but has limitations in soil assessment and monitoring.	(KQ) | Can REDCAT produce supporting evidence of impacts influencing land capabilities?	(Opp) | Using REDCAT for landscape comparison and monitoring vegetation growth without physical site access.	(PRB) | Liability issues arise when monitoring extends over long periods without certifying outcomes.	(SF) | Ground truthing is essential for accurate soil depth and texture assessment, which REDCAT cannot provide.	
Regulatory Challenges in Methane Measurement	(MI) | Technological advancements in methane measurement outpace regulatory updates, necessitating a review of existing policies.	(KQ) | How can regulations be updated to incorporate new methane measurement technologies? (KQ) | Is there a need for dedicated areas to support testing and evaluation of existing or new REDCATs?	(Opp) | There is potential for developing flexible regulations that allow for innovation in methane measurement technologies.	(PRB) | Broad regulations may hinder compliance and innovation, requiring a balance between flexibility and specificity.		
Regulatory Framework and Precedent Setting	(MI) | The need for a defendable methodology in regulatory assessments and the importance of learning from other jurisdictions.		(Opp) | Exploring successful regulatory implementations in other countries as benchmarks for Alberta's framework.	(PRB) | Challenges in establishing a precedent due to the complexity of historical certification processes and potential legal issues.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Regulatory Framework for Precision Agriculture	(MI) | The need for a standardized approach to evaluate forestry sites using remote sensing and precision agriculture technologies was emphasized.	(KQ) | Who will develop the regulatory criteria for precision agriculture technologies?	(Opp) | There is potential for research on weed management and the integration of remote sensing to enhance data accuracy in forestry assessments.	(PRB) | Challenges in accurately counting trees and assessing their health due to seasonal variations and limitations of current technologies were discussed.		(NS) | Investigate current forestry criteria and explore how remote sensing can be integrated into assessments for better data collection.
Remote Data Collection in OSC Applications	(MI) | The main idea discussed was the potential to reduce the frequency of physical site visits by utilizing remote data collection to assess land capability and inform decisions.	(KQ) | The participants raised questions about the effectiveness of remote sensing data in prioritizing site visits and its potential to replace physical inspections.	(Opp) | There is an opportunity to explore the cost-effectiveness of using aerial data collection compared to traditional methods, which could lead to significant savings.		(SF) | The discussion included a reference to a site that was certified based on remote data, indicating that such practices may be feasible in specific contexts.	
Remote Sensing and Ecological Monitoring	(MI) | The use of drone data for ecological assessments can provide repeatable methods and insights into species diversity and terrain stability.	(KQ) | How do we address what we can't do via a REDCAT assessment?	(Opp) | Exploring the use of high-resolution data for specific site assessments, particularly in challenging terrains like wetlands.	(PRB) | The cost associated with high-resolution terrain stability assessments may not be appropriate for all reclamation types.		
Remote Sensing and Ground Assessments	(MI) | The idea that remote sensing can reduce costs but may not be widely accepted without education and community involvement was discussed.	(KQ) | Participants questioned the acceptance of remote sensing data without on-ground verification, highlighting the need for community engagement in assessments.		(PRB) | Concerns were raised about the limitations of remote sensing and the potential lack of acceptance from communities if not combined with ground assessments.	(SF) | The discussion referenced historical skepticism towards remote sensing as a standalone solution, citing past failures in relying solely on such technology.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Remote Sensing and Site Assessment	(MI) | Remote sensing can supplement on-ground assessments, potentially reducing the number of required soil assessment locations.	(KQ) | What rules need to be updated to match remote sensing technology?	(Opp) | Using remote sensing to optimize site assessments and reduce bias in sampling locations.	(PRB) | Challenges in transferring large data to government bodies and the need for modern systems to handle remote sensing data.		
Remote Sensing and Site Assessment	(MI) | Utilizing satellite imagery for inaccessible sites can streamline assessments and reduce costs.	(KQ) | What new criteria need to be developed for REDCAT versus traditional models?	(Opp) | Implementing remote sensing technologies could enhance data collection and reduce site disturbance.	(PRB) | Challenges in local validation data may hinder the acceptance of fully remote assessments.		(NS) | Develop a matrix comparing costs and time for different assessment methods to inform decision-making.
Remote Sensing and Site Recovery	(MI) | Remote sensing can provide long-term data to assess site recovery and environmental impacts on reclamation.	(KQ) | What kind of data would be needed to support changes in reclamation practices?		(PRB) | Challenges in obtaining long-term data and the need for new criteria development for remote sensing applications.	(SF) | Government organizations suggest a 25-year data window as a baseline for assessing anomalies in reclamation.	(NS) | Participants to consider retrospective analysis of forested reclamation over the last 15 years using remote sensing data.
Remote Sensing and Vegetation Assessment	(MI) | Drones can potentially be used for remote vegetation assessments, particularly in identifying weed species and cultivated plants.	(KQ) | Is it possible for drones to assist in identifying plant species during vegetation assessments?		(PRB) | Financial constraints may limit the advancement and implementation of drone technology for vegetation assessments.		
Remote Sensing Applications in Agriculture	(MI) | Remote sensing can measure soil color and moisture, which may indicate organic matter and carbon content, impacting agricultural productivity.	(KQ) | How many years of data would provide enough statistical evidence to support the use of remote sensing in agriculture?		(PRB) | Soil variability and limitations of current technology may hinder effective remote sensing applications in agriculture.		(NS) | Identify critical parameters achievable by remote sensing within specific seasons to indicate site failure.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Remote Sensing Applications in Agriculture	(MI) | Remote sensing can track soil moisture and crop growth, but requires careful analysis and integration with traditional knowledge.		(Opp) | Integrating traditional knowledge with data analysis can enhance the effectiveness of remote sensing applications in agriculture.	(PRB) | There is a disconnect between data analysts and field practitioners, which may hinder effective use of remote sensing data.		
Remote Sensing Applications in Reclamation	(MI) | Remote sensing can aid in planning and assessing reclamation sites, but challenges exist in data acquisition and client willingness to pay.	(KQ) | Is there a need for areas in Alberta for testing remote sensing applications?	(Opp) | There are opportunities to develop innovative frameworks for funding projects that utilize remote sensing data.	(PRB) | Challenges include client resistance to additional costs for remote sensing data and the limitations of remote sensing in certain environments.		
Remote Sensing Criteria and Methodology	(MI) | The need for clear, quantifiable metrics in remote sensing to avoid confusion and ensure consistent methodologies across different users.	(KQ) | What are the remote sensing criteria that need to be established for consistency in methodologies?		(PRB) | The variability in NDVI measurements across different sensors complicates the establishment of standardized criteria.	(SF) | The speakers noted that everyone assumes NDVI is uniform, but in reality, it varies significantly based on sensor specifications.	
Remote Sensing Data and Assessment	(MI) | The 85% threshold for remote sensing assessments is debated, with suggestions for standardization and the need for comprehensive data management.	(KQ) | Curious if it would be difficult to get regulator buy-in for remote sensing to replace certain parts of the field tree assessment.		(PRB) | Legislation cannot keep up with technology, posing challenges for implementing remote sensing in assessments.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Remote Sensing Data Utilization	(MI) | A multi-resolution approach is used to assess site conditions, starting with low-resolution data and moving to high-resolution if needed. (MI) | Commercial data licensing allows sharing within organizations but restricts external use without direct purchase.	(KQ) | How is the 95% confidence interval determined for remote sensing data?	(Opp) | There is potential to improve transparency and reproducibility in applications by requiring both raw and processed data submissions.	(PRB) | Funding challenges for public data provision and platform development may hinder data accessibility.		(NS) | CLRA to consider budgeting for a Class 2 license to allow broader access to remote sensing data.
Remote Sensing for Site Assessment	(MI) | Remote monitoring can reduce unnecessary site visits by assessing readiness for DSA.	(KQ) | Can REDCAT produce supporting evidence of impact influencing site success or failure?	(Opp) | Exploring third-party impacts on land use through remote sensing data.	(PRB) | Challenges in distinguishing between public and commercial data for effective site assessments.		
Seed Plant Submission and Crop Health Variability	(MI) | The variability in crop health and the statistical relevance of yield measurements were discussed, emphasizing the need for control comparisons in ecological assessments.	(KQ) | The question arose regarding the submission of seed plants and how crop health variability affects yield measurements.	(Opp) | The idea of establishing standard monitoring sites for ecological comparisons was proposed, which could enhance the consistency of assessments across different models.	(PRB) | Challenges in establishing proximate controls for wetlands were identified, particularly in disturbed areas where ecological relevance may be compromised.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Site Assessment and Monitoring Strategies	(MI) | The speakers proposed grouping sites geographically or by operational characteristics for more effective assessments and monitoring. This approach could lead to economies of scale and improved reclamation outcomes.		(Opp) | There is potential for enhanced area-based activities that could reduce environmental footprints and improve reclamation efficiency by conducting simultaneous assessments across multiple sites.		(SF) | The discussion included references to the varying rates of vegetation regeneration in different environments, highlighting the need for tailored monitoring approaches based on site conditions.	
Site Inspection and Data Analysis	(MI) | The need for accurate data collection and analysis during site inspections, and the role of consultants in evaluating gravel pits.	(KQ) | What specific data does AER require for their analysis after site inspections?		(PRB) | Challenges in the approval process for changes in site use due to municipal regulations.		
Skepticism Towards GPS Technology Adoption	(MI) | The historical skepticism of surveyors towards GPS technology and the lengthy process of gaining trust in its accuracy and reliability.				(SF) | Surveyors in the early 90s required years of experience and evidence before they trusted GPS results, despite the technology being more accurate than traditional methods.	
Soil and Vegetation Health Indicators	(MI) | Remote sensing can help identify vegetation health, which may indicate underlying soil issues. (MI) | Soil conditions significantly impact vegetation health, and	(KQ) | What is equivalent land capability in a forest setting?				

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
	vegetation can indicate soil compaction issues.					
Soil Assessment and Remote Sensing Technologies	(MI) | The idea that remote sensing could potentially replace some traditional soil assessments was discussed, emphasizing the need for validation through field data.	(KQ) | A question was raised about whether the requirement for soil assessment would still be necessary for traditional assessments if it was removed for red cats.				
Soil Assessment Technologies	(MI) | The discussion highlighted the use of moisture content in soil assessments and the importance of understanding seasonal changes and impacts on soil during construction and reclamation.	(KQ) | The main question raised was whether technology exists to assess soil conditions, particularly the differences between subsoil and topsoil, and how AI could be integrated into this process.	(Opp) | There is potential for further exploration of AI technologies in soil assessment and reclamation techniques that are not currently recognized by existing criteria.	(PRB) | Challenges include the lack of criteria for new reclamation techniques and the difficulty in convincing stakeholders of their effectiveness compared to traditional methods.		
Soil Management and Vegetation Impact	(MI) | The importance of topsoil for grass growth and the implications of soil management practices on tree growth. (MI) | The decreasing cost of remote sensors may allow for better monitoring of soil conditions in the future.	(KQ) | How do inspectors verify the soil replacement commitments made years ago?	(Opp) | Exploring the use of imagery to track wildlife movement across sites, which could provide insights into ecological impacts. (Opp) | The potential for using sensors to monitor soil moisture content over time, which could enhance soil management practices.	(PRB) | Challenges in accurately replacing soil and verifying past commitments due to erosion and soil loss.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Stakeholder Trust in Automated Reports	(MI) | Different data collection methods, such as LIDAR and remote sensing, are essential for assessing land conditions effectively. (MI) | Human trust is crucial for landowners when accepting automated reports, as personal relationships influence their decisions.	(KQ) | How can automated reporting gain the confidence of landowners, especially in agriculture?		(PRB) | Landowners may reject automated reports due to lack of personal trust in the data or the reporting process.		
Standards for Water Act Applications				(PRB) | Challenges were noted regarding the adaptation of older operators to new systems, which may hinder compliance and data entry processes as standards evolve.		(NS) | The group acknowledged the need to prepare for the upcoming implementation of the DRS system, which may require additional support for users unfamiliar with modern data entry methods.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Strategies and Techniques in Data Analysis	(MI) | The need for a clear definition and relationship between field data and remote sensing data was highlighted, along with the importance of understanding the uncertainty in data analysis. (MI) | The necessity to evaluate data from different land cover types separately and to establish methodologies for comparing data from various platforms was emphasized.	(KQ) | What are the limitations and gaps in the current data analysis techniques, and how can they be addressed?	(Opp) | There is an opportunity to improve the recognition of non-RECAT data products and their comparative value in data analysis.	(PRB) | Challenges in validating data from different methods and the varying expectations based on ecological standards were discussed as potential roadblocks.		
Technical Review Process	(MI) | The technical review process is triggered by specific conditions such as landowner complaints and variances, with an estimated 80% of recettes going through baseline review and 20% undergoing technical review.			(PRB) | The increasing size constraints of OAC sites complicate operations, requiring more expensive equipment and potentially hindering access due to environmental factors like tree height.		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
Technological Advancements in Operations	(MI) | The introduction of AI and advanced software tools is aimed at enhancing job roles rather than replacing them, with examples of autonomous trucks being used in operations.		(Opp) | The potential for expanding the use of autonomous vehicles in various operational areas, as seen in other industries and locations.			
Training and Knowledge Gaps in Land Reclamation	(MI) | Understanding historical context is crucial for land reclamation, and there is a lack of standardized training in the industry.			(PRB) | The absence of standardized training and resources for students in land reclamation poses challenges for effective practice.		
Use of Drones in Agriculture	(MI) | Drones are being used to measure nutrient levels in agriculture, providing a more efficient method of assessment compared to traditional techniques.	(KQ) | The discussion raised questions about the methods used for measuring nutrient levels, specifically whether assessments are based on soil or plant color.	(Opp) | The conversation identified opportunities for improved agricultural assessments using drone technology, particularly in areas with logistical challenges.	(PRB) | Concerns were raised about the reluctance of landowners to fully embrace remote assessments, which could hinder the adoption of drone technology in agriculture.		
Use of Satellite Data for Agricultural Insights	(MI) | Frequent access to satellite data could reveal seasonal changes and long-term trends in agriculture.	(KQ) | Can satellite imagery provide sufficient data to influence decisions on land capability?	(Opp) | Accessing farmers' crop data could provide precise evidence of crop yields and impacts on land capability.		(SF) | Historical satellite data can provide insights into long-term changes in agricultural areas.	
Water Quality in Reclamation Criteria	(MI) | The conversation highlighted the lack of water quality criteria in reclamation standards and the varying risks associated	(KQ) | The participants raised questions about the significance of water quality in reclamation criteria and the potential		(PRB) | Concerns were expressed about the challenges of addressing water quality in reclamation, particularly in		

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)
	with different mining scenarios, such as oil sands and gravel mining. (MI) | The discussion emphasized the rights of landowners to appeal reclamation decisions and the complexities involved in these appeals, particularly in relation to land use and reclamation standards.	risks associated with it, especially in mining contexts. (KQ) | Questions arose regarding who typically appeals land reclamation decisions and the implications of such appeals for landowners and developers.		appealing land reclamation certificates and the associated risks.		
Weed Management and Policy Implications	(MI) | Alberta Environment's study indicates that current weed management practices may be causing more harm than good, suggesting a shift in policy.					(NS) | Participants to advocate for policy changes based on the study's findings regarding weed management.
Wildlife Monitoring Techniques	(MI) | The use of high-resolution sensors and infrared technology for wildlife monitoring was emphasized, showcasing their effectiveness in identifying and tracking animals in various environments.		(Opp) | There is potential for further integration of AI in wildlife monitoring to enhance data collection and analysis, particularly in identifying animal movements and behaviors.		(SF) | Suncor GPSed about 200 bears in the area, demonstrating the feasibility and effectiveness of tracking wildlife using technology.	

Table 16. Session #3 – Topics and Highlights from the MeetGeek Summary Email.

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)	DIVERSITY OF THOUGHT (DOT)
Acknowledgements and Survey Completion						(NS) | Participants are encouraged to complete an online survey by the end of the week to assist in the final report preparation.	
AI and Remote Sensing in Environmental Monitoring	(MI) | The idea of using AI in conjunction with remote sensing to improve environmental monitoring was proposed, focusing on determining signatures of environmental indicators.		(Opp) | The conversation highlighted opportunities for utilizing high-resolution satellite imagery to enhance data collection and analysis in environmental projects.				
Airspace Management During VIP Landings	(MI) | Airspace is cleared for 20 minutes around Air Force One landings, affecting other scheduled flights.	(KQ) | What protocols are in place for civilian flights during VIP landings, and how are pilots informed?					
Anomaly Detection in Earth Observation						(NS) | Propose the development of an anomaly detection system to an industry regulator or entity.	

TOPIC	MAIN IDEAS (MI)	KEY QUESTIONS (KQ)	OPPORTUNITIES (OPP)	POTENTIAL ROADBLOCKS (PRB)	SUPPORTING FACTS (SF)	NEXT STEPS (NS)	DIVERSITY OF THOUGHT (DOT)
Application of Technology in Reforestation	(MI) | The need for technology to identify appropriate areas for replanting trees to ensure survival and cost-effectiveness.	(KQ) | Is there value in having a conversation about funding for reforestation projects given the demand from the population?	(Opp) | Exploring funding avenues through organizations like CoSIA to support reforestation efforts.	(PRB) | The challenge of clients wanting to see reforestation projects but lacking the financial means to implement them.			
Assessment Criteria for Site Evaluation	(MI) | The idea of using a two-stage assessment process was proposed, where initial criteria are informed by a smaller subset of sites before applying them to a larger set.	(KQ) | The participants questioned the relevance of certain criteria for the OSEs and whether visual assessments are sufficient for site evaluations.	(Opp) | There is an opportunity to develop cost-effective criteria that could standardize assessments regardless of site proximity to highways or roads.	(PRB) | Concerns were raised about the limitations of site access and the potential costs associated with extended data collection periods.			
Assessment of Technology Readiness	(MI) | Identifying existing technologies and their ability to meet readiness criteria is crucial for project success.	(KQ) | What criteria can be used to assess technologies and their readiness?		(PRB) | Challenges in technology adoption due to existing policies and regulations may hinder progress.		(NS) | Team to create a task list for assessing technology readiness and identifying gaps.	
Assessment of Vegetation and Soil Metrics	(MI) | Vegetation metrics are easier to assess than soil or landscape metrics, and there is potential for temporal assessments using existing data.		(Opp) | The ability to assess ten years' worth of data in one acquisition presents a significant advantage for the assessment process.	(PRB) | Challenges in assessing soil and landscape metrics compared to vegetation metrics, which are easier to assess.		(NS) | Forming a technical working group around REDCAT criteria that is land cover specific to facilitate discussions and produce a report.	

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Audit of RECCertified Sites	(MI) | Utilizing existing EO data to assess certified sites and create an audit function based on historical data.	(KQ) | What discrepancies exist between ground observations and remote sensing data, and how can they be identified?	(Opp) | Exploring the potential for auditing a large inventory of certified sites using EO data.		(SF) | There are 30 to 40 years of records available for the sites, which can support the audit process.	(NS) | Access public records of RECCertified sites to facilitate the audit process.	
Challenges in DSA Approval Process				(PRB) | The DSA approval process is complicated by landowner complaints and the need for reapplication after certification.			
Challenges in Environmental Work	(MI) | Environmental work is consistently undervalued in both good and bad economic times, leading to a need for innovative approaches in academia.	(KQ) | Why are universities rehashing known concepts instead of advancing new methodologies in environmental studies?	(Opp) | There is potential to leverage existing data for better training models in remote sensing and land management.	(PRB) | The lack of reliable data and the challenge of integrating historical data into new models may hinder progress.			
Challenges in Soil Assessment and Reclamation	(MI) | The discussion highlighted the difficulties in identifying grass species and the need for specialized knowledge in soil assessments.	(KQ) | What are the specific criteria for assessing grasslands and wetlands using remote sensing?	(Opp) | There is potential for using remote sensing technologies to improve reclamation assessments for grasslands and wetlands.	(PRB) | Identifying grass species is challenging due to their physical characteristics and the need for expert botanists.			

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Challenges with Vendor Dependence		(KQ) | What if the sole vendor becomes unavailable due to high demand?		(PRB) | Dependence on a single vendor poses risks to operational continuity and reliability.			
Comparative Studies in Remote Sensing						(NS) | Explore funding opportunities for comparative studies between traditional and new remote sensing methods.	
Comparison of LiDAR and Photogrammetry	(MI) | The project aims to compare LiDAR and photogrammetry for vegetation assessment in remote sites, including both forested and wetland areas.	(KQ) | How do we quantify the effectiveness of remote sensing methods in inaccessible sites?	(Opp) | There is potential to utilize existing regulatory frameworks to enhance data collection and analysis in remote areas.				
Cost Analysis of Truck Automation	(MI) | The main idea discussed was that while the cost of automated trucks may be higher, the savings from not having to pay for drivers could offset this cost.	(KQ) | A significant question raised was about the cost difference in using automated trucks compared to traditional drivers, and how many drivers would be replaced by this technology.	(Opp) | There is an opportunity to explore the use of autonomous shovels operated remotely, which could enhance operational efficiency.				

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Cost Savings and Technology Implementation	(MI) | The main idea presented was the significant time savings achieved by using drones and satellites for water body assessments, reducing a three-month program to just two weeks.	(KQ) | The discussion raised questions about the safety implications of using drones and satellites instead of personnel for assessments, particularly regarding ground barriers.		(PRB) | Concerns were expressed about the initial costs associated with developing new frameworks and tools necessary for implementing the technology.	(SF) | The discussion included a specific example of how traditional methods involved two people assessing thousands of water bodies, which has now been replaced by a more efficient drone and satellite approach.		
Data Availability and Gaps		(KQ) | What data sets are currently available, and what gaps exist that need to be addressed?	(Opp) | The potential for regular hackathons to identify missing data sets and enhance knowledge about available data.				
Data Availability and Utilization	(MI) | The importance of utilizing available satellite data and the potential for partnerships to access additional data sets.	(KQ) | What data sets are currently unavailable that could enhance project outcomes?	(Opp) | Exploring partnerships for data sharing to fill gaps in available data sets.	(PRB) | The lack of certain data sets, such as UAV data, which may hinder project progress.	(SF) | Historical imagery and satellite data can be utilized despite the absence of UAV data.		
Data Collection and Historical Data Utilization	(MI) | The idea of utilizing aerial DSA from helicopters as an accepted method for data collection was discussed, highlighting a potential solution for inaccessible sites.			(PRB) | Concerns were raised about the accessibility of certain sites for data collection, which could hinder the overall project.	(SF) | Participants noted that historical data could be leveraged to show regulators the effectiveness of their methods, which supports the main idea of utilizing existing data.		

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Data Collection and Mapping Techniques	(MI) | Participants discussed the use of various mapping tools and data collection methods, including Avenza, Trimble, and QGIS.		(Opp) | There is potential for collaboration on data collection and sharing using open-source tools like Mergin maps.			(NS) | Jesse to connect with the team to explore potential collaboration and data sharing opportunities.	
Data Collection and Standard Operating Procedures	(MI) | The project aims to develop SOPs for data collection during reclamation to facilitate monitoring and improve data accuracy.		(Opp) | There is potential for integrating remote sensing data with field-based monitoring to enhance data collection processes.	(PRB) | Challenges may arise from the length of the project and the complexity of coordinating data collection across various sites.		(NS) | Team to develop standard operating procedures for data collection during reclamation and ensure geospatial data is included.	
Data Needs for Remote Sensing	(MI) | Existing resolution imagery like Sentinel-2 and Landsat can be utilized for data needs in reclamation.	(KQ) | What data needs are required for effective remote sensing applications?	(Opp) | Potential to enhance data collection efficiency by utilizing existing platforms and reducing manual audits.			(NS) | Participants to explore the integration of existing platforms for data collection and analysis.	
Data Requirements for Environmental Monitoring	(MI) | Identifying key parameters and their spatial scale is crucial for effective monitoring and predictive modeling.	(KQ) | What parameters are essential for decision-making and how frequently should they be assessed?		(PRB) | Challenges in obtaining comprehensive data on reclamation failures and variances may hinder effective monitoring.		(NS) | Develop a framework to determine critical parameters and establish a procedure for data collection and assessment.	

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Data Sharing and Collaboration on Environmental Projects	(MI) | The importance of creating an updated database for environmental data to facilitate collaboration among companies and government agencies.		(Opp) | The potential for a collaborative effort to develop a comprehensive Alberta wetland inventory with improved resolution.				
Data Standardization in Environmental Assessments	(MI) | Standardized data formats are essential for effective tracking and analysis across industries.	(KQ) | How can we ensure consistent data collection across different companies and sites?		(PRB) | Inconsistent data collection practices and privacy concerns may hinder the implementation of standardized data processes.		(NS) | Participants to explore the feasibility of implementing a bi-annual data submission process for environmental assessments.	
Data Standards and Schema Development	(MI) | Leverage existing standards for RIS and GIS to develop a standard schema for data.			(PRB) | Adopting existing technologies may take longer than anticipated due to complexities in relationships and decisions.		(NS) | Develop a minimally viable product(MVP) for RIS for All to demonstrate its capabilities.	
Data Utilization and Accessibility			(Opp) | There is potential to create a shared photo log for remote sensing sites to enhance data accessibility.				

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Data Utilization and Research Collaboration	(MI) | The idea of mining internal data and collaborating with universities for additional data sources was discussed. (MI) | The team discussed the need for new project ideas and referenced a recurring project that needs attention.	(KQ) | The team questioned the extent of data received from university research and its accessibility.	(Opp) | There is an opportunity to explore partnerships with universities for accessing research data.	(PRB) | Concerns were raised about the accessibility of certain data, particularly regarding LiDAR mapping and its limitations.			
Data Utilization and Trend Analysis					(SF) | The importance of field-verified data and trend maps for assessing land change and disturbances over time, as discussed in relation to previous data shared by colleagues.		

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Data Utilization in Forestry Research	(MI) | The conversation highlighted the importance of utilizing existing datasets from forestry projects to inform practices and conduct wildlife assessments, suggesting that collaboration among industry stakeholders can enhance research efficiency. (MI) | Participants expressed that they have shared all their ideas and are ready to conclude the session, indicating a sense of completion in the brainstorming process.						
Data Utilization in Forestry	(MI) | The conversation highlighted the importance of collaboration with regulatory bodies and universities to gather and utilize data effectively in forestry.	(KQ) | The participants raised questions about the specific data needs for the forestry industry and how to effectively utilize existing technology.					

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Data Utilization in Research	(MI) | Regularly updating data sources is essential for maintaining accuracy in research outputs. New elevation models can enhance project quality.					(NS) | Conduct a literature review to identify existing data and resources that can be leveraged for ongoing projects.	
Data Validation and Comparison	(MI) | The need for a project to validate and compare high-resolution data with publicly available datasets, focusing on results rather than input data.	(KQ) | What are the true limitations of data and how can high-resolution data influence decision-making?	(Opp) | Exploring the relationship between high-resolution data products and publicly available data to enhance decision-making capabilities.	(PRB) | The challenge of accessing high-resolution data and the implications of relying on lower resolution data for decision-making.			
Database and Species Recognition Discussion	(MI) | The main idea discussed was the importance of species recognition and its integration into a database for better analysis and decision-making.	(KQ) | The discussion raised questions about how to connect species colonization with disturbances indicated by weeds, highlighting the need for further exploration of these relationships.	(Opp) | There is an opportunity to explore socialization projects that could enhance the understanding of species identification and its relevance to the database.				
Defining Ecotone Signatures	(MI) | Defining ecotone signatures is essential for identifying reclaimed areas through various metrics, including vegetation and terrain stability.						

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Development of Remote Sensing Criteria	(MI) | Conduct a gap analysis to identify available parameters and assess the feasibility of technologies for remote sensing criteria.	(KQ) | What parameters are currently available and which tools can assess them?		(PRB) | Challenges in defining the data gap may hinder the relevance of solutions proposed for remote sensing criteria.		(NS) | Team to perform a gap analysis and identify key parameters for remote sensing by reviewing existing data and tools.	
Discussion on Caribou Habitat	(MI) | Linear features like seismic lines may facilitate predator access, impacting caribou populations and habitats.						(DoT) | Various perspectives on caribou populations and their habitats were shared, highlighting ecological concerns.
Discussion on COSEA's Scope and Federal vs Provincial Value	(MI) | The scope of COSEA is focused on city operations, and there is a suggestion to consider federal engagement. The discussion includes the potential involvement of academia and other groups.	(KQ) | Would there be value in that conversation of being federal instead of provincial?	(Opp) | Engaging with federal discussions could open new avenues for collaboration and resource sharing.	(PRB) | The challenge of not repeating previous workshops and ensuring the new group has a clear, time-bound objective.		(NS) | Identify specific outcomes and terms for the group to ensure the task is completed by a set date, rather than forming a permanent committee.	
Discussion on Data Oversight and Management	(MI) | The idea of conducting example sites remotely before full implementation of REDCATS was proposed, emphasizing the need for field verification.	(KQ) | Participants questioned how to effectively implement REDCATS for forestry and whether remote assessments could be reliable.		(PRB) | Concerns were raised about the hesitance to implement new systems like REDCATS without prior testing and verification.		(NS) | It was suggested to start with a few example sites to test the REDCATS implementation before broader application.	

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Discussion on Data Utilization and Challenges	(MI) | The main idea was to leverage open data and multi-sensor data for better validation and to identify gaps in existing data sets.	(KQ) | The discussion raised questions about the types of data available and how they can be effectively utilized for specific projects.	(Opp) | There is an opportunity to stack different data types over the same geographic area to facilitate better comparisons and insights.	(PRB) | Challenges were identified regarding the difficulty of processing time series data and the need for clear goals in data collection.			
Discussion on Funding and Resources			(Opp) | The discussion highlighted the potential for universities and industry to provide funding, which could lead to new partnerships and resources for their projects.	(PRB) | Concerns were expressed about the need to control meetings and make decisions effectively, indicating potential challenges in managing discussions and reaching consensus.			

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Discussion on Meeting Assistant	(MI) | The discussion revolved around the identity and responsibilities of the meeting assistant, with emphasis on its importance in facilitating the meeting. (MI) | The use of GPR and EM surveys can provide valuable data on moisture and chlorides, although the accuracy of these methods is limited. The complexity of defining parameters for effective modeling was highlighted.	(KQ) | Participants expressed uncertainty about the answers to specific questions, indicating a need for clarity and further exploration of these topics. (KQ) | Participants questioned the effectiveness and functionality of the meeting assistant, indicating a need for clarity on its role.				(NS) | There was a suggestion to clarify the meeting assistant's role and how it can assist in future meetings.	
Discussion on Project Budget and Value Assessment	(MI) | The idea that project value can vary significantly based on duration and complexity, with a focus on high-resolution imagery and weed detection as examples.	(KQ) | What is the budget for the projects being discussed, and how does it impact project feasibility?	(Opp) | Exploration of the potential for high-resolution lidar imagery and weed mapping as valuable services for clients.	(PRB) | Concerns about the overlap of client requests and the feasibility of meeting those demands within budget constraints.			

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Discussion on Project Ideas and Challenges	(MI) | The group emphasized the importance of generating new ideas and refining existing ones to tackle ongoing challenges effectively.			(PRB) | Participants acknowledged that some ideas could not be shared due to restrictions, which may hinder open discussion and collaboration.		(NS) | There was a call for collaboration and further discussion to refine ideas and address the challenges presented.	
Discussion on REC Certification and Liability	(MI) | The main idea presented is the distinction between APEA and non-APEA REC certifications, highlighting that APEA certifications transfer liability immediately upon certification.	(KQ) | The discussion raises questions about the effectiveness of REC certifications in areas with limited fuel and tree growth, which could impact fire spread.		(PRB) | A potential roadblock identified is the lack of sufficient fuel and tree size in certain areas, which may hinder the effectiveness of fire management strategies.			
Discussion on Tool Utilization and Data Gaps	(MI) | The need to build a comprehensive understanding of the tools used and the datasets available, as well as identifying gaps in data.	(KQ) | What tools are currently used related to criteria, what datasets are there, and what are the gaps in data accessibility?		(PRB) | Challenges in measuring vegetation and soil data effectively, as well as the difficulty in accessing certain datasets.			
Drone Assessment Benefits	(MI) | Drones provide comprehensive site data, reducing the need for on-ground assessments and minimizing risks.		(Opp) | Utilizing drones can streamline assessments across multiple sites, enhancing efficiency and reducing costs.	(PRB) | Challenges in identifying plant species using drones due to limitations in clarity and data requirements.		(NS) | Identify funding sources such as PTAC and Alberta Innovates for drone assessment projects.	

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Drone Usage and Cost Assessment	(MI) | The main idea discussed was the potential for drones to monitor cultivated areas for weeds and the implications of this technology for farming practices.	(KQ) | A significant question raised was about the cost difference associated with using drones for agricultural assessments compared to other methods.	(Opp) | There is an opportunity to utilize drones for remote monitoring of weeds in cultivated areas, which could enhance farming efficiency.	(PRB) | A potential roadblock mentioned was the reliance on farmers' willingness to adopt new technologies, as they may prefer traditional methods if they perceive drones as ineffective.			
Earth Observation Assessment Methodologies	(MI) | Establishing a program approach for EO assessments and defining a statistically relevant field assessment methodology.		(Opp) | Using EO to audit existing reclamation sites to demonstrate past success and recovery rates.				
Ecotones and Land Use Change	(MI) | The participants explored the definitions of ecotones and their potential transitions, emphasizing the ecological implications of land use changes due to climate change.		(Opp) | The discussion highlighted the potential for further research into how climate change may alter land use patterns, particularly the transition of forests to grasslands.				
Engagement with Indigenous Communities	(MI) | Engagement with local communities and rights holders is crucial for successful drone assessments and reclamation certifications.	(KQ) | How does the involvement of overlapping First Nations and traditional territories work in drone assessments?		(PRB) | Lack of trust from Indigenous communities may hinder the implementation of drone assessments.		(NS) | Develop a foundation of trust with Indigenous groups before implementing drone assessments.	

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Establishing a Pilot Program	(MI) | The team discussed the need to establish a pilot program that focuses on growth curves and regional background conditions, emphasizing the importance of data collection and field sampling methods. (MI) | The team proposed conducting a look-back audit of existing rights using Earth Observation assessments to analyze data from past certifications and site conditions.						
Field Validation with Remote Sensing		(KQ) | The speakers raised questions about how remote sensing data can complement field assessments and what metrics should be used to evaluate their effectiveness.				(NS) | The objective was set to evaluate the effectiveness of remote sensing in conjunction with field assessments, indicating a need for further exploration of this integration.	

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Forest and Species Identification	(MI) | The objective is to identify tree, shrub, and herbaceous species for reclamation, with a focus on regulatory compliance and Indigenous consultation.	(KQ) | What is the purpose of identifying species for reclamation certification?	(Opp) | There is potential for improved frameworks that incorporate Indigenous planning and consultation in reclamation processes.	(PRB) | Lack of harmonization in reclamation standards across different industries and regions complicates the process.			
Forest Fire Assessment and Reclamation		(KQ) | The participants questioned the classification of forest fire assessment and reclamation sites, seeking clarity on the tools and methods used.				(NS) | A task was requested to be created regarding the assessment of reclamation sites, indicating a need for follow-up actions.	
Forested Species Identification Challenges	(MI) | Identifying different species in forestry is more complex than in precision agriculture due to monoculture cropping.	(KQ) | What kind of value and difficulty do you believe forested species identification would have?	(Opp) | There is potential for using high-resolution and ground LiDAR for species identification in forestry.	(PRB) | Current technology for species identification is not operational yet, which may hinder progress.		(NS) | Identify additional projects related to forested species and reclamation criteria for future discussion.	
Framework Development for REDCAT Technologies	(MI) | The need for a multi-sector working group involving government, industry, and technical experts to develop assessment criteria for REDCAT technologies.	(KQ) | What criteria should be established for assessing REDCAT technologies?		(PRB) | Lack of internationally recognized standards for reclamation may hinder project development.	(SF) | Current REDCAT technologies lack validation against existing approaches, necessitating a foundational framework.	(NS) | Form a working group to define the criteria and involve regulators in the early stages of project development.	

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Funding and Data Collection Strategies	(MI) | The main ideas included utilizing drones and Earth observations for data collection, seeking partnerships with data providers, and the significance of publishing data for peer review.	(KQ) | Participants questioned whether funding sources could be expanded to cover all land types and how to effectively collaborate with data providers like Maxar.	(Opp) | There is an opportunity to leverage existing data collection projects like the Boreas Project to facilitate data sharing and collaboration among researchers.	(PRB) | Challenges may arise in securing funding and coordinating efforts among multiple stakeholders involved in data collection.	(SF) | The discussion referenced the Boreas Project as a successful model for collaborative data collection and sharing, highlighting its structured approach to research.	(NS) | Next steps involve reaching out to data providers for collaboration and exploring additional funding sources to enhance data collection efforts.	
Funding and Resource Allocation		(KQ) | The repeated question of 'Who's going to pay for it?' indicates a significant concern regarding funding for the proposed data collection and analysis efforts. (KQ) | The repeated inquiry 'Who's going to pay for it?' underscores the critical issue of funding for the project, indicating a need for clarity on financial responsibilities.	(Opp) | There is an opportunity to form smaller working groups focused on specific issues related to technology output formats and aligning criteria with REDCAT technologies.			(NS) | The discussion suggests the need to identify potential funding sources, such as PTAC or individual companies, to support the project.	
Funding Sources for Projects	(MI) | Federal and academic institutions are potential funding partners, but industry collaboration is often	(KQ) | Clarification needed on whether external partnerships are required for initiating IRA projects.		(PRB) | Some funding sources may require external partnerships, which could complicate project initiation.			

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	necessary for project proposals.						
Geo-referencing Data for Wetland Inventory	(MI) | The need for a hub for data resolution and the importance of geo-referencing for wetland data.	(KQ) | How accurate is the data for wetland delineation?	(Opp) | Crowdsourcing PDA data to improve reporting and problem-solving.	(PRB) | Challenges in geo-referencing data that is not collected digitally.	(SF) | The accuracy of remote sensing data depends on spatial resolution and the timing of data collection.	(NS) | Update DSA requirements to mandate geo-referencing of all locations.	
GPR and EM Survey Discussion	(MI) | The use of GPR and EM surveys can provide valuable data on moisture and chlorides, although the accuracy of these methods is limited. The complexity of defining parameters for effective modeling was highlighted.						
Grassland and Pipeline Assessment	(MI) | Grasslands are diminishing, and technology can aid in pipeline assessments without physical access.		(Opp) | Potential for collaboration with universities in Canada for projects related to grasslands and technology.		(SF) | TC's pipeline integrity division conducts drone assessments weekly for various purposes including spills and erosion control.	(NS) | Identify and engage with researchers like Dr. Chris Henry and Dr. Chris Storey for collaboration on deep learning algorithms.	

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Impact of AI on Radiology	(MI) | AI's capability to analyze millions of scans could lead to significant advancements in radiology, potentially replacing human radiologists due to its superior efficiency.			(PRB) | A challenge mentioned is the emotional impact on radiologists regarding the fear of being replaced by AI technology.			
Impact of Fire on Site Regeneration	(MI) | The team examined the impact of fire on site regeneration, discussing the need for more research on vegetation dynamics and the use of historical data to understand changes in burned areas.						
Key Projects for REDCAT Video Assessment Methodology	(MI) | Identifying key projects to support the adoption of the REDCAT methodology and assessing gaps in data, policy, and technology.	(KQ) | What are the key data, policy, and technology gaps that need to be addressed to support the adoption of the REDCAT methodology?	(Opp) | Utilizing open data areas to enhance assessments and scale methodologies from regional to site levels.				

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Land Cover and Fire Monitoring					(SF) | The discussion referenced a time series analysis conducted using Landsat data to classify land cover changes over several decades, illustrating the dynamics of land cover post-fire.		
Land Cover Types and Project Implementation	(MI) | Using well-performing acclimation sites as a baseline for model training instead of control sites, which are challenging to define.	(KQ) | What data would be required for the project implementation?		(PRB) | The risk of discrepancies in reclamation approaches between different parties involved in the project, which could affect trust and outcomes.			
Landscape Change and Recovery Post-Disturbance	(MI) | The main ideas included the need for long-term mapping of landscape changes, understanding the impact of disturbances like fire, and the role of forestry in recovery efforts.	(KQ) | The discussion raised questions about how the oil and gas industry responds to areas affected by fire and whether they revisit these sites for recovery.	(Opp) | There is an opportunity to explore the effectiveness of different recovery methods post-disturbance, including natural regeneration versus active reforestation efforts.		(SF) | The discussion referenced a specific study conducted in Alberta by a group of female sensing scientists, highlighting the importance of their work in understanding landscape changes.		
Leveraging Existing Data and Regulations	(MI) | Utilizing machine learning to extract data from PDFs and georeferencing datasets for better analysis.	(KQ) | How can we leverage existing positions and collaborate with regulators to access genuine data sets?	(Opp) | Exploring the integration of low-value, easier tools like ABMI with existing systems to enhance data usage.			(NS) | Identify the tools available for data extraction and outline their limitations for current measurements.	

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LiDAR Technology in Monitoring	(MI) | LiDAR technology can be utilized through drones and smartphones for environmental monitoring, offering advanced capabilities.		(Opp) | Exploration of smartphone LiDAR applications presents new avenues for data collection in environmental projects.				
Metrics for Land Capability Evaluation	(MI) | Current metrics are based on historical data and may not reflect new technological capabilities; exploring new metrics is essential.	(KQ) | What new metrics can be considered for evaluating land capability beyond traditional soil metrics?	(Opp) | Utilizing drone technology for remote sensing could enhance data collection and evaluation of land capability.	(PRB) | Entrenched practices and training may hinder the adoption of new metrics in land capability evaluation.			
Need for Standards in Data Handling	(MI) | The need for clear standards in data formats and information requirements was emphasized to streamline processes with external parties.	(KQ) | What standards should be established for data handling to facilitate easier collaboration with consultants and academia?					
Oil and Gas vs Forestry Reclamation Criteria	(MI) | Oil and gas sector pays timber damage, influencing replanting responsibilities and criteria differences with forestry.	(KQ) | Why is the oil and gas reclamation criteria more intensive than forestry survey criteria?		(PRB) | Conflicting policies between sectors hinder effective reforestation and reclamation practices.		(NS) | Policy updates are needed to address the current limitations in reforestation standards and practices.	

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Open Data Areas for Land Reclamation	(MI) | The team discussed the need for new open data areas that reflect reference ecosystems, emphasizing the importance of public accessibility to data for land reclamation efforts.		(Opp) | There is an opportunity to leverage existing data tools for land reclamation projects, which could enhance strategic planning and collaboration with various stakeholders.			(NS) | The team plans to explore the creation of new open data areas and engage with EO companies to gather relevant data for land reclamation.	
Project Concepts Development	(MI) | Integrating historical pre-disturbance assessment data into a common system for better analysis.	(KQ) | What constitutes a pilot project and who would be responsible for it?				(NS) | Team to evaluate the readiness matrix for existing technology and its application in different jurisdictions.	
Project Concepts for Environmental Monitoring	(MI) | Classifying projects into categories of high/low value and difficulty to identify funding sources.	(KQ) | What specific tree and invasive species should be targeted for identification?		(PRB) | Need for ground truth data to calibrate models for species identification.		(NS) | Identify funding partners such as PTAC and Alberta Innovates for project support.	
Project Title and Structure	(MI) | The project should involve a steering group with active regulator participation and a clear framework for objectives and requirements.	(KQ) | What should be the title of our project?		(PRB) | The process of creating standards may be painful and complicated, requiring significant effort.		(NS) | Establish a working group or session focused on standardization development.	

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Public Engagement and Hackathons	(MI) | Hackathons can be a valuable tool for public engagement and understanding community concerns. They should be targeted to address specific issues and involve local stakeholders.	(KQ) | What are the specific community concerns regarding ecological integration in the surrounding villages?	(Opp) | There is potential for more hackathons to be organized in different regions to engage the public and gather insights on local ecological issues.		(SF) | The speaker mentioned that hackathons have been successful in Ottawa and other cities, leading to ongoing community involvement and addressing public concerns.		
Public Engagement in Projects	(MI) | The speakers highlighted the significance of public engagement in project success, using Sudbury as a case study. They proposed that hackathons could be a method to increase public involvement.			(PRB) | The challenge of engaging diverse groups, particularly within First Nations, was identified as a potential roadblock to effective public engagement.			
Regulatory Acceptance of Technology	(MI) | Demonstrating technology capabilities to regulators can streamline certification processes and save time and money.	(KQ) | Can we show regulators that RedCat technology meets OEC certification criteria?	(Opp) | Using remote sensing for pipeline reclamation applications could provide a new avenue for compliance without physical access to properties.	(PRB) | Challenges related to accessing private property for data collection and the potential for regulatory pushback on new technologies.			

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Remote Sensing and Data Utilization	(MI) | The conversation highlighted the potential of combining various data types(LiDAR, multi-spectral, radar) for better outcomes compared to relying solely on hyperspectral data.	(KQ) | A question was raised about the effectiveness of hyperspectral data versus LiDAR and traditional high-resolution data in solving specific problems.	(Opp) | There is potential for new indices from space-based hyperspectral data that could enhance the effectiveness of remote sensing applications.				
Remote Sensing and Data Validation	(MI) | The integration of remote sensing with field data collection to enhance validation processes and address variability issues in vegetation assessments.	(KQ) | How much time is required before a site can be validated with remote sensing?		(PRB) | Challenges in obtaining initial observations and establishing a temporal timeline for data validation.	(SF) | Current criteria for site validation require a minimum of two years or one year after production, which may need to be extended with remote sensing.	(NS) | Evaluate the feasibility of incorporating drone technology into ongoing projects to improve data collection.	
Remote Sensing and Ground Assessment Integration	(MI) | Combining drone assessments with ground truthing can enhance data reliability and reduce costs for site evaluations.	(KQ) | What is the minimum number of sites needed for effective testing and validation of remote sensing data?	(Opp) | Utilizing drone data can provide additional insights for sites that are difficult to access, enhancing overall assessment accuracy.	(PRB) | Variability in site conditions may require a larger sample size to ensure accurate data interpretation.	(SF) | Previous assessments have shown that combining remote sensing with ground data can improve confidence in site evaluations.	(NS) | Consultants to coordinate with drone operators to integrate aerial assessments into existing site evaluations.	

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Remote Sensing and Traditional Reclamation Requirements	(MI) | The team discussed the need for a project that demonstrates how to review remote sensing submissions alongside traditional field assessments, proposing a proof of concept for bulk submissions.		(Opp) | There is an opportunity to work with regulators to improve their understanding and review processes for remote sensing applications, potentially leading to more efficient assessments.		(SF) | Previous successful collaborations between oil companies, government, and surveyors were mentioned as a precedent for integrating remote sensing data into regulatory processes.		
Remote Sensing Applications in Peatlands	(MI) | Exploring the use of drones for identifying peat-forming species and assessing hydrology in peatlands.	(KQ) | What criteria should be used to assess peatlands using remote sensing?				(NS) | Team to develop an objective to differentiate graminoid species within native grasslands using remote sensing technologies.	
Remote Sensing for Reclamation Monitoring	(MI) | Utilizing remote sensing to identify problem sites and assess reclamation success over time is a high-value opportunity.			(PRB) | There may be pushback from industry regarding the implementation of remote sensing for audits.	(SF) | Remote sensing can provide data on vegetation health and site conditions, aiding in the audit process.	(NS) | Team to explore the use of remote sensing for RCA audits to determine project trajectory and success.	
Research Project Collaboration	(MI) | The importance of understanding metrics and criteria for evaluating research projects, particularly in remote sensing and data variances.	(KQ) | How can we tie together drone technology and Earth observations for effective data sharing and evaluation?	(Opp) | Exploration of new tools and methodologies for remote sensing and data evaluation, particularly in contaminated sites and vegetation metrics.	(PRB) | Challenges in understanding and measuring variances within datasets, which may complicate the evaluation process.		(NS) | Identify a team to draft a proposal or document that outlines the discussed ideas and metrics for the research project.	

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Role of Graduate Students in Projects	(MI) | Graduate students could assist in data analysis and ground truthing, but should be paired with experienced professionals to ensure effective outcomes.		(Opp) | There is an opportunity to develop mentorship programs that pair experienced professionals with new graduates to enhance their practical skills in GIS and data handling.	(PRB) | Graduate students may lack the necessary experience and training to handle complex tasks independently, which could hinder project success.			
Satellite Technology and Spectral Signatures	(MI) | The discussion highlighted the importance of spectral signatures in identifying agricultural conditions and the potential for satellites to provide timely data for farmers.	(KQ) | The group raised questions about the scale of interviews needed and whether there are alternate funding sources available, particularly from universities.				(NS) | Next steps include determining when satellites will be available for monitoring specific areas, which is crucial for effective agricultural assessments.	
Soil and Vegetation Interaction	(MI) | The approach to weed control should focus on soil health rather than vegetation alone. Understanding the nutrient cycle is crucial for supporting native species.	(KQ) | What deficiencies are present in different soil types and how can vegetation indicate soil health?	(Opp) | Exploring the correlation between soil data and vegetation health could lead to improved agricultural practices.				
Species Identification and Regulatory Compliance	(MI) | Species identification is necessary to meet regulatory requirements, but it may also be beneficial to assess which species are truly	(KQ) | What is the intent of identifying species-free reclamation people?		(PRB) | The current regulatory framework may not align with practical reclamation needs, creating challenges in meeting both regulatory and ecological goals.			

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	important for reclamation.						
Standardization in Remote Sensing	(MI) | Standardizing remote sensing practices can reduce costs and improve regulatory acceptance.			(PRB) | Lack of standardization may lead to regulatory rejection of remote sensing data.			
Survey Participation	(MI) | A QR code is available at tables for survey access, with 25 participants having filled it out so far.						
Technical Requirements and Specifications	(MI) | The objective is to create a technical report that outlines measurable reclamation outcomes using remote sensing techniques.	(KQ) | How do we spend the most money and get the least amount of value?	(Opp) | Exploring funding sources such as COSEA or agricultural partnerships for the project.		(SF) | The EPA has established a remote sensing working group to support the initiative.		
Technology and Cost Assessment for Data Collection	(MI) | The technology used for data collection should align with the assessment objectives, particularly regarding resolution and scale. Cost considerations are crucial when evaluating different methods of data collection.		(Opp) | Exploring the potential for using drones or satellites as cost-effective alternatives to traditional methods like helicopters for data collection.	(PRB) | The need for human oversight in data analysis may limit the cost savings from using technology for data collection.			

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Understanding Remote Sensing Applications	(MI) | The need for education on technology limitations and the importance of long-term data collection for remote sensing applications.	(KQ) | What are the appropriate resolutions needed to answer specific remote sensing questions?	(Opp) | Enhancing datasets that are currently outdated to improve remote sensing applications.	(PRB) | Challenges in maintaining relevance of data over time and ensuring continuous updates to datasets.		(NS) | Establish new sites for data collection that utilize current best practices in remote sensing.	
Use of Drones in Site Assessment	(MI) | Drones can streamline site assessments, reducing costs and improving efficiency by providing preliminary data before sending assessment teams.		(Opp) | Integrating drone technology into Indigenous environmental monitoring can enhance data collection and build community trust.				
Utilization of High-Resolution Data	(MI) | The speakers discussed the significant value of high-resolution data sets obtained from drone flights, which can be utilized for monitoring and reclamation purposes. They noted that these data sets are often funded for other business reasons but can be leveraged for environmental assessments.		(Opp) | There is an opportunity to demonstrate the potential of high-resolution data to other companies, which may lead to more efficient and economic practices in reclamation efforts.		(SF) | The speakers mentioned having one of the longest and most comprehensive data sets on wetlands, which includes extensive measurements over multiple years, showcasing the depth of their data collection efforts.		

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Wetland Reclamation Discussion	(MI) | The main idea discussed was the need for increased attention to wetland reclamation, which has been historically overlooked compared to upland reclamation.	(KQ) | The discussion raised questions about the industry's approach to wetland reclamation and the challenges associated with it.		(PRB) | The complexity of wetland reclamation was identified as a potential roadblock, making it less appealing for industry focus compared to upland reclamation.			
Workshop Reflection and Future Initiatives	(MI) | The workshop fostered a spirit of sharing and innovation, with plans for future workshops and initiatives in environmental sectors.						