Oil Sands Mining Reclamation Challenge Dialogue – Report and Appendices

R.K. Jones and D. Forrest

Innovation Expedition Consulting Ltd.

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Oil Sands Research and Information Network

OSRIN is a university-based, independent organization that compiles, interprets and analyses available knowledge about returning landscapes and water impacted by oil sands mining to a natural state and gets that knowledge into the hands of those who can use it to drive breakthrough improvements in reclamation regulations and practices. OSRIN is a project of the University of Alberta's School of Energy and the Environment (SEE). OSRIN was launched with a start-up grant of $4.5 million from Alberta Environment and a $250,000 grant from the Canada School of Energy and Environment Ltd.

OSRIN provides:

- **Governments** with the independent, objective, credible information and analysis required to put appropriate regulatory and policy frameworks in place
- **Media, opinion leaders and the general public** with the facts about oil sands development, its environmental and social impacts, and landscape/water reclamation activities – so that public dialogue and policy is informed by solid evidence
- **Industry** with ready access to an integrated view of research that will help them make and execute reclamation plans – a view that crosses disciplines and organizational boundaries

OSRIN recognizes that much research has been done in these areas by a variety of players over 40 years of oil sands development. OSRIN synthesizes this collective knowledge and presents it in a form that allows others to use it to solve pressing problems. Where we identify knowledge gaps, we seek research partners to help fill them.

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REPORT SUMMARY

This report provides a high level summary of the conversations and discoveries that emerged over the course of the Reclamation Challenge Dialogue. During the first two months of 2010, OSRIN explored the idea of the dialogue with a number of key stakeholders who were either directly involved in or affected by the oil sands reclamation challenge. These discussions confirmed its value in having such a dialogue and provided guidance on what particular challenges were most important to focus on.

Over 100 participants across the oil sands reclamation community of interest and practice were invited to respond to the Challenge Paper. Feedback was received from 43 individuals, including responses from governments, individuals working with First Nations in the oil sands area, academia, consulting firms, oil sands companies, research/technology agencies and nongovernment organizations. Many responded in considerable detail; over 100 pages of feedback were compiled unattributed into a Consolidated Feedback Document. This material was then synthesized into a Progress Report supplemented by a detailed Progress Report Appendix. Both the original feedback and the Progress Report material contain a wealth of information that can and should be capitalized on further.

While the Challenge Paper intended to focus on a few key aspects of the reclamation challenge for mining in the oil sands area, it ended up provoking a wide range of reactions across almost the full spectrum of the "oil sands reclamation system." The nature and depth of the responses underscored the complexity, diversity and interconnectivity of the numerous reclamation issues and opportunities presented. The responses also indicated how much people wanted to express their views on these challenges. It was obvious that the respondents put considerable effort into articulating thoughtful feedback. These were not just subjects of professional interest but were matters that evoked strong, passionate feelings. Clearly there are some strongly held but also widely divergent beliefs on certain topics.

All of this feedback and its synthesis informed the design of the June 17th Workshop, which was held at the University of Alberta in Edmonton and attended by 38 people. The workshop was supported by a Workshop Workbook. The results of the workshop were summarized in a Workshop Synopsis document that was distributed in early September.

Based on the feedback to the Challenge Paper the Workshop scope was narrowed to create a systems view of oil sands reclamation with a particular focus on key components: (1) challenges related to the rationale and application of the equivalent land capability concept; (2) challenges related to end land use selection; and (3) challenges related to how to respond to and inform the public's expectation of reclamation success.

Two different approaches to developing a reclamation system "map" were tested with Workshop participants.

Eleven recommendations were developed from the ideas generated by the Challenge Dialogue process.

ACKNOWLEDGEMENTS

The Oil Sands Research and Information Network (OSRIN), School of Energy and the Environment, University of Alberta provided funding for this project.

The Dialogue was assisted by the Advisory Members of the Organizing Team comprised of Satya Das, Cambridge Strategies Inc.; Calvin Duane, Canadian Natural Resources Ltd.; Simon Dyer, Pembina Institute; Fred Kuzmic, Shell Albian Sands; Albert Poulette, Alberta Environment; and Lisa Schaldemose, Fort McKay Industrial Relations Corporation.

The Dialogue was facilitated by Keith Jones and David Forrest, Innovation Expedition Consulting Ltd.

OSRIN, the Organizing Team and the consultants are grateful for all of the constructive input received from people who participated in one or more parts of the Challenge Dialogue process.

1 INTRODUCTION

This report provides a high level summary of the conversations and discoveries that emerged over the course of this Reclamation Challenge Dialogue. During the first two months of 2010, OSRIN explored the idea of the dialogue with a number of key stakeholders who were either directly involved in or affected by the oil sands reclamation challenge. These discussions confirmed its value in having such a dialogue and provided guidance on what particular challenges were most important to focus on. Many of these ideas, challenges and opportunities, guided by an advisory group (listed on the front cover), were brought together in the form of a Challenge Paper, the first in an incremental series of Dialogue products.

Over 100 participants across the oil sands reclamation community of interest and practice were invited to respond to the Challenge Paper. Feedback was received from 43 individuals, including responses from governments, individuals working with First Nations in the oil sands area, academia, consulting firms, oil sands companies, research/technology agencies and nongovernment organizations. Many responded in considerable detail; over 100 pages of feedback was compiled unattributed into a Consolidated Feedback Document. This material was then synthesized into a Progress Report supplemented by a detailed Progress Report Appendix. Both the original feedback and the Progress Report material contain a wealth of information that can and should be capitalized on further.

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Each of the reports noted above are provided in the Appendices.

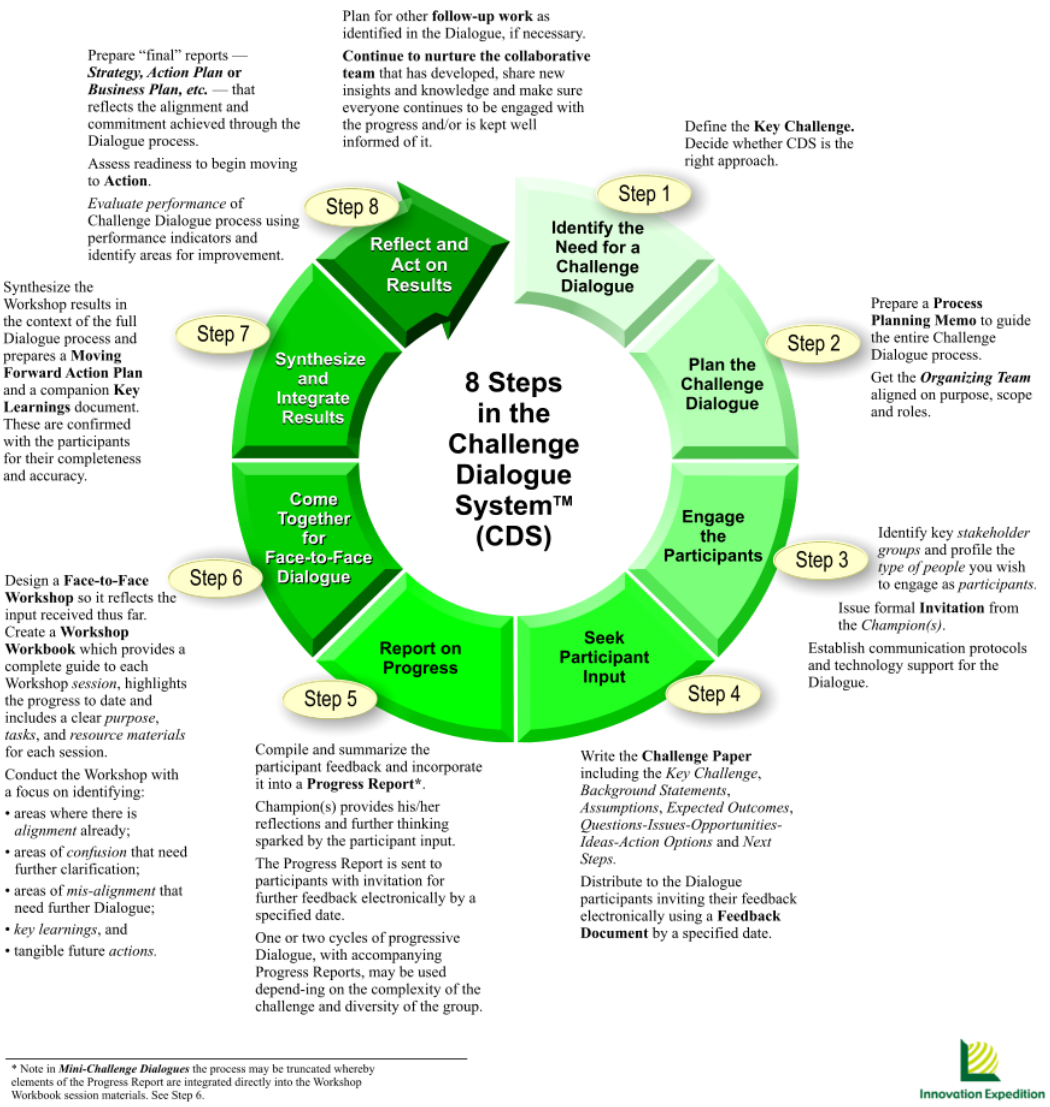
Stemming from this Challenge Dialogue, and subsequent activities being planned, OSRIN intends to develop some specialized knowledge products focused on a few key discussion topics that emerged.

1.1 The Challenge Dialogue System

We used the Challenge Dialogue System™ (CDS)[1] developed by Innovation Expedition to guide our Dialogue – prior to and during and the face-to-face Workshop on June 17, 2010.

CDS is an efficient and effective vehicle for engaging diverse stakeholders and assisting them to collaborate and innovate in order to accomplish a complex task. CDS is a structured but flexible methodology for moving a team from ideas to action quickly and effectively (see diagram below).

[1] www.innovation.expedition.com



1.2 Organization of This Report

The body of the report summarizes the key findings and recommendations arising from the Challenge Dialogue process.

Appendices 1 to 5 are the reports from each of the Dialogue stages. The Challenge Dialogue process is disciplined process that engages diverse groups on discovering collaborative and innovative solutions to complex challenges. A Challenge Dialogue typically operates over several months, with the bulk of the work being done electronically with the participants via the issuance of an initial Challenge Paper which is then commented on. The synthesized comments are used to create one or more Progress Reports, the process being repeated iteratively as the Challenge evolves. Finally, a face-to-face Workshop is held to work in a focused way on the remaining outstanding issues.

Note that these Appendices contain edited and reformatted materials and therefore will look different than the original materials provided to Dialogue participants. There is considerable duplication in the documents but it is provided to show the evolution of the concepts as additional feedback was received.

The output documents from this Challenge Dialogue are:

- Appendix 1 – the original Challenge Paper that was sent to over 100 knowledgeable people
- Appendix 2 – the feedback received from 43 respondents
- Appendix 3 – the Progress Report that summarized the feedback and revised the Dialogue components as required
- Appendix 4 – the Workshop Workbook that was provided to the Workshop participants
- Appendix 5 – the Workshop Summary Report

References to the Figures in Appendices 3 to 5 are linked to the Figures in s. 4.2 of the report rather than replicating them in each of the Appendices.

2 KEY CHALLENGE AND EXPECTED OUTCOMES

The Key Challenge for the Dialogue started out somewhat broad and ambitious:

> To engage a diverse set of reclamation-related domain experts and stakeholders in a purposeful conversation that is focused on: (1) identifying challenges and required timelines in managing and containing contaminants, and reclaiming to equivalent capability; and (2) exploring the feasibility of creating alternative desirable end land uses.

Reflecting on the feedback received, the OSRIN team changed the Key Challenge to be:

> To engage a diverse set of domain experts and stakeholders in a purposeful dialogue to create a systems view of oil sands reclamation with a particular focus on key components: (1) challenges related to the rationale and application of the equivalent land capability concept; (2) challenges related to end land use selection; and (3) challenges related to how to respond to and inform the public's expectation of reclamation success.

The workshop and this report have focused on the reclamation system perspective and these three particular challenge areas in a systems context.

The Expected Outcomes for the Dialogue also started out ambitiously as:

1. To identify challenges in reclaiming oil sands developments to functional boreal ecosystems and landscape;

2. Define the attributes by which functional boreal ecosystems and landscapes can be recognized (these could include visual, biophysical and spatial attributes; ecosystem functions; indicative successional trajectories;
3. Identify and characterize potential end land uses in the reclaimed area; and
4. Identify related challenges in landscape design and in institutional, economic, and social and cultural acceptance for these alternative end land uses.

While much of the feedback touched on all of these points to some degree, the Expected Outcomes were also revised so they were more focused and realistic. They became:

1. Achieve alignment on the key elements, linkages and dependencies within the oil sands reclamation system and how a lack of shared understanding and alignment is hindering its effectiveness.

   The key elements OSRIN has chosen to focus on are: the equivalent land capability concept and its application; end land use selection and response to and informing the public's expectation of reclamation success.
2. Achieve alignment on and commitment to specific follow-up initiatives to be undertaken by OSRIN and others to increase shared understanding and help increase the effectiveness of the oil sands reclamation system.

Drawing on these revised outcomes, the June workshop zeroed-in on five specific outcomes:

1. The benefits of taking a Systems Perspective to the overall oil sands reclamation challenge are better appreciated and have begun to be applied to the challenges and opportunities identified in this dialogue.
2. Challenges related to the rationale and application of the Equivalent Land Capability concept have been framed and key questions to address this challenge and to guide future work have been identified.
3. Challenges related to End Land Use Selection have been framed and key questions to address this challenge and to guide future work have been identified.
4. Challenges related to How to Respond to and Inform the Public's Expectation of Reclamation Success have been framed and key questions to address this challenge and to guide future work have been identified.
5. Preliminary outlining of Action-Recommendations as input to a post-workshop Action Plan.

At the end of the workshop we asked the participants to how well these five outcomes were met. On average (median value) they rated outcomes 1, 2 and 3 as being "met." Outcomes 4 and 5 were rated as "partially met." These ratings confirmed OSRIN's sense that the workshop had been a success.

3 NATURE AND EXTENT OF THE CHALLENGE PAPER FEEDBACK

In total the feedback was comprehensive, broad ranging, insightful and constructive. While the Challenge Paper intended to focus on a few key aspects of the reclamation challenge for mining in the oil sands area, it ended up provoking a wide range of reactions across almost the full spectrum of the "oil sands reclamation system." The nature and depth of the responses underscored the complexity, diversity and interconnectivity of the numerous reclamation issues and opportunities presented. The responses also indicated how much people wanted to express their views on these challenges.

It was obvious that the respondents put considerable effort into articulating thoughtful feedback. These were not just subjects of professional interest but were matters that evoked strong, passionate feelings. Clearly there are some strongly held but also widely divergent beliefs on certain topics. It soon became evident that OSRIN tried to include too many topics into the Challenge Paper. Appendix 2 provides a flavour for the breadth and diversity of the feedback. It is a synthesis of the feedback received on the critical questions posed in the Challenge Paper.

At first blush it appeared like there were significant differences of opinion with the statements in the Challenge Paper. Indeed, there are some topics where some said "all is well", while others said "this is a significant area of concern" or, on the other end of the spectrum – "we have absolutely no idea."

But, in many cases upon closer examination, it often became evident that these differences in views were more of an indication of people simply not knowing or not being able to know because they don't have access to the necessary information to offer an opinion. Most often what was brought forward in the comments was not so much counter arguments but rather new information and deeper insights on a subject.

In many cases we noted that a systems perspective overall and around a particular challenge was missing, being called for, not understood or not understood universally among the many active players and stakeholders. We discuss this observation further in section 4 below.

In the Challenge Paper people were asked to share their expectations for the workshop. While the responses apply to the workshop they also illustrate the broader needs and expectations of the oil sands reclamation community. Four general themes are evident in this feedback:

1. Common understanding of the state of our knowledge – the need for this community of practice (and interest – i.e., stakeholders) to have a common, shared understanding and exchange of what is known, what is not known, what is not known but being researched.
2. Reclamation outcomes – the need to have clearly defined, agreed upon, high-level reclamation outcomes. Tied closely to this is the need for a deeper understanding of some foundational concepts (e.g., equivalent land capability) with their supporting explicit definitions of key terms (e.g., functional, landscape, boreal, etc.).

3. Collaboration – an explicit or underlying desire to more effectively on our knowledge and expertise through better collaboration.
4. Collective action – a desire to share and build on what we know and to move forward with some collective action.

As a result of the feedback OSRIN adjusted the key challenge and expected outcomes for the Dialogue (see above). A more in-depth examination of other topics identified in the feedback will be considered for discussion in subsequent venues.

3.1 Critical Questions Feedback

The Challenge Paper asked six critical questions. Following is a summary of the results.

What are the top four challenges in reclaiming oil sands developments to functioning boreal ecosystems and landscapes?

Ninety-four priority challenges were advanced by the participants. They broke out into seven (7) categories:

1. Strategic Goals and Desired Outcomes for the Reclamation of the Oil Sands Area
2. Understanding of the Nature and Magnitude of Oil Sands Development and Implications to the Reclamation Task
3. Misalignment of Legislation, Regulations, Policies, Expectations, Requirements, Enforcement
4. Communicating with the Public, Transparency
5. Reclamation Success – Criteria, Uncertainty, Demonstrating It
6. Knowledge Gaps, Knowledge Transfer / Sharing, Tools. The sub-categories apart from general comments in this area included: landforms-hydrology-water-soils; plant ecology, succession; salts, contaminants; wetlands; and, tailings
7. Timelines
8. Miscellaneous – determining end land use, disruptive use of reclaimed land, provision of reclamation costs, liability management practices and climate change

Do we have the required capability to manage and contain contaminants to create a healthy biosphere?

There were 19 respondents to this question: 'Yes' – 9 most with caveats; 'No' – 4 only one without a comment; 'Don't Know' – 6 did not know or implied they did not know for sure.

- YES – The caveats included – lack of will to apply the capability; R&D of past 20 years has proven this but we need time for this to be applied; greater investment of effort is need than the present approach, needs to become integral component of closure plans; need risk assessment as part of the review process; it's expensive; and, understanding of acceptable impacts over time.

- NO – the comments included – ability to measure naphthenic acids very recent, what fractions are causing NAs; more research needed before we can manage them; data isn't publicly available; need research on the potential of wetlands to act as wastewater treatment areas.
- DON'T KNOW – the concerns included – no success stories; unresolved differences of opinion; each contaminant has to be considered separately.

Does the current requirement to create equivalent capability, including the use of the Land Capability Classification System, achieve the expectation of a having functional boreal ecosystems and landscapes?

There were 18 respondents to this question: 'No' – 10, all but two with comments; 'Yes' – 6, all but one with comments or caveats; 'Maybe' – 1, with a comment.

- NO – the comments included – knowledge and experience not at a point where we can claim this; need data over time to validate our predictions; bias against wetlands, a separate system is needed to assess wetlands; does not clearly translate into setting clear, consistent and measurable goals for achieving reclamation success; originally and agriculture tool; forestry-focused – sends a confusing message for defining desirable wetland outcomes; far from achieving this goal; 'equivalent' as a statement is useful to set very high level direction but stops short as no one knows what it means.
- YES – The caveats included – overall the tools and systems are OK, adequate; LCCS probably close to achieving the expectation; will lead to functional ecosystems give the time to do so; capabilities of wetlands need to be addressed, biased against wetlands.

How would you recognize that a site / landscape has achieved equivalent capability?

There were 19 respondents to this question. The feedback ranged from a general acknowledgement of this measurement challenge to clear and detailed ideas on what equivalent capability meant and implied more deeply and this concept and intention could be enhanced and measured.

The informative feedback was organized into six categories: landscapes including spatial-temporal considerations, landforms, soil, vegetation, lakes and water bodies, time, and stakeholders and human use. Two respondents shared specific ideas about how the intentions of equivalent capability approach could be augmented and enhanced more explicitly in terms of the concept, and criteria and measures.

What are possible and desirable end land uses for reclaimed land?

There were 22 respondents to this question. The comments included:

- suggested lists of customary regional uses including traditional use by Aboriginals
- suggested lists of non-conventional uses

- thoughts on who should make this evaluation and decision
- timeframe considerations with respect to the longevity of today's values 100 years from now
- the relatively small size of the land areas that actually might entertain different end land uses relative to more customary uses
- land use trade-off considerations including multiple uses of the same piece of land (i.e., compatible uses), which escalates the reclamation discussion into a broader land use planning (LARP) conversation
- the feasibility of some end land uses regarding compliance with legislation and regulation (e.g., endangered species, Aboriginal constitutional and Treaty rights), economic, equitable cost sharing, institutional alignment and technical factors

What are some of the key challenges in landscape design and in institutional, economic, and social and cultural acceptance for these alternative end land uses?

There were 19 respondents to this question. The feedback was wide ranging but tended to matching in many cases the different aspects of the feasibility end land uses outlined in the Challenge Paper (assumption #3). The key challenges advanced were grouped into 4 categories: public and aboriginal values and expectations, communications and related stakeholder processes to ascertain these values and communicate them; landscape design and other technical challenges and constraints; and, institutional factors.

4 THE RECLAMATION SYSTEM PERSPECTIVE

As noted above, the lack of clear systems perspective soon became evident as we worked through the feedback material. This observation was noted in the Progress Report and respondents to that report affirmed its absence and the importance of including it in further discussions. At the workshop the importance of taking more of systems approach to oil sands reclamation was a prevailing theme. We have summarized this overarching theme from the Dialogue by outlining our observation, mapping-out a quasi-systems figure based on the Dialogue discussion points, examining the unintended consequences of not taking a systems view, and examining the implications of taking more of a systems approach to oil sands reclamation in the future.

The term "reclamation system" is intended here to include all of the elements involved in planning, managing, conducting and measuring / monitoring reclamation. This includes, but is not limited to a policy system, a regulatory system, an operational reclamation system, and others. Thus the "reclamation system" can be thought of as a system of systems.

4.1 Oil Sands Reclamation Seldom Recognized and Managed as a System

What was evident in the feedback to the Challenge Paper is that first, the reclamation of the oil sands is very complex but is seldom recognized as reclamation system per se. Different people –

planners, practitioners, experts, policy-makers, regulators, etc. – engage with the reclamation system at different places. In so doing, they observe different things and focus on different things. The feedback underscored the complexity of this system and demonstrated how different people related to different parts of it and therefore had significantly different priorities and issues with that part of the system in which they engaged.

A second observation was that the feedback indicated directly and through inference that a system perspective is often either missing or, for those that have a systems view, that a common systems view is not understood or shared universally among the reclamation planners and practitioners.

4.2 Mapping Themes

Recurring discussion points and themes emerged from the feedback. They were organized into 10 themes with the key discussion points represented within each theme. Figure 1 attempt to provide an integrated picture of these themes and their key discussion points on a single page. This conceptual representation is only one of a number of possible representations of the "oil sands reclamation system." At the workshop it was suggested that the sand grains in the figure be turned into cog wheels to illustrate their interconnectedness (see the inset within Figure 1).

In the Progress Report we also portrayed some the key elements of the reclamation system in the form of a process map (see Figure 2). This representation starts with the development of the mine plan which in turn, triggers the development of a reclamation plan and a tailing plan and so on. The process steps are further highlighted showing what steps are supported with guidance information, which ones have uncertainty and which ones represent gaps in the system.

Figure 3 shows yet another portrayal of the oil sands reclamation system – in this case as a series of four layers. There may even be a fifth layer which would be for "society's values and expectations". People working in the system go back and forth between at least two of the layers depending on what level you operate at in an organization.

In the workshop it was suggested that feedback loops be incorporated so the system is adaptive, a learning system and is continuous improved. As important, there is a need to convey the system as a regional, multi-operator scheme, not a single mine site. When polled, none of the participants at the workshop were aware of other existing system diagrams apart from some that may show the regulatory process.

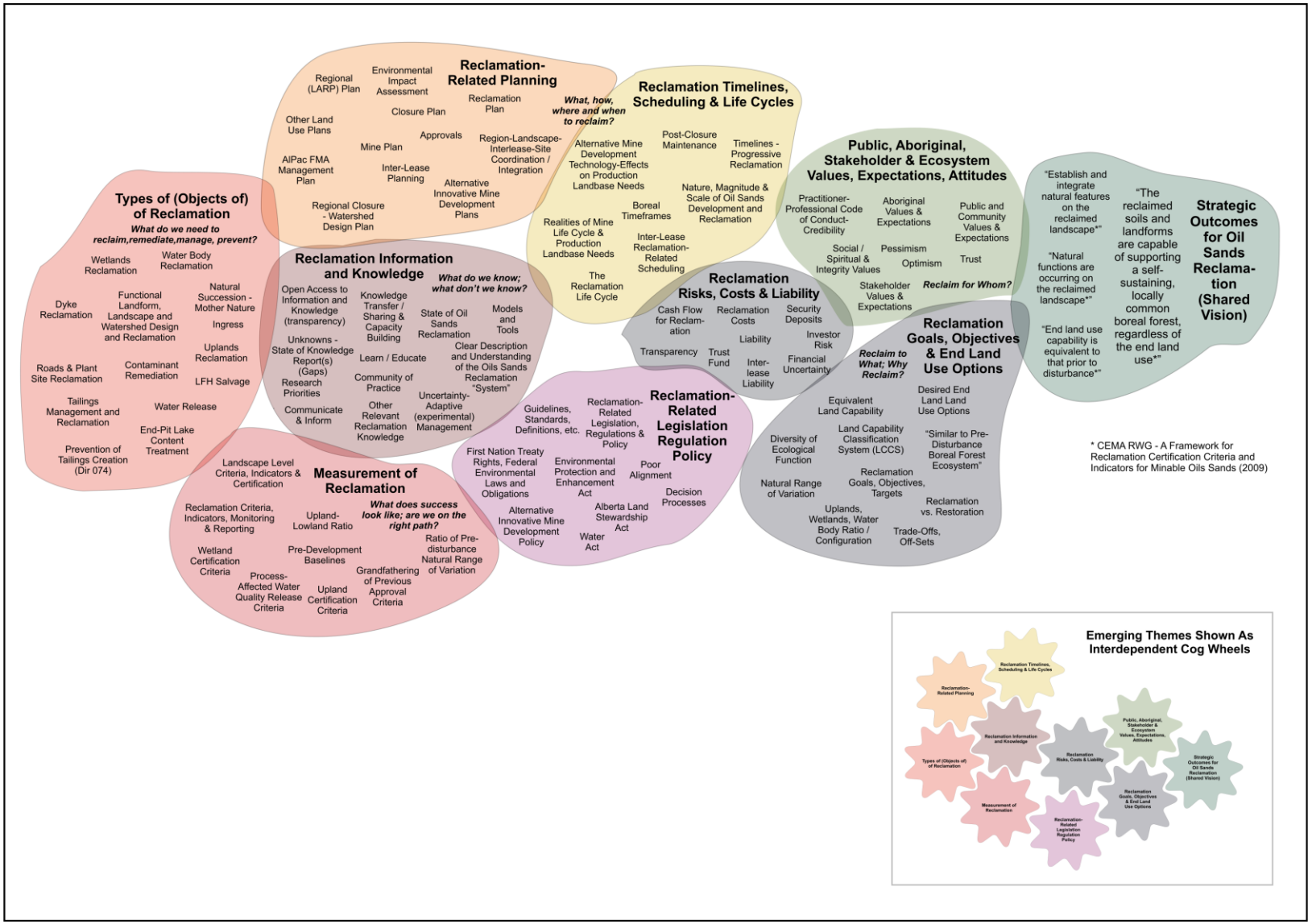


Figure 1. Emerging discussion themes and key discussion points – the 'oil sands reclamation system'. The inset shows the themes as interdependent cog wheels.

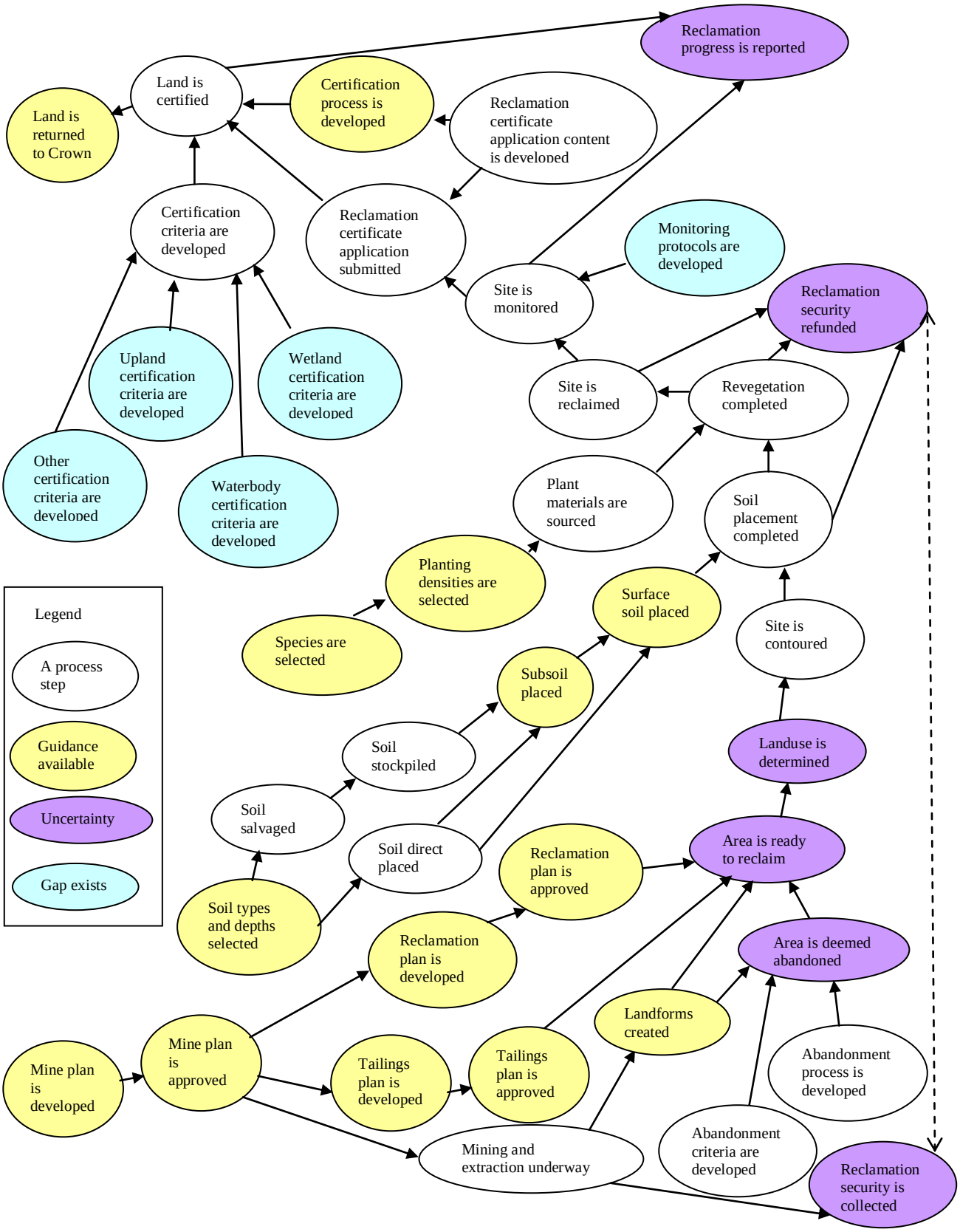


Figure 2. Simplified process-oriented view of the "reclamation system."

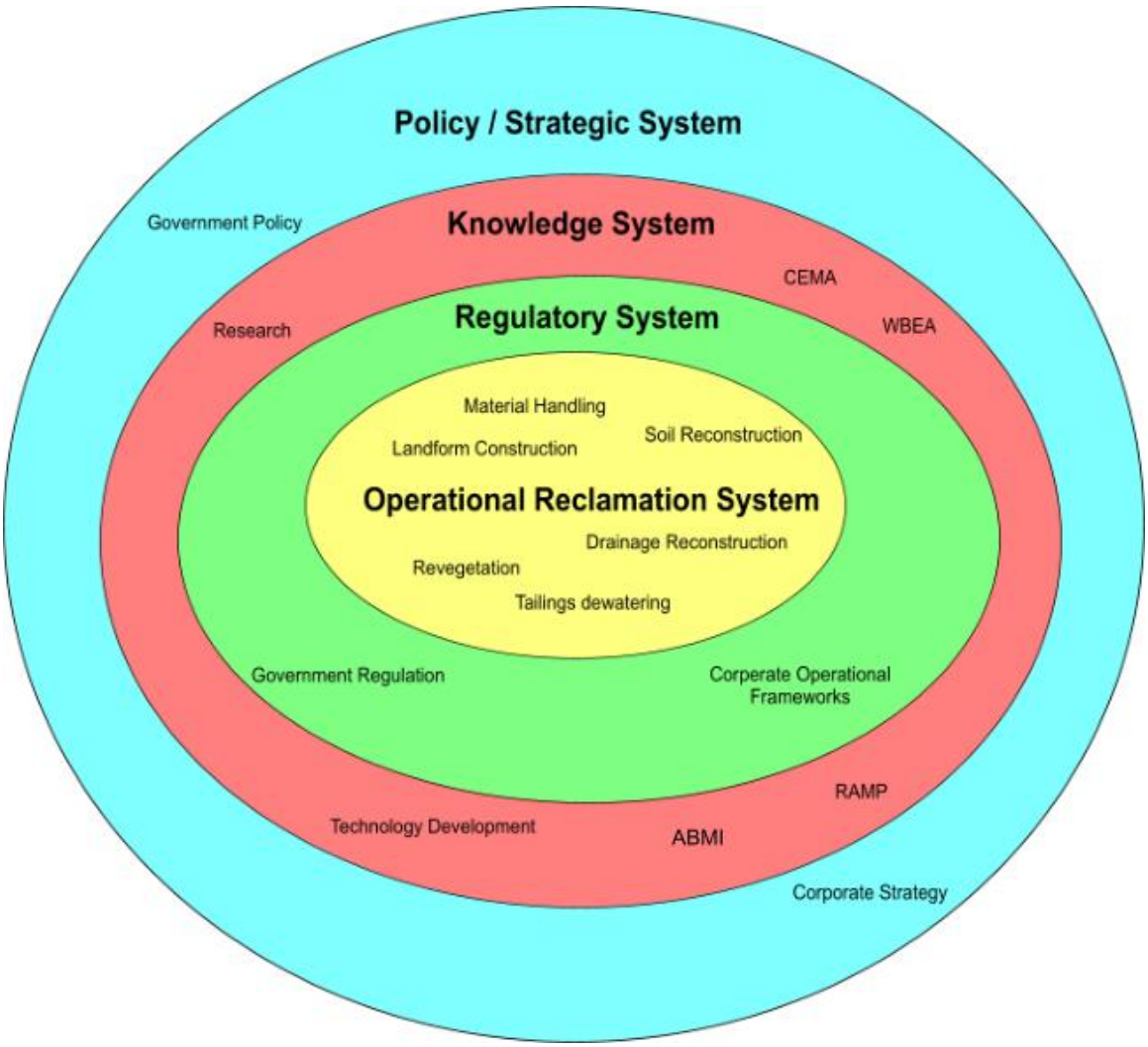


Figure 3. A layered approach to representing the oil sands reclamation system. Note – the labels are incomplete but provided simply for illustration.

4.3 Unexpected or Unintended Consequences of Not Taking a Systems Approach

Fourteen examples of unintended consequences due to not taking a systems approach were described at the workshop. This list is for illustration purposes only and is not meant to be exhaustive. Details for these are available in the Workshop Synopsis.

1. Selection and optimization of bitumen separation technology
2. ERCB draft directive for fresh water use
3. Zero discharge of process affected water
4. Conflicting management objectives; making decisions that precludes alternatives

5. Poor communication between mining operations and reclamation limits coordination and cooperation
6. Reclamation liability misconceptions, fear of failure and disincentives hinder more timely reclamation certification
7. Conflicting regulatory and policy requirements
8. Changing reclamation objectives and outcome-based performance means yesterday's reclamation doesn't meet today's certification criteria
9. Consolidated tailings (CT) presented more challenges for reclamation (and water quality, extraction and mine closure)
10. Change in overburden depth requirements for saline-sodic lack scientific rationale
11. Land Capability Classification System's forestry bias causes wetlands to be undervalued and under considered
12. Oil sands promotion and government incentives for development
13. Rigid application of rules reduces situation-specific flexibility jeopardizing reclamation outcomes
14. Access control and management need to be a part of reclamation planning
15. Accounting rules for the disclosure of liabilities may affect a company's 'reclamation attitude'
16. Reclaiming uplands affects the wetland system hydrology

The above unintended consequences illustrate that when we examine how to best increase the efficiency and effectiveness of current reclamation plans and practices, we must take the whole system into account. Ultimately everything is connected to everything – "the detailed elements are important and need to be worked on, but we need to focus also on the 'system' and how these elements have to work together."

4.4 Implications of Taking a Systems Approach to Oil Sands Reclamation

At the workshop there was considerable interest in exploring the meaning and implications of taking more of a systems approach to reclamation of the oil sands area. Some felt this approach would help address the increasing need to align site-level plans and actions with landscape-level planning objectives such as those in the Lower Athabasca Regional Plan (LARP). Expanding on this, is the need to more explicitly link EIAs to mine plans, mine plans to closure plans, and closure plans to regional plans. A systems approach means that all reclamation efforts need to be better coordinated so that one organizational unit's objectives are not creating untended consequences for others and that they together are aligned with regional outcomes.

The reclamation system tends to be partitioned among various organizations and sub-units of organizations. Local optimization or maximization may lead to overall (system-wide) sub-optimization. This situation is typical of any large complicated system and not unique to the oil

sands develop or reclamation. What is important to ask here is – how we can develop strategies for overcoming these sources of ineffectiveness and of inefficiency?

At the end of the day, all of the various planning components need to work in an integrated manner and not be at cross-purposes so that the ultimate reclamation outcomes can be achieved effectively and efficiently. One key to this greater integration is the need for everyone to understand better the "natural life cycle of mining and how the current reclamation matters relate to that."

As shown in Figures 1 and 2, systems can be represented using various types of diagrams that show relationships among the different elements of the system or process connections. These types of diagrammatic representation can be a useful tool for understanding and describing linkages and dependencies and for testing the potential impacts of decisions, plans and actions in one element to decisions, plans and actions in other elements of the reclamation system.

5 EQUIVALENT LAND CAPABILITY

Alberta legislation is absolutely clear in stating that the end objective of reclamation of lands disturbed by mining is "equivalent land capability". What is far from unambiguous, and less clear, is what "equivalent land capability" means. It was clear from both the feedback to the initial Challenge Paper and Progress Report, and from the discussion at the workshop, that there are many interpretations of what "equivalent land capability" does mean and what it "should" mean. There is confusion about the origins and application of the concept and many people equate the concept of capability with the measurement of capability. It is critical that regulators, planners and practitioners thoroughly understand what it means and what it implies.

The concept of capability was used in the Canadian Land Inventory (CLI) series of reports as a way of describing the potential of landscape/soil units to support agriculture, forestry, recreation, or wildlife. Capability was assessed using 7 classes. Class 1 denoted the highest suitability for the intended use with essentially no limitations. Class 7 denoted landscapes on which the intended use was not possible. Subclasses are used to describe the nature of the limitation that causes the land to be downgraded from the maximum value that the climate and soil would allow.

Capability is not an intrinsic property; rather capability is an attempt to describe potential or suitability for a particular intended use. For example, a site with characteristics that would make it Class 1 land for alpine skiing recreation would make it Class 7 for an airport to service commercial jet aircraft, and vice versa. In oil sands Land Capability Classification System (LCCS)(CEMA 2006) terms, Class 5 may be poor forest land but could be Class 1 for wetlands.

Capability is also not about productivity; rather it focuses on potential for the land to produce, given appropriate management. The historic language "capability equal to or better than" is not about capability; rather it is about a focus on a particular land use. For example, if an undisturbed site was originally Class 5 (wetness) for forestry, it might be made better for forestry by reclaiming it to avoid ponding. Thus, the site would have a higher capability for forestry.

But that same site might have been Class 1 for moose habitat prior to disturbance and be reduced to a much lower class through removal of the ponds.

In attempting to provide guidance for practitioners with respect to reclaiming to and determining whether a site had been reclaimed to "equivalent land capability", the Reclamation Working Group of CEMA developed the LCCS. This system, which focuses on capability for forestry, seeks to establish objective, quantifiable criteria for classifying the capability of land for a specific purpose.

Discussion at the workshop highlighted numerous issues and concerns with the effectiveness of the LCCS as a predictor of performance of forests built on reclaimed landscapes. Considerable discussion focused on modifications to the existing framework that would strengthen it. Others suggested alternative approaches that would replace the LCCS altogether. Still others clearly equated the concept of Equivalent Land Capability with the practice of the LCCS and on that basis rejected outright the concept of capability as having any relevance to managing reclamation.

Even though Equivalent Land Capability doesn't mean "the same as before" many people believe it should. Growing expectations that are shifting "reclamation" to "restoration" may also affect the concept and the practice. We need to manage expectations by speaking of trajectories, expected end points and key measurement and certification points in time. Regarding spatial scales, it is easier to define and measure Equivalent Land Capability on a smaller scale than at the landscape level or higher.

In short, the conclusion of the dialogue was that there is a high need for more conversation on this topic/issue before we can achieve alignment on the use of "equivalent capability" as an effective tool.

6 LAND USE SELECTION

The 1998 report *Oil Sands Mining End Land Use Committee Report and Recommendations*, which resurfaced through the Dialogue, was still seen as a useful explanation of the processes to identify and propose alternative land uses. However, few people are aware of its existence. The reclamation community needs to know that these land use selection challenges have been addressed already through this earlier work. However, people also need to know that these recommendations need to be re-evaluated in context with the Lower Athabasca Regional Plan and other present day considerations. Further, no one in industry has tried to use the process outlined in this report to propose an alternative land use. This lack of use may have led people to assume that these alternatives are not really an option.

One of the key questions raised in the Dialogue was whether there are more productive uses than boreal forest that might be appropriate particularly in consideration of changing values and uses of land over time – e.g., greater recreational demands. It was also recognized that areas that are receiving high land use pressure in NE Alberta could be moved to a simpler, quicker decision system.

Alternative uses likely will require different reclamation practice. Reclamation standards will need to be based on end land use. However there is still the question of which approach is "best." Do we reclaim the site for the specific end use, or reclaim the site so it can support the full range of uses and then superimpose the selected use?

7 RESPONSE TO AND INFORMING PUBLIC EXPECTATIONS OF RECLAMATION SUCCESS

The challenge here is less about targeted "measures" of success or performance as an intellectual pursuit and more about directly engaging a broad range of stakeholders at an emotional level. Further, there should be less focus on public relations initiatives and more focus on improving reclamation performance. Some important ideas for addressing this challenge were brought forward including:

1. Learning from experiences in the BC forest sector over the last two decades.
2. In a competition for hearts and minds, you can't compete with facts and knowledge.
3. Visualization tools offer one of the most effective approaches to communicating alternatives and your intentions.
4. Authentic stakeholder engagement at a very deep level is critical.
5. Developing a Sustainable Oil Sands Code of Practice that establishes the underlying principles for "sustainable oil sands development operations".
6. Practicing open, transparent, confident leadership based on the strength of what we know, what we don't know, what we are doing that is right and what we are doing to fill gaps.

8 RECOMMENDATIONS

Over the course of the workshop in June the participants were asked to identify recommendations. The OSRIN team reviewed and then organized them into four categories with a total of 11 recommendations which constitute the next steps to follow from the conclusion of this Challenge Dialogue overall.

8.1 The Oil Sands Reclamation System

Recommendation 1: Strike a small, informal "oil sands reclamation system" subgroup (ideally including at least some people that attended the workshop) to explore options for designing, developing and implementing a systems- and outcome-based approach (constructs, tools, etc.) to oil sands reclamation that would span all or most elements of the reclamation system (e.g., Figures 1 to 3) and that span reclamation objectives from individual mines to multiple operators (landscapes) and to the region (LARP). OSRIN could facilitate this process and help create some straw dog options, some concrete examples and other supporting discussion materials to help seed the conversation.

Recommendation 2: Linked to Recommendation 1 – analyze the pros and cons of moving towards an outcome-based regulatory approach to reclamation of the oil sands area.

8.2 Equivalent Land Capability

Recommendation 3: Develop a "capability manual" to better define what Equivalent Land Capability means and relate that to certification criteria.

Recommendation 4: Conduct a dialogue and workshop focused solely on Equivalent Land Capability in the fall to flesh out ideas for developing policy, practice and communication options.

8.3 Land Use Selection

Recommendation 5: Advertise the *Oil Sands Mining End Land Use Committee Report and Recommendations* and explain its purpose.

Recommendation 6: Evaluate the need to update the *Oil Sands Mining End Land Use Committee Report and Recommendations* once the Lower Athabasca Regional Plan is released.

Recommendation 7: There was uncertainty around the need for, or appetite for, alternative uses. There may be some value in exploring this further – if there is no appetite then this is not an issue; if however there is an appetite then an identification of acceptable uses and the locations/landforms they could be applied to, would be helpful.

8.4 Response to and Informing Public Expectations of Reclamation Success

Recommendation 8: If the Oil Sands Information Portal shows that cross-lease coordination is ineffective, explore real and perceived institutional impediments to better effectiveness.

Recommendation 9: Engage executives from forest companies to learn both what failed and how the industry is learning to perform in new, much more sustainable ways.

Recommendation 10: Explore the feasibility of developing dynamic visualization tools along the line of the McGregor Model Forest scenario tool. Although the pending Alberta Environment Oil Sands Information Portal would be helpful, it may not be sufficient to provide the kind of visualization of future conditions that is needed.

Recommendations 11: Explore developing a code of practice for Sustainable Oil Sands Development.

9 REFERENCES

Alberta Environment, 1998. *Oil Sands Mining End Land Use Committee Report and Recommendations*. 16 pp. plus appendices. Alberta Environment, Edmonton, Alberta. http://environment.gov.ab.ca/info/library/6856.pdf Last accessed September 28, 2010.

CEMA, 2006. *Land Capability Classification System for Forest Ecosystems in the Oil Sands, 3rd Edition. Volume 1: Field Manual for Land Capability Determination*. Prepared for Alberta

Environment by the Cumulative Environmental Management Association, Fort McMurray, Alberta. Pub. No. T/875. 53 pp. plus appendices.
http://environment.gov.ab.ca/info/library/7707.pdf Last accessed October 5, 2010.

10 GLOSSARY OF ACRONYMS IN THIS REPORT

10.1 Acronyms

AAC	Annual Allowable Cut
AENV	Alberta Environment
ASRD	Alberta Sustainable Resource Development
ATV	All Terrain Vehicle
BC	British Columbia
C&R	Conservation and Reclamation
CDS	Challenge Dialog System
CEMA	Cumulative Environmental Management Association
CNRL	Canadian Natural Resources Limited
CLI	Canada Land Inventory
CONRAD	Canadian Oil Sands Network for Research and Development
CT	Consolidated/Composite Tailings
DDA	Dedicated Disposal Area
EC	Equivalent Capability
EIA	Environmental Impact Assessment
ELC	Equivalent Land Capability
ELU	End Land Use
EPEA	*Environmental Protection and Enhancement Act*
EPL	End Pit Lake
ERCB	Energy Resources Conservation Board
FMA	Forest Management Agreement
GOA	Government of Alberta
ICMM	International Council of Mining & Minerals
LARP	Lower Athabasca Regional Plan

LCCS	Land Capability Classification System
LFH	Litter, Fibric, Humic
LUF	Land Use Framework
NA	Naphthenic Acid(s)
NE	Northeast
NGO	Non-Government Organizations
OSRIN	Oil Sands Research and Information Network
PAW	Process Affected Water
R&D	Research and Development
RWG	Reclamation Working Group
WBNP	Wood Buffalo National Park

APPENDIX 1: Original Challenge Paper

This Challenge paper was sent to over 100 people in April 2010 for comment.

Challenges and Timelines in Reclamation and the Feasibility of Alternative End Land Uses

A Challenge Dialogue sponsored by the Oil Sands Research and Information Network

University of Alberta

NOTE: References in the Challenge Paper to *submitting comments* is now out of date as the Dialogue process has been completed; similarly, the proposed Workshop dates mentioned are incorrect as the Workshop was held in June 2010.

PURPOSE OF THIS CHALLENGE PAPER

The purpose of this Challenge Paper is to stimulate a conversation or Dialogue with a diversity of individuals and organizations interested in the responsible use of Alberta's oil sands about Challenges and Timelines in Reclamation and the Feasibility of Alternative End Land Uses. The diversity of Albertans contacted to participate in the Dialogue includes individuals affiliated with First Nations, academia, industry, media, and a variety of government (federal, provincial and local) and non-government organizations. The Dialogue Organizing Team in part reflects that diversity and has an interest in fostering a successful and open Dialogue.

By sponsoring this 'Reclamation Feasibility' Dialogue, the Oil Sands Research Information Network (OSRIN), along with the Organizing Team, wish to initiate an exchange of ideas, first electronically via this Challenge Paper, and then with a Workshop which will be designed to reflect and be informed by the preceding Dialogue feedback. This approach will allow us to make the most effective use of our limited time together at the Workshop tentatively scheduled for May 27, 2010.

At various points in this Challenge Paper you will be asked for your reaction and further input. Please write your responses in a separate Feedback Document (MS Word format).

Please consider what has been presented in this Challenge Paper carefully and contribute your reactions. A participant typically spends 1 hour, but please feel free to contribute as much or as little as you have time for – even taking 5 minutes to share your thoughts on an issue of personal importance is of great value to us. Your input is very important and will strongly influence the success of the Dialogue and Workshop.

AN IMPORTANT NOTE ABOUT SCOPE AND NATURE OF THE MATERIAL IN THIS PAPER

The scope of the Dialogue is oil sands mining reclamation (including all disturbances related to mining), not reclamation where oil is extracted in situ.

Throughout this Challenge Paper we have excerpted material from a variety of expert sources. We have chosen to not cite the source in order to set out diverse perspectives and to facilitate a more open conversation.

KEY CHALLENGE

The proposed Key Challenge for this Dialogue is:

> To engage a diverse set of reclamation-related domain experts and stakeholders in a purposeful conversation that is focused on: (1) identifying challenges and required timelines in managing and containing contaminants, and reclaiming to equivalent capability; and (2) exploring the feasibility of creating alternative desirable end land uses.

> INPUT REQUEST #1: PLEASE USE THE ACCOMPANYING FEEDBACK FORM TO PROVIDE YOUR FEEDBACK TO THE KEY CHALLENGE. Consider – Do you agree with the Key Challenge? What is missing? Is anything not relevant in your view? What additional clarification would be helpful? What other ideas does the statement spark in your mind?

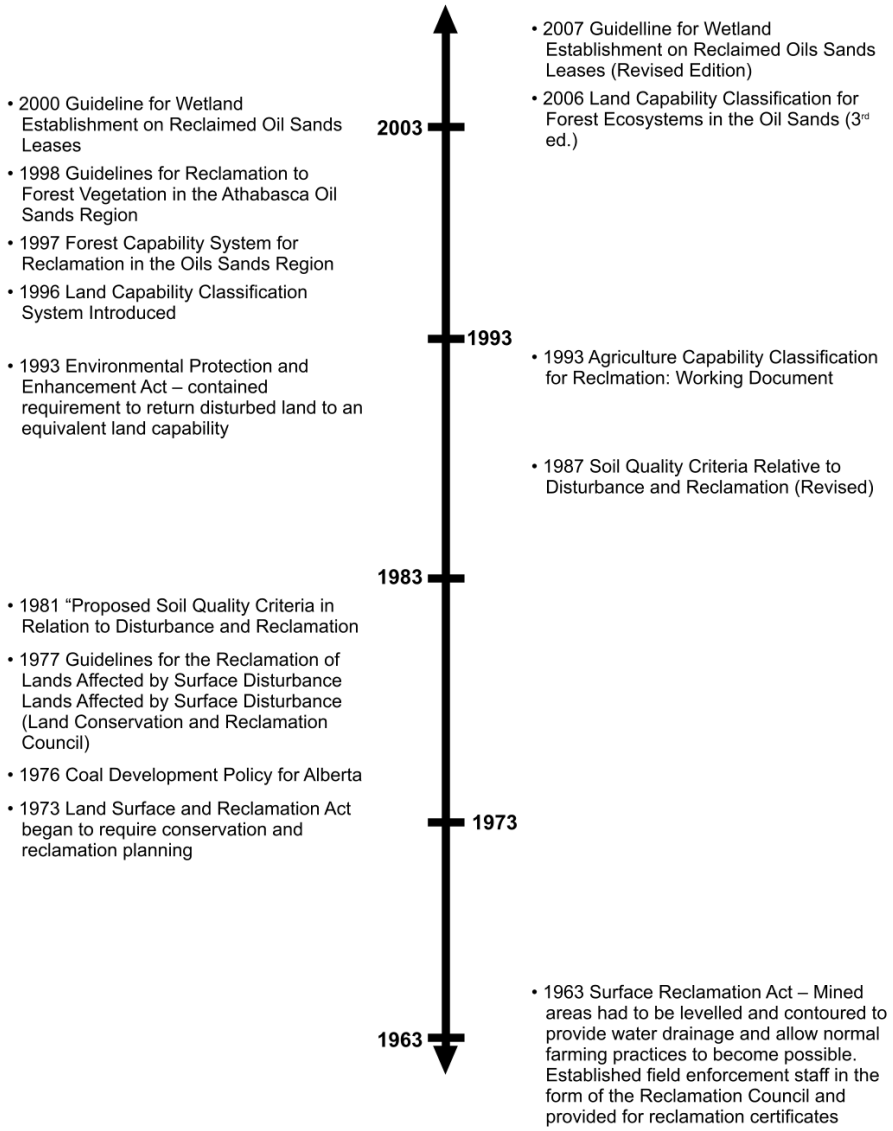
BACKGROUND ISSUES AND EVENTS THAT HAVE LED TO THIS KEY CHALLENGE

A number of developments and perspectives have led us to our current Key Challenge. The following background statements have been provided as a reminder of some of the key ones and to help set context for this conversation.

Some Historical Background on Reclamation of Oils Sands Development

1. Summary of Major Regulatory Changes and Documents: The evolution of reclamation practice or progression of reclamation techniques over time is based on the changes in regulations and guidelines and overall government policy combined with research and experience gained through operational practice. The figure on the next page provides a summary of the major regulatory changes as well as “criteria” and “system” based documents used to provide guidance with respect to reclamation practice and mechanisms for measurement of reclamation success.

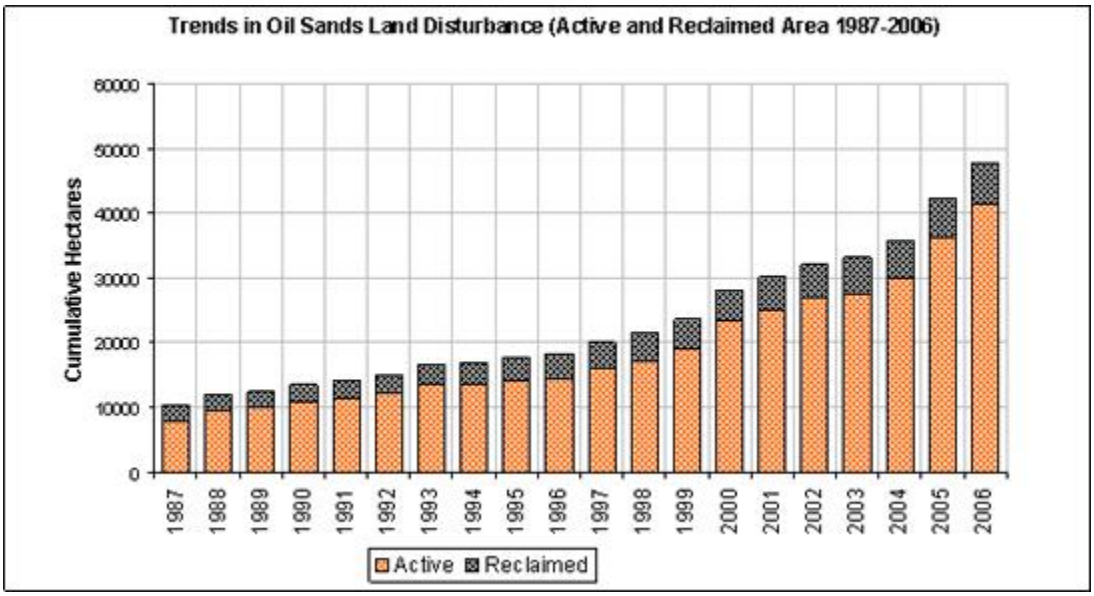
Summary of Major Regulatory Changes and Documents to Guide Reclamation Practice and Mechanisms for Measurement of Reclamation Success



Comprehensive Report on Operational Reclamation Techniques in the Mineable Oil Sands Region Prepared for Cumulative Environmental Management Association (CEMA). Prepared by: T.M. Macyk and B.L. Drozdowski, Alberta Research Council Inc. September 15, 2008

2. Directive 074: This directive sets out new requirements for the regulation of tailings operations associated with mineable oil sands. It is the first component of a larger initiative to regulate tailings management. The directive specifies performance criteria for the reduction of fluid tailings and the formation of trafficable deposits. These criteria are required to ensure that the Energy Resources Conservation Board (ERCB/Board) can hold mineable oil sands operators accountable for tailings management. Operators may use a suite of technologies to meet the requirements of this directive.

3. Cumulative Extent of Mined and Reclaimed Areas: The area being reclaimed is increasing slowly as lands become available for reclamation. Large increases in active area reflect the development of new mines or new mining and processing areas within an existing mine.



4. Deferral of Reclamation: Over the long term, many mine plans defer much of the reclamation towards the end of the mine life, with unreclaimed land largely comprising the most challenging areas represented by tailings impoundments and cells.

5. Reclamation Certification: In the Athabasca Boreal region only one company has applied for reclamation certification to date.

Definitions Related to the Reclamation of Oils Sands Development

6. Equivalent Land Capacity: Equivalent land capability means that the ability of the land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but that the

individual land uses will not necessarily be identical (*Conservation and Reclamation Regulation*, EPEA).

7. Land Capability Classification System (LCCS): There are five classes of land recognized in the LCCS, rated according to potential and limitations for productive forest use. Classes are based on adjusted Canada Land Inventory categories, with Classes 1, 2, and 3 being capable of supporting commercial / productive forests, and Classes 4 and 5 being non-commercial / lower-productivity forest lands.
8. "Similar to pre-disturbance boreal landscapes": In the oil sands area, the definitions of reclamation and equivalent land capability imply that post-mining landscapes will be similar to pre-disturbance boreal landscapes, with functional terrestrial and wetland ecosystems that provide (for example) biodiversity and habitat, and provide for public and First Nations requirements.
9. Wetland Reclamation: is defined as the creation of wetlands on disturbed land where they did not formerly exist or where their previous form has been entirely lost. Wetland restoration is a process of returning wetland function of a remnant wetland site, as it was before disturbance.

Background Related to Reclamation Regulations

10. Reclamation requirement: is a key requirement for areas disturbed by industrial development. Under the government of Alberta's reclamation standards, companies are required to reclaim and remediate land to a state capable of supporting the same kinds of land uses as before disturbance.
11. Operator Liability: For an oil sands mine, operator liability for reclamation ceases upon issuance of a reclamation certificate. For an oil sands processing plant, operator liability for reclamation ceases 25 years after issuance of a reclamation certificate. For all sites, the operator remains liable for contamination forever.
12. Approvals: EPEA approvals are renewed every 10 years. This means that the older operations are operating under approvals and approval conditions that may be out of date. It needs to be understood how new standards and expectations will be brought into effect in spite of outdated approval conditions.
13. Reclamation Plans – Landscape Considerations: Reclamation plans need to consider the type, size and distribution of naturally occurring landforms when post-mining landscape designs are developed. Current life of mine closure plans do not always project landscapes that resemble naturally occurring boreal landscapes; whereas EPEA approvals do require a naturally appearing post-mining landscape.
14. Guidelines for Reclamation to Forest Vegetation: The second edition (December 2009) of the *Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region* has recently been released as a result of ongoing research and monitoring programs. It includes decision charts and defines the edatopic grid,

ecosites, site types, and their characteristic species. The manual also provides guidance on declaration of end land-use and revegetation targets plus recommended actions to meet these targets. Indicators of revegetation success and methods to assess these indicators on reclaimed landscapes are also provided.

15. Targets, Criteria and Indicators: The mineable oil sands region currently lacks a complete set of targets, criteria, indicators and regulatory thresholds for reclamation including those related to values such as biodiversity, wetlands, wildlife habitat, end land-use, landscape design, landforms and other public values.

16. Wetland reclamation certification: Criteria for certification of reclaimed wetlands have not been established (as of December 2007).

17. Land-Use Framework: Alberta's new Land-use Framework is a comprehensive approach to better manage public and private lands and natural resources. It provides a blueprint for land-use management and decision-making to address challenges related to rapid growth in and competing pressures of economic activity in oil and gas, forestry, mining, agriculture, recreation, housing, infrastructure, etc. The intention is to create a better balance across these different and sometimes competing interests in the use of land. The framework embraces a cumulative effects approach that looks at the potential of all impacts within a region rather than project-by-project. While decision-making authority remains at the local level, decisions will have to be aligned with provincial policy set out in the regional plans. In the case of the oils sands, this means alignment with the Lower Athabasca Regional Plan.

18. Integrated planning: Recent EPEA approvals require that mines integrate their planning with adjacent lease holders and undisturbed lands. Whereas companies have responded indicating that such planning activities are underway, these analyses are only recently being considered on broader regional scales for the design on landscapes, drainage systems, and the potential sharing of landform and reclamation material.

Background Related to the Description of Reclamation

19. Landscape design: landforms are typically at the one to ten kilometre scale and include things like overburden dumps, tailings dykes and settling basins, lakes, wetlands, and rivers. Landscapes are at the 10 to 100 kilometre scale. They include all that one can see from a particular vantage point, are typically thought of as oil sand leases and adjacent areas, typically consist of ten to twenty landforms and are usually designed through the closure planning process.

20. Mining "landforms" and wetlands: The surface mining of oil sands in NE Alberta produces several landforms and materials that are relevant to wetland reclamation:

    - mining excavations produce end-pits, a range of gradients and overburden piles;

- extraction of bitumen from oil sands produces process-affected tailings containing water, sand, silts, clays, soluble organic chemicals (such as naphthenic acids and hydrocarbons), ammonia, heavy metals and salts;
- process-affected materials that cannot be recycled are stored in settling basins (up to tens of square kilometres in surface area), where subsequent settlement and redistribution produces sand edges, mature fine tailings and process-affected water; upgrading of bitumen to crude oil produces by-products like sulphur and coke that are stockpiled in a retrievable manner;
- the mining and extraction processes increase the volume of materials (natural soils and separated soil components like overburden and tailings) by 20% to 25% over the initial pre-disturbance volume.
- These changes fundamentally alter the topography, geochemistry and hydrology of the land. Reclamation must incorporate or accommodate these post-mining elements.

21. Wetland habitat and values: Natural boreal wetlands are a critical habitat for many important wildlife species, including woodland caribou, moose, muskrat, beaver, waterfowl (particularly diving ducks) and amphibian. They link to the traditional way of life of local Aboriginal people.
22. Wetland extent: Wetlands cover approximately half of the natural landscape in the oils sands region, and are thus a major component of the undisturbed boreal ecosystem.

INPUT REQUEST #2: PLEASE USE THE ACCOMPANYING FEEDBACK FORM TO PROVIDE YOUR FEEDBACK TO THE BACKGROUND STATEMENTS. Consider – Do you agree with the statements? Which ones do you disagree with and why? What other important information or perspectives are missing that would help inform the challenge we are addressing? What other ideas did the statements spark in your mind? Please refer to the background statement number in your response so we know which one you are referring to.

EXPECTED OUTCOMES AT THE END OF THE DIALOGUE

Through this Dialogue we will aim to accomplish the following expected outcomes:

1. To identify challenges in reclaiming oil sands developments to functional boreal ecosystems and landscapes.

2. Define the attributes by which functional boreal ecosystems and landscapes can be recognized (these could include visual, biophysical and spatial attributes; ecosystem functions; indicative successional trajectories.

Once these objectives have been realized:

3. Identify and characterize potential end land uses in the reclaimed areas.
4. Identify related challenges in landscape design and in institutional, economic, and social and cultural acceptance for these alternative end land uses.

INPUT REQUEST #3: PLEASE USE THE ACCOMPANYING FEEDBACK FORM TO PROVIDE YOUR FEEDBACK TO THE BACKGROUND STATEMENTS. Consider – Are you in alignment with these expected outcomes? Are there any others you would like see accomplished?

What expectations do you have for the face-to-face Workshop – as in "I would consider the Workshop a success if..."

ASSUMPTIONS

Please review the following list of assumptions that bear on the key challenge of the dialogue. At the end of this section, we provide the opportunity to react to these assumptions and to accept, reject, modify, or add to the list. Some of the assumptions included are meant to be provocative to stimulate a response.

Assumptions Related to Definitions

1. Reclamation vs. restoration: The term reclamation describes the general process whereby the land surface is returned to some form that is of beneficial use to humans. Here lies the distinction between reclamation and restoration: restoration is far less associated with the utility of the landscape and is guided by ecological principles to promote the recovery of ecological integrity.
2. Reclamation scope: Companies are required to reclaim more than just the mine sites themselves. Reclamation is required in all disturbed areas including the plant sites, access roads, etc.
3. "Feasibility" is much broader than ecology and engineering. It includes the many challenges in landscape design, landscape development and landscape function (terrain, soils, hydrology, vegetation, and constraints related to erosion and containment of contaminants); institutional arrangements (regulatory regime, legal liabilities, barriers to collaboration, and existing approval agreements); economic considerations (cost, responsible parties, alternative economic uses); and social and cultural acceptance.

Assumptions Related to Reclamation Challenges

4. Expectations – reclamation vs. restoration: Clarifying expectations at the onset is important; confusion often occurs between the two terms reclamation and restoration despite their many differences.
5. Public expectations: The Alberta public appear to have much higher expectations for oil sands reclamation than what is being delivered in the Athabasca Boreal region. The public expects that reclamation will return areas to close to their pre-disturbance states, but the regulations don't require anything that specific.
6. Intentions: Recovery of landscapes after mining should be the foremost priority in mining planning. Before the required planning can take place, operators, government and stakeholders need to agree on what reclamation actually means.
7. Regulation challenges: An assessment of the current policies and practices governing oil sands mine reclamation reveals an alarming range of challenges, uncertainties and risks that deserve immediate attention and broader public discussion.
8. Uncertainty: Due to uncertainty related to reclamation technology at this time, Alberta cannot be confident that reclamation of fluid tailings will proceed on a timely basis, or that liabilities associated with impoundments will not be inherited by the public.
9. Timelines: Binding reclamation timelines are absent from EPEA approvals.
10. Successional models: Many oil sands operators rely on plant succession models to generate the establishment of climax communities, which are communities of plants that are stable and capable of perpetuating themselves. There is little evidence, however, that natural plant succession — where an assemblage of species is naturally replaced with new species and associations better suited to the prevailing site conditions — is likely to occur.
11. Reclamation timelines will have to deal with the realities of natural succession rates in a Boreal environment. Communication is needed to ensure that public expectations and underlying physical and natural realities of reclamation are aligned.
12. Institutional barriers have precluded a holistic approach to landscape design -- creating silos in reclamation, development and management. For example, there are numerous regulatory agencies with different expectations and companies often act independently.
13. Naphthenic acids: It is critical that the reclamation of tailings into terrestrial and aquatic landscapes at the end of an oil sands mine operation "address residual levels of naphthenic acids and their rate, fate and transport in the environment.
14. End Pit Lakes (EPL) are complex systems in terms of hydrology, chemistry and biology, and their design requirements need to be more fully developed.

Uncertainties regarding the construction, maintenance and final success of EPLs remain.

15. Wetlands: Surface mining leaves no remnants of wetlands to recover, and there is currently no demonstrated success in reclaiming peat-forming wetlands.
16. Reclamation costs: The current oil sands mine reclamation security program lacks transparency. Information about reclamation costs, the calculation of liability bonds and the frequency (if any) of third party validation of reclamation plans are not publicly available or readily accessible.

Assumptions Related to a Vision for Reclamation

17. Healthy ecosystems are integrated across the oil sands region and are independent of lease boundaries.
18. Reclaimed terrestrial and aquatic ecosystems are healthy, sustainable, resemble native ecosystems and provide a multitude of values for all Albertans.
19. Reclamation liabilities are not passed on to future generations.
20. Reclamation success includes protection of human health.

Assumptions Related to Reclamation Principles

21. A number of the principles of Natural Step can provide guidance: successful reclamation requires that contaminants be managed and contained, that what was originally buried, be reburied, and what is man-made also be buried, so none of these can systematically accumulate in the biosphere.
22. It is desirable to remove environmental concerns and allow public access at the earliest possible date.
23. Some end uses will require that there is a "developer" and a development proposal. Such lands may require continuing active management.
24. The cost of reclamation will have to be borne by the value of oil extracted, and acceptable reclamation has to be completed while there is still financial capacity within the project to pay. Progressive reclamation helps to achieve this objective.
25. The objective is to get land back into productive use, and sooner is better than later, but not jeopardize doing it right.
26. The oil sands resource is owned by Albertans. Government plays a key regulatory role to ensure that development and reclamation are performed responsibly. In large part, what gets regulated gets done.
27. The paths to different land use end-states will have different timelines and costs.

Assumptions Related to Reclamation Goals

28. Alberta has fair and effective reclamation regulations and certification procedures.
29. Alberta is a world leader in reclamation research and innovation.
30. Alberta is accountable to current and future generations of Albertans in all matters related to reclamation.
31. Mined land needs to be reclaimed to a natural state to get the reclamation plan approved and to meet First Nations expectations.
32. Reclamation is an integral component of mine planning.
33. The geographic context for reclamation is multi-level: the mining site itself, multiple adjacent mining sites (neighbours), and a larger region (the Lower Athabasca Region and potentially beyond). End land use objectives should be set based on a broader geographic context.

INPUT REQUEST #4: PLEASE USE THE ACCOMPANYING FEEDBACK FORM TO PROVIDE YOUR FEEDBACK TO THE ASSUMPTION STATEMENTS. Consider – Are you in alignment with these Assumptions? If not, which ones do you disagree with and why? What other key Assumptions need to be added that are missing? Please refer to the assumption number in your response so we know which one you are referring to.

CRITICAL QUESTIONS TO ADDRESS

Participants are invited to react to these questions – providing information and content as appropriate, identifying those that the participant feels are very important, adding new ones, modifying existing questions to be more complete or focused, or just using them to prompt further thought to expand the Dialogue.

1. What are the top four challenges in reclaiming oil sands developments to functioning boreal ecosystems and landscapes?
2. Do we have the required capability to manage and contain contaminants to create a healthy biosphere?
3. Does the current requirement to create equivalent capability, including the use of the Land Capability Classification System, achieve the expectation of a having functional boreal ecosystems and landscapes?
4. How would you recognize that a site / landscape has achieved equivalent capability?
5. What are possible and desirable end land uses for reclaimed land?

6. What are some of the key challenges in landscape design and in institutional, economic, and social and cultural acceptance for these alternative end land uses?

INPUT REQUEST #6: PLEASE USE THE ACCOMPANYING FEEDBACK FORM TO PROVIDE YOUR FEEDBACK TO SOME OR ALL OF THESE CRITICAL QUESTIONS. Please feel free to respond only to those questions that most interest you.

Consider – In addition, what other questions should we be asking regarding the challenge of reclamation of the oils sands area? Please refer to the question number in your response so we know which one you are referring to.

NEXT STEPS

The above material establishes a starting point for our Dialogue. Please consider this document as "a work in progress." Following are the next steps in the Dialogue. Please note the deadline for receiving your feedback.

1. As noted earlier, please consider what has been presented in this Challenge Paper carefully and contribute your reactions electronically using the separate Feedback Form sent along with this Challenge Paper. A participant typically spends about ½ to 1 hour but please feel free to contribute as much or as little as you have time for – even 5 minutes on an issue of personal importance is valuable. Your input is very important and will strongly influence the success of the Dialogue and Workshop.
2. Please send your feedback as soon as possible not later than April 22, 2010.
3. Feedback will be compiled and made available to you in electronic form as-is and un-attributed in late April 2010
4. Feedback will be compiled into a Progress Report by early May, 2010.
5. We will use the Challenge Paper feedback to help design a Workshop and inform the development of a Workshop Workbook. The workshop is tentatively scheduled for May 27. The Workbook, which includes an agenda, will be distributed to you in electronic form a few days ahead of the workshop. Printed copies will be available at the Workshop.
6. The Challenge Paper feedback and the Workshop results (Workshop Synopsis document) will inform the development of a Final Report by OSRIN about the insights gained from this Dialogue.

INPUT REQUEST #7: Do you have any questions regarding the NEXT STEPS. Do you have any other questions or comments you would like to share?

APPENDIX 2: Challenge Paper Feedback

The following tables provide the consolidated feedback from the 43 people who responded to the Challenge Paper. Each row in a table represents the feedback from one person.

▪ **Input Request #1: Key Challenge** (Section 3) **PLEASE PROVIDE YOUR FEEDBACK TO THE KEY CHALLENGE. Consider —** Do you agree with the Key Challenge? What is missing? Is anything not relevant in your view? What additional clarification would be helpful? What other ideas does the statement spark in your mind?	
	The challenge and how to deal with is not new to "reclamation-domain experts and stakeholders" While I can accept the challenge statement I expect you to be guided mostly by the experts and principal stakeholders.
	I think that there needs to be some consideration of rebuilding the spiritual integrity of the degraded ecosystems. The Key Challenge seems to be too mechanistic – you need to rebuild the "life" of the restored ecosystems. In addition to re-building the ecological capital of the damaged ecosystems, you need to re-build the social and spiritual capital, recognizing that one is incomplete without the other. Re-establishment of a land ethic, sensu Leopold will be critical to the successful restoration of the degraded ecosystems. This does not come with big 4X4s with quads or snowmobiles in the back.
	Suggested minor rewording: To engage a diverse set of reclamation-related domain experts and stakeholders in a purposeful conversation that is focused on: (1) identifying challenges and required timelines in managing and containing contaminants, and reclaiming areas affected by oil sand mining operations to functional boreal ecosystems and landscapes of equivalent capability to those that existed prior to mining; and (2) exploring the feasibility of creating alternative, desirable end land uses
	The challenge is confusing. In part 1 of it, what contaminants are being referred to, those in tailings ponds? Dealing with contaminants is often considered to be remediation and not reclamation, and this topic (remediation) has generally not been discussed in the document so it seems to come out of nowhere. The second part is also confusing: I think we need to explore allowing alternate end land uses before we can explore their feasibility. Is there not an expectation by Al-Pac that the end land use is a functioning forest ecosystem? So are bison pastures acceptable? But we need to answer that question before we can address the feasibility of creating bison pastures. I trust end land use is an issue separate from equivalent land capability.

	I am thrilled that the notion of alternate land uses is being explored by OSRIN. This is a topic much overdue and hopefully no imaginative alternate land use ideas will be discounted. I think clarification of Al-Pac's expectations for forest in 'their' FMA should be discussed. This allows us to include First Nations' peoples in discussions too. The issue of how much wetland area do we wish in the reclaimed areas needs addressing.
	I would prefer to see the wording reflect the difference in challenges and timelines for equivalent capability or new alternatives. This could be accomplished by changing the wording to ….. a purposeful conversation that is focused on identifying challenges and required timelines in managing and containing contaminant for the purpose of (1) reclaiming to equivalent capability and (2) exploring the feasibility … Is there a need to also include mining and production domain experts to provide scale and feasibility?
	The difficulty with the key challenge is its assumption that Equivalent Capability has an agreed upon definition. Unless EC can be defined explicitly, I cannot see how the questions that define the key challenge can be addressed.
	Re Clause 2): alternative to what? End land uses are derived on a value basis by stakeholders – what is valued by one may not be as valuable, or even more valuable to another. Most end land uses are fewer alternatives than a balance of values that will change over time as the land (and reclamation) develops. Maybe a different way to state this would be "exploring the range of end land uses supported by reclamation techniques and ecosystem processes" – in this way, it would also be identified which end land uses would not be supported, or were not feasible (also important to know).
	Very vague key challenge. It should be broken down into smaller pieces that are more manageable considering the magnitude of the challenge. • Which contaminants? Each contaminant is a different challenge. Do we have baseline data on contaminants before disturbance? I heard about naturally occurring tar balls. How does that affect our approach to reducing contaminants? • What are the indicators for equivalent land capabilities? This is so vague that there is little incentive for doing anything. Before we go over the feasibility of creating alternative land uses • Did we locate reference sites (resembling what used to be there)? Do we have the knowledge to reproduce it? • Is there any indication that some disturbed sites are actually "reclaiming themselves" without human intervention? Are they following a pattern we identified as the early succession of an ecosystem we "approve of"?

	• Do we want alternative land uses because we are in a hurry and cannot wait for the site to recover? Also, we cannot ignore climate change. • Do we need the space for alternative land uses (a huge parking lot…)? • Could we learn from other disturbances, even far-fetched ones (e.g. succession occurring after volcanic eruptions)
	I find it a bit difficult to interpret what the "key challenge" is for point 1 – partly because the first challenge is to identify challenges (that's pretty broad) and the second is more specific, to identify timelines for a bunch of things. I think the problem is that there are many challenge not just one key challenge. Point 2 is more straight forward and understandable and I have no problem with that one and I agree with it – the flexibility to develop alternate end land uses (as long as they are sustainable). Anyway back to point 1 – I agree that one thing that has been missing with reclamation criteria is the timeline required before we are willing to "sign off" on reclamation, particularly where the end land use is forest based. One could argue that you need at least 50 years or longer before you are confident adequate forest reclamation can be demonstrated but that does not seem practical.
	I agree in principle, but believe the first statement should be expanded as follows: (1) Understand the diversity of post-mining landforms, the physical and chemical composition of those landforms, and the diversity of options for effective site-wide reclamation of the development area, including the integration with adjacent natural or other disturbed areas.
	The key challenge is broad enough in scope to cover almost all aspects of reclamation. Entertaining the idea of exploring alternative land uses suggests that end land uses are defined in current regulatory approvals.
	1. The framework within which discussions on timelines for management and containment of contaminants is critical. What are the standards that will be applied, and how might they differ from those in place at the time of construction of the facilities? What sets the standards for identifying contaminants, including both the materials of concern as well as the concentrations? The information provided in the challenge document as Background only addresses Reclamation regulations, but does not discuss industrial release guidelines (i.e., those allowed during operations). These two items may be contradictory. Who are the recipients of this work? Is this for the good of the people of Alberta today or in 1000 years? Is it the people residing in Calgary, working at the oil sands sites, or those living within site of the facilities? How much consideration needs to be made for those living in other parts of the world, supplying the materials and services used here, or purchasing and utilising the products produced?

	2. This could be an excellent discussion. A review of the objectives for the final remediation of industrial affected lands would be enlightening. For example, several other jurisdictions (west coast of Australia, Europe, etc.) allows for a variety of industrial site remediation, including conversion to public use (parkland, recreational areas, farms, shopping districts, sports facilities, etc.) with full support of the local governments and general public. One argument used is that it is better to develop on already disturbed land than to disturb additional areas.
	This is stated clearly, but the devil is in the details and how do you define who the experts are and who the stakeholders are. Perhaps the industry participation could be clearly stated since my assumption would be that they are included in the domain experts, but this may not be the case.
	I agree with most of the Key Challenge concept, with the exception of reclaiming to alternative desirable end land uses. Government and industry need to identify the problems and set up a system to address them in a timely way. Alternative landscape uses may have unintended consequences that should be addressed before any change is implemented. The landscapes that oil sand mines should be reclaimed to are rolling hills with forested lands with wetlands and lakes. The land use permitted on those lands should be multi-use for forest management, for timber and the range of traditional non-timber values such as traditional land use, water resources, wildlife and recreation. The cold climate and sandy substrates have resulted in poor soil development since the last ice age and with oil sand mine reclamation that is not likely to change. Novel intensive use opportunities may not have sufficient utilization to generate the revenue required to maintain commercial ventures. Crown lands often have commercial recreational ventures that don't generate sufficient revenue and end up being a liability that requires intensive GOA management and eventually reclamation. The exception to this would be situations within 20 km of Fort McMurray where a significant resource is developed suitable for intensive recreation by the residents of Fort McMurray. A resource such as a large pit lake, without tailings or other liabilities, would require careful planning, resources and funding so that it didn't end up as a liability to the province. Alternatively a dune field for ATV enthusiasts could end up with significant erosion and landform failures. Oil sand mine reclamation does not have the will or resources to produce an appropriate opportunity. In general a commercial recreational venture usually only works in close proximity to Edmonton or Calgary because of the need for high utilization and corresponding revenue potential. The public's motorized use of reclaimed oil sand mines could potentially result in the destruction of the sensitive landforms typically created by oil sand mine development and reclamation. The contents of the oil sand mine landforms need to remain contained rather than exposed due to erosion gullies created by recreationalists on quads and 4X4 traffic. Negative

	impact to the environment by public use tends to occur due to access and access use. Attempts to manage public access by government tend to be difficult and less effective than intended.
	Yes Defining "Equivalent Capability" Include some sort of risk assessment based philosophy to "contaminant management"
	Yes, it is quite complete and relevant.
	The key piece that is missing in this challenge statement, with regards to bullet #2, is how the broader land use framework will guide/inform what alternative land uses are desirable and where they should be placed. The foundations for creating these alternative land uses exist on a lease scale, but there is little guidance on how to plan for and integrate these land uses across the region.
	The key challenge is honorable and laudable in concept. There is nothing truly wrong with it except it is woefully incomplete. It is, framed in a dangerously simple and possibly disingenuous way, a leading way that does not truly acknowledge or give recognition to the hugely varying INTERESTS of the spectrum of stakeholders. This statement focuses on POSITIONS and safe ones at that. For that reason, it is destined to either fail, or not proceed very far with genuine change. Those stakeholders whose salaries are paid from oil producers will be limited in the range of statements their employers will permit them to voice, even if they themselves still want to provide insightful insider perspectives. Some activist and preservationist NGO's carry a large vested interest in positioning their organizations in a stance that is oppositional, regardless of what the industrial position becomes. Some participants live in the intersticies (lawyers, researchers, some governmental regulators) and benefit from the conflict and tensions, consequently, some recognition of the pressures that bear on the participants should be made explicit, as these may color the perspectives provided as strongly as the "facts". I worry about the vagueness of certain concepts such as "Equivalent capability" also. Some concepts are due for a fairly major overhaul or much tightening of specification/matrix so it is probably premature to use them in a Key Challenge statement.
	I think we have to be clearer than stating "(2) … creating alternative desirable end land uses." Instead " (2) exploring the feasibility of creating self-sustaining boreal forest ecosystems that meet a variety of end land use objectives including alternative end land use states." ???? … The above statement may better clarify that the intended meaning is not to explore only end land uses which are "alternatives" to those already identified as reclamation objectives.
	I mostly agree. Something to maybe include here is that what also needs to be considered is what are the issues and challenges with the integration of reclamation of tailings ponds during on-going operations (although that may have been what you intended under 'timelines').

	Only one point that I take a minor issue with and that is with the way you have used the word 'contaminant'. I may seem somewhat pedantic, but one person's 'contaminant' is another person's naturally-occurring component. And contaminant evokes the assumption of 'not wanted', which may not always be the case. e.g., naphthenic acids are definitely not wanted in an ecosystem, but are definitely wanted by the mining operators. You need to have an appendix where you define your terms.
	I agree with the key challenge. However, I wonder how much difference there is between what can be considered "equivalent capability" and an "alternative desirable end land use"? I think each of these phrases will mean something different to different stakeholders. My current understanding of equivalent capability is that it is intended to mean a mix of boreal upland and wetland rather than true fidelity to historic ecosystems (which is what I would personally consider to be equivalent capability). How alternative could the desirable end land uses be? Does this mean designing the reclaimed landscape as golf courses and feedlots and sandy dune parks for ATV use? Or does it mean creating alternative ecosystems? (e.g., saline marshes instead of freshwater fens).
	Generally I agree with the Key Challenge. It is very general and still recognizes the main issues including timelines, challenges, alternatives, and desirable land end uses. I would suggest adding something about reclamation priorities from both social and environmental points of view as the development of any reclamation plan should consider societal and environmental values. This is more of a feeling than a developed suggestion but I would like to also see some kind of overall idea for a plan and a "reclamation vision" for the whole mining area, a goal to achieve, an end point that should more clearly reach beyond the "equivalent capacity" objective, some kind of a holistic approach that would combine ideas of the general public, Albertans, and local communities including aboriginal groups.
	I have trouble with the term of creating alternate desirable end land uses. The ecosystem when reclaimed should provide comparable ecosystem goods and services as prior to disturbances. The *Environmental Protection and Enhancement Act* that the land should be reclaimed to a condition similar to pre-disturbed conditions. Why are we deviating from the legislation? I was of the thought from experience that the elders and aboriginal communities want the land to be the way it was prior to oil sands development.
	I agree with the key challenge however I believe it would be useful to acknowledge that challenges have already been identified. Oil Sands Mining have been occurring for decades, not just beginning. I think it is very important to identify realistic time lines for reclamation! This is not something that has been identified to date and is very important. It might also be useful to incorporate a discussion surrounding measurements for determining equivalent land capability, but this is likely a specific challenge which could be addressed by the first part. Determining reclamation success in equivalent land capability in the oil sands is a major

	challenge the operators are currently being faced with.
	I think there are too many ideas in the key challenge. Managing and containing contaminants is an industrial operations issue (i.e., sulphur, coke, process-affected waters), not necessarily reclamation issues (although it is linked at some point). One deals with contaminants through remediation, not reclamation. Also, reclaiming to equivalent capability is a huge topic within and of itself. Discussing challenges and timelines for remediation and reclamation means having a good understanding of mine operations (including how complex it is and how frequently things change), remediation, decommissioning requirements, and reclamation and you'll not be able to focus the discussion unless you narrow the focus. Creating alternative desirable end land uses assumes that there's a strong desire or a need to change current planned end land uses. Ask the question: what needs changing? With the understanding that there is not a lot of flexibility of end of mine life landforms and where they are/what materials remain (unless technology changes significantly), ask how end land uses can change. The current overarching goal is return to locally common boreal forest… would the changes still persist within that goal? Currently EIAs for new projects come with pre-set end land uses. Where can we feed into the discussions, where can changes be made, and when/how and by whom do these changes get recommended/suggested when we are looking at a specific project application?
	I generally agree with the statement; however, I would like to see definitions of the crucial terms at this stage of the document so that everybody knows what the challenge is and what it relates to. "Required timeline for managing and containing contaminants" What are those contaminants? Would one not expect that those are contained for perpetuity if they cannot be cleaned up? "Equivalent capability" See definition in 4.2.the definition itself is not clear (see my comments later) "Creating alternative desirable end land uses" for whom do we create those and alternative to what? What is the difference between capability and land uses?
	The Challenge is well framed – but the dialogue will likely require considerable management at the workshop to stay focused on point #2 (the alternatives) which I believe is the main focus of the exercise Note suggested edits to the Challenge * delete "and containing" when discussing contaminants * proper name is "equivalent land capability"
	Equivalent land capability is a poorly understood term which is so vague as to mean many different things to different people.

	I assume feasible considers a cost component Reclamation is one of the key areas that suffer from a lack of transparency that may be covered in the other dialogue. Many in Government and Industry tend to consider adequate reclamation as the only land issue of note, but I would argue that decisions around what/how much/and over what time frames lands should be available for development, and what areas are too important to mine, deserve equal attention.
	Overall I agree with the key challenge. Consideration should be made to the scale of the reclamation. If we are considering creating alternative desirable end land uses, is this on a site, project or landscape level. Equivalent capability could easily be met in most cases. If an area had been upland boreal and had provided recreational opportunities, you could consider a lake as an equivalent capability as it too can offer recreational opportunities. Maybe this challenge should include developing a working framework for "equivalent capability".
	I agree with the Key Challenge. One issue I have is in calling tailings or oil sands process affected water "contaminants". There is nothing that is added to the oil sands extraction process, in significant amounts, that is a contaminant. The toxicity issues are due to industry's practice of recycling process water for extraction. This concentrates the constituents that exist in the natural deposit; namely salts and naphthenic acids. Through retention time and managed water release, these constituents can be managed so as to have no negative effect to the environment. (However, no off site discharge criteria currently exist). Sensitivity exists in establishing any timelines for reclamation and closure. The oil sands mining industry is just starting to shift from reclaiming trafficable, low saline/sodic overburden dumps to soft and fine tailings deposits. To expect progressive reclamation on soft and fine tailings deposits to occur at a pace similar to that of overburden is unrealistic and short sighted? Science, through research & development, and best management practices needs to determine what is realistic in terms of timelines required to reclaim and close sites that contain soft and fine tailings deposits. Timelines should not be determined by regulatory agencies. Also, tailings ponds are process vessels that are a significant part of the oil sand extraction process. They may be required for plant operations for a very long time. Alternate end land uses needs to have stakeholder (first nation) involvement.
	Objective 1, in my opinion should be separated into two objectives, to distinguish between 1. "The challenges and required timelines in managing and containing contaminants", and 2. "The challenges and required timelines in reclaiming to equivalent capability", as these may be very different.
	The difficulty is to bring together a set of experienced reclamation practitioners who are not polarized in their opinions of oil sands mining reclamation. Individuals who have spent a portion of their careers with oil sands operations tend to have a firm belief that the operations are focused on meeting their reclamation commitments. These individuals can arguably be the

	most knowledgeable in the application of oil sand reclamation techniques; having successfully reclaimed lands on a large scale basis. These reclamation practitioners have been able to evaluate through operational experience and monitoring how these tracts of reclaimed lands are providing the ecological functions that are in tune with the surrounding boreal forest. The opposing set of reclamation experts may have experience in reclaiming lands in other settings or have an excellent background in reclamation research. The challenge is to take this potentially unrelated experience and apply the knowledge to oil sands mining. 1) The challenge is not the difficulty in containing contaminants so much as creating a trafficable surface on tailings containment features in a short time line. The recently voiced expectation for a rapid return of the tailings pond areas to a productive land base has intensified with the increased interest and development in the oil sands. Oil sand mining is an industry that is relatively young with very few players. For most of the last 50 years Syncrude and Suncor were the only oil sands operations. The interest from Government and the public in finding alternative solutions to the tailing pond challenges faced by these two companies (since they were located in a remote part of the Boreal Forest) was not at the same interest level as is currently evident. Once a trafficable surface has been created in a tailings storage area, the subsoil and the top soil can be placed to establish the base for the vegetation prescription. When the subsoil and topsoil have been placed on a landform, the industry has had considerable success in establishing viable forest ecosystems. Thus, returning equivalent capability in upland reclamation. 2) Alternative end uses have been discussed in a number of venues during the past two decades. While some of these end uses are attractive, the primary focus continues to be for the return of boreal forest ecosystems. These ecosystems are then compared to the pre-existing ecosystems, which provide a measure for the success of the reclamation. We believe the return of Boreal forest ecosystems on our reclaimed lands is a reasonable and prudent end land use.
	I am not certain as to the definition envisioned for the term "contaminants" – for the purpose of my response I have interpreted the term broadly, and taken it to mean not just hydrocarbon-related substances, but also more ubiquitous substances associated with mine wastes such as salts. Using this definition, I think inclusion of contaminants in this discussion is certainly appropriate. Any discussion of "challenges and timelines" in reclaiming to equivalent capability must start with an exploration of how to truly define equivalent capability in such a way that its achievement can be assessed and documented. I think that this is also an appropriate part of the discussion. I am not certain as to what is meant by "the feasibility of creating alternative desireable end land uses". Alternative to what? Are we talking about end land uses alternative to the commonly cited options of commercial forestry, traditional use, and wildlife habitat

	(e.g., intensive-recreation sites, industrial parks, high-management plantation forestry), or are we simply discussing creating different end land uses on the post-closure landscape? Nevertheless, I am intrigued.
	Although I agree with the Key Challenge I believe it would be more complete to add a third focus: 3) leading to policy/regulatory recommendations to be presented to Government and field recommendations to Industry. While the two stated focus points cover the issue they need to result in an outcome – recommendations to Government and Industry.
	The Key Challenge is based on the current reclamation standard of "equivalent land capability". Do all relevant stakeholders understand and accept this standard? Is it consistent with Aboriginal treaty rights to hunt, trap and fish? Is it indeed the case, as suggested later in the Challenge Paper, that Albertans in general believe that oil sands miners will be restoring, rather than reclaiming, the landscape. Does the discussion also need to encompass the current reclamation standard, what it actually means, and whether it is acceptable? As noted later in the Challenge paper, there are many aspects to the "feasibility" of potential end land uses beyond cost and technology. These aspects would include obligations under conservation-related legislation, and consistency with Aboriginal treaty rights. The Key Challenge does not address the issue of reducing the necessity for future reclamation, the risks and technical challenges involved, by avoiding the creation of tailings. It must be accepted that legacy oil sands mining operations have created substantial tailings inventories, and are locked in to processes that will create more. However, new operations are also proposing to create significant tailings inventories. Should it be assumed that this is acceptable?
	I agree with the Key Challenge in a very general way, but should contain 3, not 2, points 1) ***Identifying challenges***, - Most of these are already known. Other than reiteration, "identification" will likely lead to re-inventing. 2) ***Reclaiming to equivalent capability <u>within prescribed timelines</u>***, - Without reference to timelines, "equivalent land capability" is essentially the same as "feasibility of creating alternate ELU". The lack of directed timelines is a widely recognized current weakness, should be identified, and will play an important differentiating role between "capability" and feasibility". and 3) ***exploring feasibility*** …
	- For the future, please have a professional edit the document. It is difficult to determine the meaning of many statements. - Roles should be clarified. In my opinion, stakeholders should set the direction and technical experts should work on the problem as defined by the stakeholders. This is a model that

	works well if it is well defined. Related to this, I don't disagree with the intent of the two statements (i.e. identifying challenges in reclaiming to equivalent capability and exploring the creation of alternative end land uses). However, these require two different skill sets. The first is very much a technical debate. The second is not. This all comes back to the same question: Do you want to look at the problem from the top-down or bottom-up. I would recommend a top-down (stakeholder-driven) approach for now which would be a debate about what would be acceptable outcomes for the reclaimed land (define what equivalent capability is exactly). A second phase would have technical experts examine the challenges in this endeavour. - I don't see a good vision for what this exercise is trying to accomplish. Is it "responsible use of Alberta's oil sands"? This would greatly assist me in directing my comments. - Identifying required timelines in managing and containing contaminants is a very challenging (if not impossible) goal for this group at this time. This is dependent on so many factors. I would keep it simple and high-level. If this document is to be iterative, take small steps. If you mean identifying timelines for the challenges, then that may be ok (not sure since the sentence structure is poor). Perhaps you meant identifying challenges and THEIR timelines. I would still just focus on the challenges as a start. - Creating alternative end land uses will be a lot easier than reclaiming to equivalent capability (or something that looks natural). Do you want to explore the feasibility or have a dialogue with stakeholders to determine if this is acceptable and what it may look like? - In my opinion, "managing and containing contaminants" relates more to the management of process water, etc. during operation, which is not the same thing as reclamation. I would get rid of it as it adds confusion. There is an understanding that "reclaiming to equivalent capability" means that contaminants will be dealt with through reclamation. Keep it simple.
	I don't believe the containment of contaminants is relevant. The paper is about reclamation not remediation. The operators have a duty to reclaim and land will only be certified once the risk is deemed low enough for the crown to take back liability.
	It would be valuable to consider the values or end land use objectives that currently exist through commitments (Aboriginal use such as wildlife habitat requirements) and natural capital and the need for landscapes and vegetation that are resilient and do not require management to re-grow after natural disturbances.
	…reclaiming to equivalent capability with a target of, to the extent possible, reclaiming features of the landscape that once existed (e.g. muskeg, bogs & fens) ; and (2) exploring the potential to and feasibility of creating alternative end land uses desirable to all stakeholders, especially future end land users.
	I think issue 1 is two separate issues – so 1) managing and containing contaminants is a separate issue from, 2) reclaiming to equivalent land capability.

	I would prefer to deal with managing and containing contaminants as a separate issue. There are a variety of potential solutions to dealing with contaminants – engineering, landscape design, time management, potentially policy. I see the equivalent land capability and feasibility of creating alternative desirable land uses as tightly coupled issues. It is sufficient to focus on these issues together. The issues are more a policy and management based discussion.
	Overall – this characterization is vague and difficult to rally behind. Unreclaimed (is that a word?) or poorly reclaimed mine sites represent a social, economic and ecological liability that are being experienced by current generations as well as being passed onto future generations. We owe it to this generation and future generations to reclaim these sites using coordinated, deliberate, and credible tools. These tools are primarily management tools. However, a full suite of management tools have not yet been developed, few of the existing management tools have been tested, and we certainly don't know where many of these tools are taking us. The challenge might be alternately characterized as: To develop a rationalized, coordinated, scientifically credible system to create, validate, and operationally implement reclamation management practices so that future generations are not inheriting these sites as liabilities.

▪ **Input Request #2: Background** (Section 4) **PROVIDE YOUR FEEDBACK TO THE BACKGROUND STATEMENTS.** Consider — Do you agree with the statements? Which ones do you disagree with and why? What other important information or perspectives are missing that would help inform the challenge we are addressing? What other ideas did the statements spark in your mind? Please refer to the background statement number in your response so we know which one you are referring to.	
	Item 1, in section 4.1, is informative on reclamation regulation. Reference to D-074 right after item 1 leaves me wondering if we're not overstating its role in reclamation regulation. D-074 is about making some fluid tailings ready for reclamation – it is about applying available process engineering technology. As I understand it reclamation science and engineering is not so developed – putting the mined materials together again and making a useable landscape is orders of magnitude more difficult and the means are nowhere near as developed despite extensive efforts over the past 30+ years. If I read it correctly Item 4 identifies tailings as the most challenging for reclamation "unreclaimed land largely comprising the most challenging areas represented by tailings impoundments and cells"

	When I listen to reclamation experts talk about putting the mined material back in place and making it useful for vegetation, animals and people I shudder at the challenge. Making fluid tailings solids is straightforward by comparison i.e., engineering processes to densify fluid tailings exist, and have for a long time – the impediment to commercial application has a cost not the absence of technology.
	The lack of effective restoration of disturbed ground has led to a severe restoration deficit in the oil sands area. This must be addressed or the social licence to mine will be lost. Care needs to be taken to ensure that land capability and capacity is not related solely to human expectations but rather incorporates a diversity of ecological functions. Reclamation needs to be progressive so that mine designs are developed that will allow reclamation of the disturbances as the mine develops rather than waiting until the end of mining to start reclamation.
	Overall: Section 4 is quite a good summary of background issues and events. Suggestions for other aspects to be considered are listed in my specific points. Some important issues that may require different or greater emphasis include: • Greater emphasis on progressive reclamation and improving rehabilitation through 'doing, monitoring/research, and reviewing' • The need for clearer understanding of approaches to developing achievable certification criteria • Landscape planning and reclamation; understanding what is possible, and what may not be – setting realistic expectations around 'adopt leading practice, learn from it, and implement adaptive management/continuous improvement practices'. Other comments related to specific points are listed below: 4.1.1 Just a thought – regulations, policies, guidelines and are important for defining the general framework and expectations of rehabilitation (particularly minimum acceptable standards), but in reality, industry generally *learns* more by implementing leading practice, then monitoring, reviewing and revising practices. It is important that oil sands companies recognise the importance of 'learn as you go' and not expect regulators and others to solve problems for them. Some challenges (e.g., operational issues – how do we do this with our resources and staff) can only be solved internally. 4.1.3. This is typical of an expanding industry and it is acceptable when it reflects development of new mines and new areas within existing mines. However, companies leaving rehabilitation for later, when 'we will know the answers' is unwise as it misses opportunities for learning and adds to the total open area = net impact. The concept of progressive rehabilitation should be strongly encouraged through the provision of policies and advice – in Australia, the Queensland State government introduced a progressive rehabilitation policy designed to encourage companies to reduce open areas (and therefore net environmental

impact, and security bonds) at any one time. For their part, companies need some regulatory certainty that, if they rehabilitate now and it performs as expected, regulators will not change expectations for the same site at a later date.

4.1.4 See previous point – directly relevant.

4.2.6 There are generally two ways of dealing with the question of land capability in multiple land use natural systems such as this. 'Keep it general' as this seems to suggest, or get very specific resulting in great detail in expectations, certification criteria, and verification methods to show criteria have been met. Whilst the general approach provides less specific guidance in relation to expectations, it is usually preferable to the latter approach which is potentially fraught with difficulty, does not readily address differences between sites and offers little opportunity or incentive for companies to develop creative rehabilitation solutions.

4.2.8 'Similar to pre-disturbance' is a good concept and should be supported. However somewhere it should be noted that the definition of 'similar' can be a real sticking point in these instances. As we recently emphasised when reviewing the 2007 Wetland Reclamation Guidance, at the next level of detail (i.e., marshes vs. fens vs. bogs) it may not be possible to match pre- and post-mining areas of wetland types even on a relatively large scale due to uncertainties with regards to the extent to which some types can be successfully established.

4.3.10 This is a good general requirement. More specific details can be developed on a site by site basis.

4.3.12 Good point. Whilst 10 years might not seem a long time, requirements can become outdated. Companies should be encouraged to review expectations and reclamation requirements on an ongoing basis. Responsible companies will adopt them for any new reclamation they do, even though they may not be legally required to do so. Conversely, companies should not be expected to 'retrospectively' meet new standards for reclamation already implemented.

4.3.13 Links to 4.2.8 above – similar issues will arise. Depending on the landscape scale, it may or may not be possible to produce reclamation plans that 'project landscapes that resemble naturally occurring boreal landscapes'.

4.3.14 I haven't seen this but based on the RWG Biodiversity workshop I attended in Edmonton in September 2009, I expect that it is likely to contain much useful guidance on the key elements of successful reclamation programs.

4.3.15 A critical point and essential that this be addressed.

4.3.16 The thinking on this is progressing as per the recent 2007 Wetland Reclamation Guidance review; RWG personnel involved in this project could provide an update on where this is at.

4.3.17 Important in a regional context but often of limited (albeit important) relevance when mines and stakeholders are developing specific details of reclamation.

	4.3.18 Good point; important that integration and broader landscape aspects are taken into account in planning and, where relevant, operations. 4.4.20, 21, 22 Important considerations discussed in the recent peer review of the 2007 Wetland Reclamation Guidance.
	Sorry but I think this section is really confusing. The law requires companies to return lands that they are reclaimed to 'equivalent land capability'. Section 4.3 point 10 reads… "companies are required to reclaim and remediate land to a state capable of supporting the same kind of land uses as before disturbance". Yet section 4.2 point 6 says that "the individual land uses will not necessarily be identical". The latter statement is correct: the former is not. Then to make matters even worse: section 4.3 point 13 says: "…EPEA approvals do require a naturally appearing post-mining landscape". AND the statement in the OSRIN intro page says: "…returning landscapes and water impacted by oil sands mining to a natural state…" Of course I have read on in the document and the next section (Section 5 point 1) adds further to the confusion by stating that the goal is "reclaiming oil sands developments to functional boreal ecosystems and landscapes"… There are even more examples of what I am saying later in the document. Arrrrh! So how many different and unrelated versions of what we are supposedly trying to do in reclamation is that now? Four??? If I was not so familiar with reclamation and its legislation requirements I would be totally confused by this section as to what companies are supposed to be doing in Alberta. This is so sad because reclamation in Alberta is the most progressive anywhere in North America, maybe the world. What is missing from this challenge? CLARITY! The confusion in this section I have outlined above worries me tremendously. How can workshop attendees meaningfully participate in the discussion with such lack of clarity? Unless of course I am the only one who sees this as lack of clarity, in which case I trust you will summarily dismiss my points.
	Statement 3; is additional information available that would segment the disturbance into mine site, plant site as well as tailings impoundments? The information would be valuable as reclamation or restoration strategies may differ. Statements 15, 16; are key to the discussion, are there known reasons why the criteria have not been defined? A section that defines the domains between the regulatory agencies would be helpful for the discussion.

4. Deferral of Reclamation: I agree that the bulk of reclamation is deferred towards the end of the mine life. This, however, is problematic because (a) We do not yet know how to successfully reclaim oil sands materials and thus considerable learning can be achieved from the existing reclamation 'experiments'. If only small areas are reclaimed this limits the information that can be derived for improving reclamation practices. (b) Emissions from mine activities are likely adding considerable nitrogen loading to existing reclaimed sites, which could be enhancing productivity (at some point the opposite could also occur). Deferring reclamation to the end of mine life could mean that nitrogen deposition is substantially reduced. Hence, ecosystem development might be substantially different than currently occurs under existing practices. (c) Over subsequent decades, climate change effects may be of greater magnitude than we are currently experiencing. Given that no reclamation planning or prescriptions currently address climate change this introduces uncertainty into outcomes. (d) Deferring reclamation introduces risk that companies may default on their reclamation obligations.

5. Reclamation Certification: A lack of certification is probably desirable. I am not convinced that long-term productivity will be achieved or maintained on reclaimed sites. Hence, it is premature for the Province to assume liability for reclaimed sites.

6. Equivalent Land Capacity: The definition, as presented, is meaningless. This is probably the most important issue in reclamation. Currently, there is no agree-upon definition. EC could be defined in 3 ways: Structural EC, Functional EC, and in terms of the goods and services that ecosystems provide. Furthermore, most consider EC to be defined at the stand-level. This is simply false. EC can only be meaningfully defined at the landscape level.

7. Land Capability Classification System (LCCS): The LCCS is a useful but inadequate tool for reclamation planning and in my opinion there is an overreliance on its predictive capability. The LCCS is constructed such that moisture and nutrient availability is defined at the outset by a series of static 'pools'. While this approach may be applicable to an agricultural environment (for which it was originally developed), the biochemistry of forest ecosystems is far more complex. Defining land productivity classes is potentially useful for reclamation planning (as the LCCS purports to do) but unfortunately the LCCS doesn't do that simply because its productivity classes do not correlate well with any standard productivity metric (site index, for example). This is not surprising given its overly simplistic representation of forest ecosystems. The LCCS is really only appropriate as a tool to ensure minimum soil handling practices are within accepted limits and standards, and that there are no contamination issues in reclaimed material.

8. "Similar to pre-disturbance boreal landscapes": Another meaningless statement. How similar? What is the spatial extent of the pre-disturbance landscape? Over what time scale?

10. Reclamation requirement: As with equivalent capability, the requirements are not specific enough to be meaningful or useful.

	14. Guidelines for Reclamation to Forest Vegetation: The updated version of the manual is considerably improved over its predecessor but there is no consideration of climate change and how reclamation practices need to be modified accordingly. 17. Land Use Framework, and 18. Integrated planning: should be mandatory components of all new mine approvals and approval renewals.
	Statement #1 – the Landscape Design Checklist is missing from the summer – this has guided many landform design principles to date, whether or not the direction is still aligned with this document. Statement #4 – deferral implies deliberate slowing of the reclamation process. Mine plan development generally demonstrates the progression of the equation development time + lag time for e.g., tailings consolidation = time to reclamation. Mine companies are well aware of the liability issues related to back-ending reclamation, and deferral is not part of the liability reduction. Statement #5 – this is correct in terms of certification of a mine area. But what about cert of pipelines, OSE programs? This always seems to get forgotten. Statement #6 – "Capacity" should be "capability". Statement #10 – This is a different implication than equivalent land capability. Stakeholders may choose different land uses than were there before mining – is this then not reclamation? Statement #14 – This guideline has not yet been released – I checked the CEMA website again just in case.
	6. Equivalent capability: soils are probably not enough. Do we know of anything else form literature on other disturbances? 7. Land capability classification: Is it too much based on knowledge from agricultural soils? Do we know enough about forest soils? 14. information for operators is missing 15. We need to define the terms target, criteria and indicator. 20. Very optimistic! I always believed that wetlands plants were very sensitive to their environment. Perhaps we should be planning on creating totally new types of wetlands. Challenges associated with tailings pond water are missing. In aboriginal culture, are sites (which include location, plants and surroundings) rather than only plants more important in terms of traditional ecological knowledge? Will an aboriginal community use a reclaimed site even if its newly established ecosystem is similar to a natural one?

	All of the statements make sense to me. The one on integrated planning (#18) sounds really good in theory but I wonder how practical that is considering neighbours are often offset in time (sometimes decades) from each other. One thing that seems to be missing is the sometimes competing objectives of Alberta Environment (conservation and efficient development of the land) versus the ERCB (conservation and efficient development of resources). For example, an integrated reclamation plan between two neighbours might require mine plans that are not the most effective way to extract the oil sand resource.
	Statement 4 – The "deferral" of reclamation is made to sound as if it is a delaying tactic of the operators. The fact that developed areas are used as part of the operations (be it for facilities, tailings ponds, reclamation stockpiles or the like is not a deferral of reclamation, it is a use of the area, which, when that use ends, would then be available for reclamation. That is not deferral of reclamation; it is the deferral of the opportunity to reclaim because of another, alternate, viable use. Statement 8 – It is often forgotten that pre-disturbance boreal landscapes were functional, integrated ecosystems that may, or may not have had a "defined human use". The discussions now tend to focus on perceived human uses without focusing on ecological resilience. Statement 9 – This definition is important, but has not been well described previously. Statement 13 – I believe this focus is a red herring. It is functionally impossible for any operator to create a landform that is not similar to something currently found in northeastern Alberta. The fact that it may not have been a component of the specific site should not be the driver; rather, the fact that the created landform fits within the reclaimed site, and is integrated with the adjacent natural (or reclaimed) areas is what is important. Many seem to forget the relevance of information provided in point #20, where the mining and extraction process increases material bulk by 20% to 25% - the reclaimed landforms will always have areas that must be higher than pre-development to accommodate the bulking factor. Statement 15 – I agree, but disagree. There may not be a defined "list"; however, the lack of a defined "list" vetted by some group does not mean that viable targets, indicators and criteria have not been applied. If the target is ecological resilience and the focus of efforts has been towards that end, then the lack of a regulated "list" is not an issue. Statement 17 – It is critical in the consideration of the application of a new framework, that all remember that many areas have been developed (and reclaimed) before the framework has been issued. The legacy of development and reclamation areas, as well as reclamation practices (such as, for example, soil salvage 20 or more years ago) must be considered when evaluating the success of developers meeting the land use targets. Statement 19 – The planning of landforms is a function of mine planning and closure planning, not just closure planning. The mine operators are driven by the regulatory requirement for resource conservation. The dictate not to sterilize ore defines the extent of

	mine pit areas, as well as the facts that some mine wastes (e.g., overburden dumps) are placed in out of pit areas over areas without bitumen resources. Statement 20 – The oil sands operations do not produce the listed materials, they liberate them. It is important to note that there are very few of the listed contaminants that are added to the process. They are natural components of the ore body or overlying overburden materials. The oil sands mining and extraction process does two things – it liberates the materials, and it may concentrate those materials. Statement 21 – Natural boreal wetlands implies peat lands. Peat lands tend not to be good habitats for waterfowl like diving ducks that need larger open water areas such as lakes, swamps or marshes. This distinction is important as the reclamation wetlands, which may always be primarily swamps or marshes, not peat lands, still provide viable habitats for wildlife.
	I agree with the statements and related assumptions. The list is quite comprehensive and appears to reflect a "brainstorming" or list all things that come to mind session.
	1. In addition to the discussion as an evolution of policy documents, it would be helpful to provide the drivers behind the policies. What was the evolution of thought and view of the future state as embodied by these documents? What are the objectives and perceived future state for the current process? Agreement on this might help the discussion. 2. Is Directive 74 included as a useful and integral part of the process, or simply as an additional in-place regulation? Part of the challenge discussion could include whether any particular regulation meets the overall objectives, including (but not limited to) Directive 74. Assuming we have the overall objectives clearly identified. 4. This is due primarily to the economics resulting from NPV analysis. Several papers have been published on dealing with this issue, and needs to be associated with ARO or liability costing. 5. In a very real sense this is a failure of the certification process. Without clearly defined requirements, it is difficult for a business to provide expenditures to meet undefined objectives within an unknown timeframe, both of which may change without notice. 7. This is an extremely limiting view of the landscape. Again, it is important to decide on the true stakeholders and their associated objectives before developing KPI's and reclamation yardsticks. Do we really want to rate all lands according to how commercially productive the resultant forests would be? 8/9. Is it "capability" that is the target, or the actual functioning landscape? If an operator turns a pond back into a trafficable surface that is "suitable" for upland forests, does it need to be reclaimed to a forest? Can we consider a "Do No Harm" approach, which specifies what characteristics the landforms cannot take (i.e., salty groundwater releases preventing vegetation growth, storage of fluid materials in areas that could cause damage under uncontrolled release conditions, slopes inappropriate to support growth)? There is a valid

	concept of natural reclamation, where the land is set-up meeting the "Do No Harm" guidelines, then allowed to naturally regenerate. There are numerous examples globally of this concept producing much better, more sustainable ecosystems than attempts at man-made and stewarded reclamation efforts. Ultimately nature will decide what thrives within a specific locale, regardless of what Aspen density or benthic species distribution targets we decide on. Perhaps letting nature take over is the better plan. 10. Why does "capable of supporting" imply that it must actively support those land uses before certification? 11. This is standard and appropriate. 12. Reclamation of large areas of land requires years of effort, millions of dollars, and the dedication of the operator and their employees. The business risks associated with "moving the goal posts" are very high and may hamper efforts to improve the systems. If the process of meeting the most recent approval conditions at closure is followed, this could serve to delay closure efforts in order to ensure that current and planned efforts will achieve the final objectives with a minimum of risk. 15. Agreed – see previous points 18. While easy to say, integrated planning can often run into issues of cross liability. A legal framework for resolving these types of issues from the GoA would greatly assist in achieving this goal. 19. I am not certain why this mentions the number of landforms within a landscape. Other than that the definition seems appropriate. 21/22. No problem with these statements, they are true assuming the reclamation targets remain.
	I do not see how statements 14 and 15 can be reconciled. Other statements are on a similar vein where words like "complete" or "comprehensive" or "regulation" are out there with different meanings for different people. In order to agree or disagree with these statements, they need to be in plain language, one or two sentences.
	Statement #4: it says "…many mine plans defer much of the reclamation towards the end of the mine life, with unreclaimed lands largely comprising the most challenging areas represented by tailings impoundments and cells." This situation will be reduced in the future with requirements of Directive 74; however additional legislation is required to address the legacy tailings. Reclamation of tailings dykes to forested lands is no longer permitted by the Dam Safety Branch of AENV because the trees might hinder appropriate monitoring. The dykes created by the mines are not especially suitable for reclamation because they do not have an appropriate watershed system to prevent gully erosion that could eventually cause the slopes to fail. Once a dyke is no longer required to be a dyke it could be properly shaped and reclaimed with a system of ephemeral watercourses to sustainably handle surface drainage.

This is especially important in the river valley where any failure would end up in the Athabasca River.

Statement #5: Only one company has applied for and received a reclamation certificate to date, for 102 ha. There are other small areas on the fringe of the Syncrude lease that might be looked at for reclamation certification, such as some of the old gravel pits above the Athabasca River escarpment.

Statement #7: It should be noted that the LCCS was developed to assess the capability of natural and reclaimed lands to support upland forest productivity. Since its acceptance by the GOA; it has been applied to undeveloped wetlands, resulting LCCS classes 4 & 5 because wet areas do not grow upland forests very well. Salinity or droughty soil is most often the reason a reclaimed area would have an LCCS class of 4 or 5. The LCCS system would more appropriately assess the comparison of predisturbance to post disturbance land capability if it were not used to assess wetlands.

Statement #12: The Oil Sands operators participate with regulators to conduct research on important environmental issues and commit to resolving these issues in EIA documentation. However companies have declined to implement some of these key findings, such as the need to salvage and use upland soil materials.

Statement #13: A strategy and agreement between operators and regulators is required on how, and when, to develop natural appearing landforms to satisfy regulator requirements. A key issue is missing from the discussion and that is the need for functional landscapes and landforms. Landforms should be robustly designed to handle post closure climate, land use and natural disturbance. Landforms will require quality soils, functional watersheds, and stable slopes to withstand the effects of water, wildfire, forest harvesting and people.

Issues to consider in the creation of functional landform and landscape designs include;

- Establish regional closure watershed design and requirements for mine development to steward to. This would implement planning and execution of mine planning, landform design, elevation planning at lease boundaries and water quality management.
- Functional landforms means inter-lease planning so that lease development proposals do not leave a dry trench left between leases, or create lease boundary dendritic patterns. Functional landforms mean that reclaimed landforms provide the same opportunity for land use post closure as predisturbance. Refer to the *Oil Sand Mining End Land Use Committee Recommendations*, 1996.
- Out of pit structures should have slope angles appropriate to watershed size, material type and chemistry issues to sustainably withstand watershed erosion, natural disturbance and land use such as people using ATVs on them.
- Salinity constitutes a significant challenge to the landscape and would best be managed by putting saline materials in mined out pits and/or under a couple meters of clean overburden to minimize their impact to surface ecosystems. It would require a bit

more planning than the existing system.

- Progressive management of tailings and process affected water so that we don't leave a toxic liability of water covered tailings and process affected water called end pit lakes. The potential for toxicity of the tailings (and PAW) will remain evident many years after creation. Once the revenue is gone then the political capability to resolve such a situation may be gone as well.

Statement 16: A Landscape Capability Classification System for Wetlands would bring significantly better integrity to the Equivalent Capability discussion. The existing LCCS wouldn't need to be mingling the issues of the LCCS classes in predisturbance wetlands as compared to reclaimed lands reduced capability to grow forests due to salinity contamination or droughty soils.

Statement 18: Integrated planning: Measurable criteria are required to make Integrated planning enforceable. The issues discussed within Statement 13 above apply.

Integrated planning would also require considerations of issues such as local and regional access management planning, utility corridors and resource recovery: silica, topsoil, peat, timber, gravel. Non-renewable resources should be regulated to prevent their wastage.

Statement 19: Detailed approval requirements and criteria are required to establish criteria for inter-lease landform and landscape design; otherwise the default choice would be the least effort alternative.

Statement 20: This requires a bit of clarification.

Bullet 3: says "Process-affected materials that cannot be recycled are stored in settling basins." This situation will change over time with the implementation of Directive 74 and future tailings management regulation. However most of the oil sands industry did not achieve effective reclamation of fluid tailings until regulation establishing performance deadlines and milestones was put in place.

Directive 74 will slow the accumulation of fluid tailings, but not stop the accumulation. Most new tailings management will take the tailings solids and convert them to reclaimable landforms. Bullets 3 & 5: Public and government sentiment appears to be unwilling to accept the proposal that such settling basins are not reclaimable and that the contents are not treatable. An expansion to Directive 74 is required to address the legacy tailings, and any new tailings produced in excess of that dealt with by Directive 74.

Tailings management requires progressive management of the process affected materials so that the closure landscape is guaranteed to be non-toxic, the closure ecosystems should thrive without chemical challenges and water quality from the oil sand mine affected areas should not adversely affect the surrounding environment. Water covered tailings are a least cost option. Is it appropriate to adopt a risk management strategy for tailings disposal where the risk is inherited by the people of Alberta?

	2. Don't agree that criteria are required to "ensure…accountable" 3. Need to consider time land in use for mining & time it takes to reclaim 4. See above; it's not about deferral, it's about what is in use vs. what's available 5. Oil sands mining; other activities in Boreal may have applied! 12. Agreed, but let's not say conditions are "out of date" – they were best available when applied and are valid although refined 13. Natural land forms are considered but reclaimed ones may be constrained by material, geotech 20. Add naturally occurring to "soluble organic chemicals" 20. Broader range between 10-25% depending on material.
	1. I feel is it more appropriate in the background to remind us that Mining and reclamation of mines has been going on for quite some time, and not just since 1963, as the chart implies. I know that's meant to highlight regulations but a more thorough reminder of the background as well as some of the initial conditions and past and current relevant research done is important. 3 and 4. The statements also don't recognize the natural Life cycle of mining and how the current reclamation matters relate to that. Because of that it feels like we are using all disturbance is a problem and can't be reclaimed properly or in a timely way. I don't know if that's true or not. 5. I noted reference to one area certified in the region; but context should be added, that this land was a mined out area. It also doesn't give any credence to areas that are mostly or partially reclaimed. 12. Assuming that new standards will be required of older operators is wrong. Grandfathering is also an option. (i.e., it may not be how but if the new standards are applied) 15. I disagree with this statement. The high level information is well understood.
	I do not agree with using the word similar in definition 4.2.8 "similar to pre-disturbance boreal landscapes." We need to recognize that the goal of oil sands reclamation is to reclaim the land such that the reclaimed soils and landforms are **capable** of supporting a self-sustaining, locally common boreal forest, regardless of end land use. The post mining landscape is going to look different than the pre-disturbance boreal landscape. There will not be the same proportions of uplands, wetlands and lakes than existed previously; nor, will there be the same types of wetlands. I am in agreement with the lack of a complete set of targets, criteria, indicators and regulatory thresholds (4.3.15). A complete set of targets, criteria, indicators and regulatory thresholds for oil sands mine reclamation needs to be established that support the reclamation certification process. The indicators that need to be measured; however, need to be practical.

	I agree that criteria for wetland reclamation certification are required (4.3.9), but don't agree that this should separate this out as a separate statement. In the context of reclamation certification, it is important to consider the entire area being certified from the context of one area with multiple ecological units (wetlands, uplands and the areas in between). These units need to be assessed together on the basis that for ecosystems to function and progress over time, there needs to be a strong linkage between the uplands and lowlands.
	There is an awful lot here. Summary of major regulatory changes chart- very good, simple, helpful for context. 3. Trends in mined and reclaimed area chart – it would be helpful to show as percent increase over time as well. Hard to see if reclamation rate has kept pace with absolute area as a percentage (clearly has not in absolute terms). It is helpful to recognize that the easiest sites to reclaim will be done first and the most difficult will be reserved until last – likely the deeper tailings ponds. 4.2-6 The bounds of equivalent capability need to be carefully discussed and guidelines of how far afield reclamation may stray and still receive credit for reclaiming need to be put forward. Classic jokes exist about bison pastures and artificial eskers, and inland salt marshes. It is like calling someone an expert marksman because they shoot a hole in the paper THEN draw concentric circles around the hole showing that every shot is a bullseye. 4.2-7 The LCCS needs either an overhaul or a new system needs to be developed for reclaimed sites. Agriculture and forestry are too commercially/market weighted to be useful for evaluating broader ecological goods and services for which good markets do not yet exist. It is the wrong tool for the job. 4.3-10 There is no mention of compensation/mitigation or banking of mitigation credits or the compensation ratios for lost habitats. 4.3-12 There is some curiosity about the "teeth" of EPEA approvals. Are they *ever* denied? Are they supposed to serve as guidelines, incentives, targets, encouragements or even a stick to be better resource stewards? 4.3-13 Appearances are nice but functions are critical. A large ugly scummy pond that produces clean water at its lower end is far preferable to a green forested hillside of sand that constantly leaks salty oily water out of its toe slope. A beautiful wetland pond that looks great has clear water but doesn't support insects (naphthenates) or waterfowl is less attractive than a weedy muddy wetland that is rife with insect, plant, amphibian and waterfowl life. 4.3-15 Need for targets, thresholds, criteria, indicators is well stated. Also, rates of change and a whole series of time lines need to be maintained so relative rates of progress can be charted. If a company makes the claim that they are satisfactorily on track towards forest reclamation at year 20 and they are only 10% as far along as previous forest reclamation sites, they may be questioned. Now is the time to build an index of suitable reclamation rates. Forestry has this in the form of site index, LAI, Stand quality, basal area, and stocking rates.

	Non-commercial sites may use species richness, cover, biomass, organic matter accumulation, soil horizons, lack of invasive exotics etc. 4.3-16 Wetland success criteria are badly needed. A debate is emerging as to whether peatlands should be considered separately from the broader category of wetlands. 4.3-17 The LUF is so political at this point that with the Premier's predicament, it is highly speculative to say what will occur and when. The pause in progress is probably a good thing. It is important to get a commitment from GOA to press on when the political landscape allows it though.
	4.1.4 – Further, operational mine development plans have not adequately considered alternatives which reduce the area of land required for 'active mining' thereby limiting progressive reclamation opportunities (e.g., operational tailings technology for in-pit disposal initiated only when full mined out pits become available). What is not clear from this statement is the 'why'? I do not think this is a fundamental choice by the operators, especially as they post bonds of reclamation security for disturbed lands. Instead there has been no policy to drive innovation for alternative mine development technologies which focus at least partly on effects to the reclamation schedule. 4.1.5 – One needs to be cognizant of the drivers which have resulted in few applications for reclamation certification. From the GOA perspective, all reclamation liability is transferred to the government on the date a certificate is issued, unlike other activities on specified land where a liability period for reclamation persists with the company. 4.2.7 – The LCCS is very poor at providing valuable ratings for anything other than forest capability (which the authors will readily admit and for which it was never developed). As a result, other systems must be in place to facilitate classification of the return of equivalent capability upon reclamation. 4.3.12 – While the statement referencing EPEA approval conditions is correct, it is not necessarily so with respect to "older operators having older approval conditions". Neither Syncrude nor Suncor hold the oldest approval as their approvals were updated in 2007. CNRL Horizon Mine has the oldest approval currently. Instead the statement should focus on how to adaptively manage the conservation and reclamation process including changes for reclamation standards and expectations both within and external to EPEA approvals to ensure timely implementation of best management practices. 4.3.15 – There has been much criticism that oil sands development and in particular mines lack clarity associated with reclamation certification requirements and associated criteria and indicators which may be used for assessment. Definitely clarity is required, but in many cases, the anticipated or expected outcomes are well articulated in closure plan and related documents on a mine by mine basis, with relevant criteria and indicators available from applied scientific literature. Examples of well-articulated closure plan (and certification) requirements may be found in other jurisdictions (e.g., Australian bauxite mines), however upon reflection and comparison to the oil sands mines of Alberta, there is much overlap in

	requirements. Thus I would argue we need to 'better articulate' outcomes and identify measures for the criteria and indicators. 4.3.16 – It is true that wetland reclamation certification criteria have not been developed and for some wetland types, such development may be very premature. Indicators for fen wetlands may be very difficult to identify since young fens are unlikely to look like fen ecosystems for some type and simple functional measures like 'is the wetland carbon accumulating or not' may vary over shorter time periods (e.g., year to year). However, there is a significant tech transfer process currently focused on developing key indicators for reclaimed wetlands (marshes in particular) which will help the next revision of the wetlands reclamation manual by discussing indicators and trends associated with successful wetland development. 4.4.20 – wetlands should be able to be developed on any and all landforms being constructed post-mining as long as geotechnical requirements for stability can be met, and water quality issues are managed in accordance with targeted vegetation communities. Much of the text in this heading doesn't match or align well.
	Statement 3: To call an area 'reclaimed' without a reclamation certificate is misleading. That whole graph is misleading. Unfortunately on most I have no first-hand knowledge to be able to agree or disagree.
	I agree with most of these background statements. A few points where I disagree or would like further clarification: 4.4 Deferral of Reclamation: I agree the statement is accurate, but I don't agree that this should be the normal practice. Once an operation is closed, what is the motivation for an operator to complete the reclamation if the site is no longer making money? 4.11 I would like more information about operator liability. Does contamination include salts? Or are salts considered an issue related to drainage and hydrology, keeping them in the realm of reclamation and therefore zero operator liability after certification? Also sparked in my mind, related to this; what if certified reclaimed end pit lakes start off-gassing large amounts of H_2S? Would this be considered contamination or just a reclamation problem? Some lakes naturally produce H_2S, but this may be increased in oil sands situations because of sulfate ions in tailings. Additional potentially useful background information: How do reclamation security bonds work? How much do operators pay for these bonds? I can see the importance of operators proposing ambitious reclamation plans for approvals and renewals, but what are their incentives for actually seeing these plans through to certification? Are there additional financial implications for not completing reclamation?
	My general comment is that the statements, in my view, are much unbiased and it is very hard to disagree with them. What I think is missing here is the issue of how regulators ensure that the corporations will fulfill their reclamation responsibilities. One of such ideas is financial

	guarantees like letter of credits, bonds, etc. Maybe it should be advisable to provide information on such guarantees, and information about what the financial securities are for. Another issue that I think should be included in the background statements is the financial cost of reclamation and Government, academia, and corporations investment in the research and development associated with the reclamation. I would try to discuss the public needs and perceptions of reclamation efforts to date as well.
	The ERCB directive specifies performance criteria for the reduction of fluid tailings and the formation of trafficable deposits. These criteria still has to be proven. Whether these trafficable deposits will support ecosystem function has to be proven. Its effects on people as affected by wind, contamination of water bodies, etc. as these deposits may still have residual chemicals, thus their effects are partly unknown. Connection between ground water and surface water in the oil sands is missing. The issue of wetland restoration in Alberta has moved into the forefront of environmental concerns due to an awareness of the size and complexity of restoration work associated with the mineable oil sands. The "reclamation efforts in the oil sands are large-scale, involving whole landscapes or watersheds; thus wetland created in this context are fundamentally different from many of individual wetland projects. There are also federal policies dealing with wetland conservation and "No net loss", which includes a balance of unavoidable loss of wetland function. Equivalent Land Capacity term is misleading. While it provided the function, does it provide the ecological good and services? As before. For example, we can show that white spruce and aspen poplar grow and have a closure of canopy in about 20 years, but does not support the biodiversity values, aboriginal values, wildlife habitat values as prior to disturbances. Yippie, we can grow trees, but what about the rest of the values. Canadians expect more.
	I agree with statement #'s 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 (I have not read it yet), 15, 16 (nor has a wetland been successfully established on a large scale), 18, 19, 20, 21, 22 I disagree with statement #'s 10, I partially agree with statement #3. The areas of land that are currently reclaimed are increasing, but are very disjoint. There are small patches of reclaimed areas scattered over the entire leases. When you add them up they amount to a good percentage, but it is difficult to imagine that the operators have considered the overall mine lease as a whole and are planning for the entire mine reclamation. Statement 10 is not entirely correct. Equivalent land capability doesn't necessarily mean it was similar to before disturbance and this is what the current regulations state. I agree with this statement, because it is what is implied. Statement 13 – I have not read the most recent life of mine closure plans, but I believe it is imperative to create landscapes that integrate undisturbed areas with disturbed areas. I believe

	mine operators are now required to work together on a larger overall regional plan and this will be beneficial for this development. Statement 15 – companies are required to reclaim according to their approval conditions, which are changing frequently. This is like hitting a moving target. It would be very useful to have guidelines with best practices for operators to follow. Much of the attention recently in the oil sands has been placed on wetland creation and tailings management, but let's not forget that we still struggle with appropriate capping depths, soil storage techniques, succession and native shrub/rare plant establishment
	It seems like you've done your homework and have a pretty good list. Your list obviously comes from people who work directly in the oil sands. Impressive. Oh, one thing missing maybe is a reference to the Landscape Design Checklist completed through CEMA a number of years back.
	1. The summary of the major regulatory changes clearly demonstrates that reclamation and its regulation is based on an agricultural model which is in my opinion a major stumbling block in the development of reclamation standards and approaches on disturbed lands especially in forested systems. This continues to drive the reclamation strategies. 2. Agree, it was about time. 3. I partially agree, however it is important to note that at this time and likely in the foreseeable future reclamation increases linearly while disturbed areas increases exponentially. 4. Don't agree as there is little long-term monitoring capability which allows for adaptation of reclamation strategies of necessary. 6. Should read "Equivalent Land Capability" not "Capacity" what does "conservation" mean? Equivalent land capability is an agricultural model it does not include sub soil conditions and geo hydrology as an inch of rain every few weeks is good enough for annual or perennial herbaceous crop. 7. Also driven by the agricultural models, it is mostly driven by surface soil conditions but very little by sub soil and hydrology (see comments above). 8. Don't agree, since the landforms and their proportion will be different in a post-mining environment these pre disturbance boreal landscapes will NOT be similar however they should be able to function as terrestrial and wetland ecosystems. 9. Restoration of organic dominated wetlands (e.g., "as it was before disturbance") is impossible over the next 1000+ years. 10. Why only the same kind of land uses would it not be better to let the systems recover to ecosystems that provide potentially many uses we know of now but why exclude the potential of new uses for the future. 12. This needs to be within reason

	13. Landscape and landforms are likely the most important aspects of reclamation. They eventually will determine what can be established and what will be maintained in the long run. As mentioned in points 6, 7, 8 this cannot be driven only by what we want to see on the surface and how we asses our soil surfaces but needs to be closely connected to the sub surface condition. 15. Completely agree! 17. Interestingly there is no provision of protection and conservation in the Land-Use Framework!
	General support for the Background Statements (exceptions/comments noted below) #4 – large tracts of land are occupied by infrastructure (e.g., tailings ponds, plant site) that cannot be reclaimed until the end of mine/plant life #6 – this is the regulatory definition; what is missing in the definition is the way it is implemented in real life. Specifically, the definition suggests that alternative uses are allowed if the reclaimed land still has the ability to support the original uses. In fact, the original intent was to allow alternate uses **in place of** the original uses. There is flexibility (and lots of examples) in the application of this reclamation objective to allow a completely different use – e.g., an end pit lake, leave a road, or transform a gravel pit into a residential development. Many people in discussing oil sands reclamation seem to feel that the only way an alternate use should be allowed is if the soils and landscape are replaced with the "right" use in mind and then allow the alternate use to exist on top of the "right" building blocks. These two different interpretations can lead to vastly different costs for industry and a general avoidance of any discussions of alternate uses. #7 – the use of the LCCS tends to focus discussion on upland forested land uses just as use of the Agricultural LCCS for coal mines focuses discussion on agricultural uses. This causes problems because an alternate use like recreation or wildlife habitat or wetlands is often "best" on the poorest quality lands as measured by LCCS. There is need for parallel measurement systems for alternate uses. #8 – see comments on #6 #9 – we should broaden the language to focus on wetlands and waterbodies (ponds, lakes, streams, etc.) otherwise people tend to focus on wetlands as traditionally defined #15 – the statement appears to presume these are all needed. This is not necessarily the case if the regulators and industry are on the same page in terms of outcomes/expectations #16 – see comments on #9 #18 – we need to gain a better understanding of the impediments (real and perceived) to undertaking cross-lease coordination (e.g., is it $$, is it liability, is it timing of work) #20 – need to broaden focus to include processing waste landforms (e.g., coke, sulphur, tailings) as well as mining landforms

	#21 and 22 – see comments on #6 New Items to include • Oil sands plant sites are very large industrial complexes that will require dismantling, disposal and remediation before reclamation can start – such activities have not been carried out in the Fort McMurray area to date so there is little experience to guide planning Three is a disconnect between what the regulators believe and the industry believes in terms of whether the reclamation expectations for a landform are based on the date of construction (industry) or the date reclamation is undertaken (regulators). The differences can have a material effect on reclamation planning and costs. This needs to be resolved. If the latter is correct then there needs to be a mechanism to resolve cases where the goals cannot be met (most often due to lack of suitable soil materials).
	There is virtually no publicly available information to support the "reclaimed area" in the figure, beyond self-reported numbers by companies. As such, I am not sure how "The area being reclaimed is increasing slowly as lands become available for reclamation" is supported. Although reclamation is nominally required, I am not aware of any binding requirements for achieving an acceptable rate of terrestrial reclamation, and no ramifications for operators if progressive reclamation is not achieved. Directive 074 has the potential to drive tailings reclamation performance, but only if it is enforced. Would like to see some statements around access to reclamation information. i.e., access to information on reclamation certificates is not provided. Why? Access to GOA calculation methodology on reclamation securities is not available. Why?
	4.3.10 – companies are not required to reclaim and remediate land to a state capable of supporting the same kinds of land uses as before disturbance. They are required to provide equivalent capability. 4.3.12 – There is some confusion on how far back the client will be required to meet the new approval conditions. For example, a client is required to salvage enough soil to reclaim the area with 10 cm of material. When they begin reclaiming 20 years later the requirement is to place 20 cm of material. Is the expectation that they will try their best to meet the 20 cm thickness or are they only required to meet the 10 cm depth? This is always a confusing item. 4.3.18 – the last part of this statement is a bit unclear. 4.4.20 – the use of the word "relevant" is a bit confusing. Water management and water drainage could also be considered in this statement. 4.4.21 – what makes these species listed "important"? Maybe the word important could be dropped in the first sentence and included in the second sentence. (i.e., Some of these species are important to the traditional ...)

Statement 1 – generally agree.

Statement 2 – agree with statement. However, ill-defined strength criteria without any scientific basis makes Directive 074 flawed. However, I agree with the intent of managing tailings to create a reclaimable deposit.

Statement 3 – agree

Statement 4 – disagree. My experience has been that whatever landform that is decommissioned and ready for reclamation is reclaimed.

Statement 5 – agree

Statement 6 – agree

Statement 7 – agree with statement. However, retrofitting an agricultural classification system to boreal forest has severe shortcomings.

Statement 8 – agree

Statement 9 – agree

Statement 10 – agree

Statement 11 – agree, however contaminant should be better defined.

Statement 12 – disagree, as this is not an issue. Syncrude's Gateway Hill was reclaimed under different approval requirements and received certification. To "change the rules" half way between start of reclamation and certification could force industry to delay reclamation until new approval conditions are set which is not in the best interest of industry, government or the people of Alberta.

Statement 13 – agree in general. It is unrealistic to expect a closure plan to project a landscape that "resembles a naturally occurring landscape" as it is a plan and not a detailed design.

Statement 14 – agree

Statement 15 – disagree with statement. Syncrude received certification on Gateway Hill, which was measured against some of the listed indicators. Setting targets could become too subjective (e.g., Wildlife targets adjacent to an operating plan) or too prescriptive (e.g., Landform design) such that achieving the targets maybe difficult.

Statement 16 – agree

Statement 17 – agree

Statement 18 – agree. Integrated planning is being worked on issues like closure drainage. However, there will be some challenges with sharing reclamation material as it will depend on what stages the adjacent mines are at with their operations.

Statement 19 – agree

Statement 20 – agree

	Statement 21 – agree Statement 22 – agree
	Overall I agree with these statements.
	I find myself in general agreement with statements 1 and 2 and from 6 to 22, but feel statements 3, 4 & 5 are presented out of context. These appear to have been made without consideration of the challenges faced by oil sands mining operations. *4.* ***Deferral of Reclamation:*** *Over the long term, many mine plans defer much of the reclamation towards the end of the mine life, with unreclaimed land largely comprising the most challenging areas represented by tailings impoundments and cells.* Deferral implies that there is an opportunity to complete the reclamation of these structures at an earlier time period, yet this is not the case. While this comment is true in part, it does not consider the challenges of managing the tailings stream through the life of an oil sands mining operation. Until the tailings ponds are no longer needed as part of the production cycle and then turned into a trafficable landform, there is no opportunity to complete reclamation of the surface. This results in large blocks of land being a part of the production land base, which is unavailable for reclamation. ***5. Reclamation Certification:*** *In the Athabasca Boreal region only one company has applied for reclamation certification to date.* Syncrude has been able to obtain a Reclamation Certificate for a 104 hectare parcel that was isolated from their primary operating area. While other oil sands mined lands are in a reclaimed state such that a Reclamation Certificate could be issued, roads, pipeline corridors, and operational activities continue to use adjacent lands such that these parcels cannot be segregated from the current operations. The certification process used by the government of Alberta does not allow for the issuance of a Reclamation Certificate for lands that cannot be completely withdrawn from an ongoing operation. This places a constraint to operators requesting reclamation certificates. Question: Would the Government of Alberta as well as the public agree to the issuance of reclamation certificates for fully reclaimed lands within an operation?
	3) The major mitigation referenced in oil sands mining-project applications is reclamation. The chart shows that the premise that reclamation will be able to deliver a functional and similar post-closure landscape is largely untested, particularly at a landscape scale. This is not to doubt the intentions and efforts being directed to successful reclamation, but just to point out that the regulatory regime around surface mining of oil sands in the manner being carried out in NE Alberta rests on a largely untested foundation of return to equivalent capability. 4) Obviously there is a balance between reclamation objectives and what is feasible and intelligent in terms of mine engineering design. However, while acknowledging this balance, it is true that local residents in the community of Fort McKay would like to see land returned

to a functional state as quickly as possible, to protect regional ecosystems, and the cultures that are dependent on them. It is also true that modeling conducted in support of development of CEMA SEWG's *Terrestrial Ecosystem Management Framework* (similar to modeling conducted in support of LARP) indicated the importance of rapid reclamation in contributing to status of ecological indicators in the region.

6) As noted above, there is a lack of precise definition in the EPEA clause on equivalent capability. If we are to apply this clause as a reclamation yardstick, there must be transparent and mutually understood definition of what equivalent capability is, and how to measure, assess, and document its achievement. Words like "similar" – contained in the EPEA definition – do *not* contribute to precision and certainty around this definition. It is also worth considering the larger context of application of the equivalent-capability concept – in my opinion, and I have worked almost exclusively in the field of mine reclamation since 1998, there are two alternative approaches to thinking about environmental effects of mining and mitigation through reclamation:

1. The "equivalent capability" or "good-as-new!" approach. This approach holds that we will be able to return post-mining landscapes to a state that is not identical to the pre-disturbance setting, but one that will virtually indiscernible from the pre-disturbance state, at least in its capacity to support ecological functions, goods, and services. Related concepts in approvals, such as "locally common, self-sustaining boreal forest communities" take this concept even further, suggesting that the *form* of the post-mining landscape will be similar to pre-disturbance, in addition to the *function*. Equivalent capability clauses are generally careful to not give the impression that conditions will be *restored* to a pre-disturbance state, but leave the overall impression that they will be "as good" as that state. Although sincere and well-meaning, these clauses may create unrealistic expectations in regulators, industrial operators, and stakeholders. They also support the premise of "sustainable" mining, particularly among perhaps less-informed members of the public whose land is being managed by regulators and treated by operators. This premise holds that mining is a short-term land-use, and that land will be returned to the Crown (public) in as good a state as it was lent in.
2. The "all-land-uses-have-costs" approach. This approach would hold that oil sands mining creates immense benefits (e.g., jobs, royalties, standards of living), but that land uses have corresponding costs, including ecological costs. This is generally *not* the view that is publicly espoused, or if it is, it is done with the emphasis on the short-term nature of the costs. Land reclamation activities face a number of constraints: regulatory, economic, ecological, technological, thermodynamic – it is my experience in the mine reclamation field that it is the intersection of these constraints and corresponding opportunities that actually determine reclamation outcomes, rather than "requirements" set by approvals.

So, in reality, both approaches are likely necessary: the equivalent-capability "requirement", that creates expectations/obligations and guides practice towards achievement/fulfillment of

these, and the cost/constraint/opportunity approach, which determines on-the-ground results. But, in my opinion, we should be careful not to confuse equate regulatory requirement with achieved outcome.

7) The LCCS system has served, and may continue to serve, a vital purpose in providing guidance on use of better-quality soil and mine waste materials in the reconstructed, reclaimed landscape. However, at this time and stage of oil sands development and reclamation, we require a more sophisticated tool that provides two primary things:

1. An ability to understand three-dimensional landform/landscape effects on soil properties; and
2. A demonstrated link between soil properties and plant-community response, to help guide revegetation efforts.

Such a tool would contribute to analysis of end-land use capability for a range of uses, which would be more helpful than the perhaps-outdated commercial/productive forest focus of the LCCS.

8) Discussed above in point 6. I agree that the concept discussed in this point is necessary, and provides a useful target. However, use of the term "similar to pre-disturbance", in addition to the difficulties around the lack of precision in defining 'similar', introduces problems with respect to the comparison of reclaimed sites to the previous landscapes, in that it implicitly assumes that these landscapes are relatively static. We are grappling with issues of potential climate change that are operative over the time-scale of oil sands reclamation, and thus it is not clear that, at the time of final reclamation of oil sands mines, that even the "undisturbed" landscape will be similar to the circa 2010 "pre-disturbance" landscape.

9) It is worth considering, and I do not know the answer, the extent to which wetlands play a critical functional role in the boreal forest of NE Alberta. This is a region where Potential Evaporation exceeds precipitation (unlike eastern Canadian boreal forests), which means that upland communities experience drought stress in typical summers. Organic wetlands act as water reservoirs by limiting evapotranspiration (though insulation of frozen water and evolution of dry peat barriers to evaporation) – it is possible that these reservoirs support the function of surrounding upland areas. It is possible that a lack of ability to create functional, organic wetlands in the post-closure landscape will result in fundamentally different characteristics and functions than found in the pre-disturbance landscape.

11) The idea of liability, although perhaps somewhat satisfying in a regulatory context, is challenging, for at least two reasons:

1. Most reclamation issues and outcomes of any substance are addressed and determined during the primary mining and reclamation efforts of landform construction, grading, soil capping, and revegetation. For all but the most superficial issues, it will be *extremely* difficult, perhaps impractical, to "correct" unsatisfactory outcomes. Thus, liability is a bit of an empty concept, when there is no action to correct, and thus no cost to put to that action.

2. Liability over the time frame of 15 to 25 years is likely workable, especially given the size of most corporations operating in the oil sands mining industry. Liability in perpetuity seems to be an unrealistic concept, although it probably appears sound from the vantage point of a single human lifetime. But, if I wished to sue the East India Company for damages, or seek redress for inadequate outcomes of this company's actions, would I be able to identify a liable entity in 2010?

12) I agree that this issue poses some challenges. I would say that there is a related, perhaps more important, *potential* lack of clarity around application of standards "of the day". It is not clear to me whether reclamation is to be judged by the standards in place at the date of: approval issue, landform construction, soil placement, or revegetation. Clarifying this (if indeed there is any confusion), and implementing a system of certification milestones and mutual understanding about which standards will be used to assess achievement of these milestones, and when, would be an extremely useful undertaking.

13) Definition of "natural appearance" is, again, challenging, and perhaps in some tension with construction of mining landscapes, as natural landscapes have been shaped by massive forces (ice movement, large-scale water transport, etc.) at massive scales, and further refined by 10,000 years of post-glacial evolution (e.g., through smaller-scale erosion), whereas mining landscapes are formed by persistent but relatively small forces (shovels and trucks) at smaller scales, and further shaped over months to years prior to certification. As with equivalent capability, the challenge for operators, regulators and informed stakeholders here is to steward to an objective masquerading as an approval requirement, and look for the optimum intersection of opportunities and constraints to approximate that objective.

14) I worked intimately, along with my colleagues, on this manual for approximately 4 years. Thus, I think it represents a substantial advance in thinking about one of the last stages of the reclamation process!

15) I believe that we should work towards development of targets, criteria and indicators, but do so with humility, recognizing that we will be primarily limited by our own knowledge and certainty, rather than by a reluctance to develop "hard targets".

16) I would say that this is more or less true for the majority of ecological issues around mine reclamation, not just for wetlands, but it may be true that the debate has advanced further for upland ecosystems.

17) The text of the challenge dialogue provides a number of inspirational sentences about what LUF/LARP will achieve. Until we see what the final LARP product looks like, it is very difficult to judge whether it will have any practical effect on reclamation objectives or practices. In my opinion, it is likely that LARP will take the "good-as-new"/equivalent-capability approach to mine reclamation.

18) My opinion is that regional reclamation issues should primarily be the responsibility of the long-term land manager (i.e., the government), and not be delegated to industrial operators. From what I have seen, although operators appear to be doing their utmost to satisfy objectives

	relating to "integration", planning processes are not necessarily inclusive, nor are results necessarily satisfactory in achieving regional objectives. This is at least in part attributable to two things: 1. No one knows what integration means; and 2. There are very few explicit and defined regional objectives, which is an information gap that again rests with the regulators. 20) I agree. It is not clear that organic wetlands can be successfully re-established in any form (or function) similar to the pre-disturbance landscape, on the artifact substrates and topography of the post-mining landscape (although operators are investing substantial effort and resources testing this hypothesis). Further, it is not clear whether organic wetlands can be established in today's climatic conditions, or the climatic conditions of the next century. 21) I am not a wildlife biologist, but believe that these statements are supportable. "Muskeg" is certainly a critical element of the pre-industrial landscapes that supported/supports traditional use by aboriginal peoples.
	1. Could include the Athabasca Land Use documents. 2. Directive 074 – A good start which will need continuous follow-up including enforcement. 3. The pace of reclamation needs to increase. See 4 below. 4. Deferral of reclamation has to be curtailed. Specific timelines are needed in approvals. 5. Companies need to move ahead with Reclamation Certificate applications. One RC after 40 years of operations does not present a good public image. There has been good reclamation done so why not get the recognition. 6-11. Agree. 12. The Director can amend an approval any time to include new requirements. 13-22. Agree.
	(In each of the input request boxes, where no comment is provided for a statement number, I either agree with the statement, or do not feel qualified to comment.) 2) It is a matter of increasing concern to investors that many companies appear to be indicating that they will have difficulty meeting the requirements and timelines of Directive 074, and will require exceptions to be made. 3) The increasing divergence between active and reclaimed area is a cause for concern in the context of the tendency to deferral of reclamation (Statement 4). Hence the query about the lack of reference in the Challenge Statement to preventing tailings creation. 4) From an investor perspective, there is lack of transparency about the long-term costs of reclamation in current corporate disclosure. Companies interpret the accounting and

	disclosure regulations as allowing them to discount long-term reclamation liabilities and obligations. Yet changing regulations could create a situation in which the timeframe for dealing with these issues becomes much shorter. 5) It may be useful to explain some of the reasons given by companies for not applying for certification of reclaimed areas – for example, loss of site access when the certified land reverts to the Crown. 6) The bold heading could be changed to "Equivalent Land Capability" for consistency. 12) The fact that legacy operations are not compliant with emerging regulatory requirements, and that it may not be economic for them to change the way they operate, is indeed an important challenge, and an area of uncertainty for investors. 15) i) The absence of targets, indicators and thresholds for reclamation is another area of investor uncertainty and risk. If companies are creating impacts without clarity about what the end state must be, it is impossible to assess the scale of reclamation liabilities and obligations. ii) Is there a need to distinguish the weight that should be assigned to end land uses, based on whether they are merely "desirable", or backed up by the need to comply with legislation such as endangered species habitat provisions, or to respect Aboriginal constitutional and treaty rights? 17) Alignment with the Lower Athabasca Regional Plan under the Land Use Framework is a vitally important issue for reclamation planning. Failure to address the cumulative impacts of multiple projects has created reputational risk for the entire oil sands sector. 21) It might be appropriate to add a reference here, or in separate statements, to current Aboriginal litigation citing development approvals (including those for oil sands mines) as improperly negating treaty rights to hunt, trap and fish; and to recent court decisions relating to obligations to protect habitat under endangered species legislation. Possible missing considerations in the historical section: reference to the international controversy surrounding oil sands tailings ponds, their safety and their reclamation, which is creating reputational risk for companies and the province.
	4. Deferral of reclamation is true beyond oil sands operators. Where reclamation requirement timelines are not stipulated, and where no other disincentives to "defer" exist, reclamation is often slow to proceed. 9. Wetland reclamation. I've never heard "reclamation" to infer creation on disturbed land where none existed before. Isn't that normally referred to as "construction"? 10. Reclamation requirement. From the last sentence "… a state capable of supporting the same kinds of land uses as before disturbance" is too limiting as land use has frequently changed (wetlands to forested lands; change in land characteristic which support different veg regimes; real change in land use e.g., forested to recreational; etc.). The reclamation requirement is equivalent land capability, a term which provides necessary latitude to permit a change in land use that has equivalent perceived benefit.

	12. Approvals. New standards and expectations should rely more greatly on desired outcomes rather than simply achieving (possibly outdated) criteria. 13. Reclamation Plans. "Naturally appearing post-mining landscapes" is a very subjective concept. Given the high cost of remoulding a landform, a more practical "criteria" is required. 15. Targets, Criteria, and Indicators. The lack of a "complete set of targets, criteria, and regulatory thresholds" after so many years of committee work does not reflect well on the effort expended. An evaluation of the effectiveness of such endeavours should be considered. 17. Land Use Framework. Very good concept.
	#8: No one has agreed to this implication. Although the statement makes intuitive sense, I doubt that if you put ten people in a room together, they would agree. #20: sulphur and coke are stockpiled in a retrievable manner. Yes, but are these useful in any way? Currently, I believe that they are a waste that must be managed and not a side-resource. This has very important implications. - I would add a statement about maintenance costs. With over 30 end pit lakes to be built, there will be maintenance that the province will have to take on at the point of transfer of liability. This maintenance will likely cost millions per year. It would be very interesting to estimate the cost of maintenance, which will inform your discussion on future land uses. e.g., if the province has a land use that makes money in return for the maintenance, this is much more palatable. - I would add that under the current regulatory regime, reclamation success is dictated by the mine plans, which are dictated by making money. Progressive reclamation is very difficult under the current regime. - Mining causes toxicity issues. Reclamation success depends on the careful management of toxicity related to salt and naphthenic acids. There are many unknowns related to these, specifically the chronic toxicity of NAs and how toxicity will change over time in soils and water.
	Bullet title 4.1 and 4.2 should be oil sands not oils sands #9 is confusing. It states wetlands will created where they weren't previously but then have the function of a remnant site (indicating some wetland is still present)? #13. It is difficult to make this sweeping judgment from closure plans when 3d versions are not available for comparison. Give some context here is this is really true. #17. The LUF and LARP don't say anything about reclamation. It wasn't in the terms of reference.
	4. Missing are a couple of key steps. End Land Use Plan Report and Recommendations 97? (a multi-stakeholder process adopted by Alberta Environmental Protection.

	Requirement for soil salvage in approvals initiated in 2006 hearings and implemented on subsequent mine approvals. 4.2.7 LCCS as of 2006 has been recognized as unable to correlate to forest productivity. It is still valued now used for some of its useful components. 4.1.3 The table should include a footnote that the table includes temporary reclamation. It is critical to credibility because a significant portion of the area is "temporary reclamation" such as seeding to grass in an area where the landform will change and the reclaimed area reworked or material place over it in the future. 4.1.4 More accurately, a quick review of EIAs would reveal that mines generally predict 40 to 45% of the area will be revegetated when the last oil sands is removed from the mine. This is improving with Directive 74. Total is the best at an EIA prediction of 60%. Out of necessity all mines will have to defer towards the end of mine life. Currently most mines defer most reclamation until after the end of mine operation. 4.4.20 Unlike other wetlands the objective is to move water off of the landscape without creating problems such as eroding into undesirable buried materials. Unlike most Recharging aquifers is potentially a negative outcome
	I thought that the background statements were very comprehensive. There could have been more said about tailings ponds: 1. The length of time to reclaim 2. Uncertainty about whether the water in tailings after settling will ever be at a quality to release back into the environment; this has yet to be demonstrated 3. The need to move to dry tailings technology to reduce the huge footprint of tailings ponds and the potential liability they present A couple of thoughts from an aboriginal community's perspective: 1. Critical wetland features to date cannot be recreated – bogs, fens, muskeg – this is where critical medicinal plants are collected (e.g., rat root). 2. There is skepticism that recreated lakes (either compensation lakes, or water capped tailings ponds, end pit lakes) will ever be productive and will likely never be used by aboriginal peoples for fishing 3. Reclamation is too slow, need to move all companies' closure and reclamation plans to progressive reclamation and consideration should be given to "no net loss" to reclamation – can only disturb so much and then have to reclaim before any further disturbance 4. Aboriginal groups (and other stakeholders) should be part of determining reclamation certification of a piece of land Industry should demonstrate that reclamation liability bonds are sufficient

	Yes, generally agree with the background statements and think the material is relevant.
	6. Management challenge/goal – Actions that will result in equivalency are a primary management challenge. Secondary challenges include: is how will equivalency be determined (largely using environmental and ecological determinations)? How will it be measured cost-effectively? How will it be communicated in the regulatory system and to the public?

	▪ **Input Request #3: Expectations** (Section 5) **PLEASE TO PROVIDE YOUR FEEDBACK TO THE EXPECTED OUTCOME STATEMENTS.** Consider – Are you in alignment with these expected outcomes? Are there any others you would like see accomplished? What expectations do you have for the face-to-face Workshop – as in "I would consider the Workshop a success if..."
	Agree with the objective. I think it is necessary to iterate through these – in particular need to be realistic about what end land uses would be (objective 3) when working on the first two objectives.
	Again, I think these miss the social/spiritual aspects of effective restoration. There is too much emphasis on the technical and not enough (none as far as I can see) on the social and spiritual aspects of restoration.
	This encompasses the challenges fairly well; essentially it is saying 'how do we describe the Boreal ecosystem, what are the challenges in reclaiming it, what might the end land uses realistically be, and will the stakeholders accept them? Some suggested improvements are: • Change the order of 1 and 2; viz., describe the system first then list challenges/knowledge gaps in reclamation. • There should be a *very* strong focus on the need to learn from existing reclamation re what is possible, and what will require more work, or may not be possible. The Workshop would be a success if attendees understand and largely agree on what are the key challenges to reclamation (including current knowledge gaps), how might these be overcome, what might and might not be possible, how this can be linked to achievable, sustainable final land uses, and how a process for establishing achievable reclamation criteria could be developed.
	It is impossible for me to determine whether my views are in 'alignment' with the expected outcomes given what I perceive to be such lack of clarity in overall objective.

	Nonetheless, points 1 and 2 suggest that the end land use is a functional boreal ecosystem which to most people means forest and which is what Al-Pac would want so are not points 3 and 4 trivial? By the way points 3 and 4 are the truly exciting ones and why I would attend the workshop.
	I think there may be value in segmenting the challenges into different aspects (e.g., technical, regulatory and social) would help define the biggest challenges in reclamation. The workshop would be successful if the gaps in knowledge could be defined for Statement 1.
	Am ok with the expected outcomes but deficiencies around adequate definitions of equivalent capability and the pre-disturbance landscape condition must be addressed before outcomes can be meaningfully defined. I would consider the workshop a success if some agreement could be reached on these definitions and how they impact expected outcomes.
	A re-wording of outcomes 1 and 4 that change them to read "challenges <u>and opportunities</u>" would recognize the potential opportunities related to compensation work and end land uses that frequently get overshadowed by more minor challenges. I would consider the workshop a success if we could come up with a common understanding of these stated outcomes, implying that we have educated each other about our different stakeholder perspectives. Respect for the differing values of stakeholders sometimes appears to be missing in other forums – it would be great to demonstrate it in this challenge discussion.
	Include outcomes for tailings ponds.
	Sounds good to me. If all of that is accomplished it will be a major success.
	Statement 2 – it may be included, but it is important that there be the understanding that the goal should be resilient ecosystems compatible with surrounding natural systems, regardless of the similarity of those systems to the pre-development systems. Statement 3 – the definitions of acceptable end land uses is important, but it is not the key challenge. The key challenge is to gain agreement on the acceptability of various end land uses for a specific site, knowing that the acceptable end land uses will not all be achievable on any one site (i.e., selection of one land use [that is acceptable to certain stakeholders], means other end land uses [acceptable to other stakeholders] cannot be achieved).
	These are desirable outcomes or topics that have been focused on for many years to which some answers are available. For example, identifying challenges has been ongoing for the past 30 to 40 years. I would consider the Workshop a success if there was some description/definition of what has been achieved or what is known relative to areas of reclamation practice such as soil handling, revegetation etc. and what is left to be done. A lot of groups and agencies have been doing a lot of work for many years – what do we really know for sure and what is left to be done?

	Would like to see the overall objectives discussed (i.e., under what conditions could alternative closure objectives be considered?) If we start the process to "…define the attributes by which functional boreal ecosystems and landscapes can be recognised…", there is likely little point in proceeding with "…identify[ing] and characteris[ing] potential end land uses in the reclaimed areas."
	I think that 3 and 4 should become 1 and 2. As it is now, if 1 and 2 are realized then there is no discussion required around 3 and 4 since we will have a boreal forest ecosystem just like the other millions of hectares. How about generating a discussion around alternative habitat creation, and alternative land uses aside from the boreal forest. What about commercial agriculture or forestry operations. If this area was just a bit further south, we would be clearing it, draining the muskeg, and looking for "equivalent" use that did not involve the forest at all. Let's explore this opportunity to create something rather than maintain the status quo. It is no intellectual challenge to put it back the way it was…..why not make something better.
	Statement #4: Identifying related challenges in landscape design…. The following information is copied from pg. 7 of the Fort McMurray Athabasca Oil Sands IRP, 2002 that says; "All public land in the Fort McMurray planning area is within the Green Area. The Green Area was established by Order in Council in 1948, to be managed primarily for forest production, watershed protection, recreation and other uses." So alternative end land use option within the forested context would be appropriate. Many stakeholders would be affected by a change away from the Green Area approach. The forest industry is a long term source of jobs which relies on a stable forested landbase. Traditional Use stakeholders rely on the non-timber values of the forest as does the public for similar uses.
	There needs to be an education component to this process as well. There are realities associated with each of these challenges and that needs to be shared so that the general public can be better educated and make informed decisions.
	I would say that #1 isn't so much about the challenges (as that implies it's a negative thing) but is more about the steps and work to be done to reclaim. I would add that we want to identify the success in reclamation and research to date as well.
	I do not disagree with the expected outcomes. We all have a broad sense of what they key land uses could be (i.e., traditional use, wildlife habitat, forestry, recreation etc.) on a reclaimed landscape, but more discussion needs to take place on how you know you have succeeded in reclaiming land to a particular land use.
	5-1 I thought the treatment of time frames and acceptable rates was not adequately covered. a. What are reasonable time frames in which to expect companies to reclaim damaged ecosystems to a functional basis?

	b. What repercussions will occur if they fail? 5-2 Appropriate functions can best be recognized by: a. The products they provide (water, carbon sequestration, soil structure and stability, nutrient uptake, plant community development, wildlife and habitat etc.) b. the services they provide (flood control, diversity maintenance, habitat connectivity, energy flows as in water-carried nutrients and carbon, fuel) c. Their response to altering effects (Forest pests occur normally? fire frequency typical? plant and animal diseases and population fluctuations are normal? Response to weather extremes the same as non-mined areas?) 5-3 Is future access to more resource extraction contingent on reclamation success? If it becomes clear that reclamation success cannot be achieved for less than 10% of the income derived from production (currently about 0.5% is re-invested) is it a reasonable approach to consider sacrifice zones where no further attempts are made and compensation dollars are routed to other locations where higher returns to the public become available?
	#2 & 3 – note that one can plan end land uses in a reclamation landscape and then the functional boreal ecosystems which will provide the end land use objectives. Reading the text indicates it is always the reverse process and it doesn't have to be. # 4 … change alternative to potential, so readers won't think the discussion may focus on end land uses different from those already identified as objectives of reclamation. Others … identify challenges in linking or articulating the relationships between planning, operations, monitoring, closure and certification requirements. Success – an indication of what stakeholders (including government, industry, public, etc…) consider the most important objectives for reclamation, and some insight on areas for future initiatives to focus on knowledge / technology development (e.g., C&I initiatives, footprint reductions, etc…).
	The expected outcomes are good as far as they go but I would like another dimension added to simply identifying the challenges, and that is, an assessment of how far along research and technology development are to meeting those challenges. After so many years of simply identifying reclamation (or other oil-sand related issues), I would like to know how far along we are to solving them. The obvious follow-up being continuing / starting the work necessary to solve the remaining issues. Less talk…more action.
	I am in agreement with these expected outcomes. I think they are ambitious enough on their own, and that additional expected outcomes for the dialogue may be counterproductive. I think the workshop will be a success if points of agreement and points of disagreement are well documented. I expect participants will strongly disagree with each other with respect to acceptance of alternative end land uses.

	I agree with these outcomes but at the same time I think that these outcomes are somewhat limiting by specifying that oil sands development will be reclaimed to functional boreal ecosystems. Yes I am aware that the term "boreal ecosystem" is quite open-ended but, considering reclamation challenges encountered to date, maybe we should consider just creating functioning ecosystems instead of "boreal ecosystems". I would consider the Workshop a success if: • We will be able to define what "good" reclaimed land in the oil sands are is; • We will be able to identify main biological, economic, social and regulatory challenges facing successful reclamation; • We attempt to suggest regulatory incentives and programs that would increase the effectiveness of reclamation; • We try to look at the desire landscape not only from biological point of view but as well from human use point of view considering aboriginal needs and desires (i.e., human health perspective); • We discuss financial implications of reclamation on corporations and government including discussion on how to ensure smooth cooperation between regulatory agencies with different expectations related to reclamation.
	I agree with item 8 of sec 4.2 I sort of agree with the definition for wetland reclamation but should go one step further to include all types of wetland and also reclamation should involve the whole landscapes and watersheds. I support item 15 and 16.targets should be increased for reclamation. It is very important to have wetland certification criteria. Now it is a project by project and no one is sure what should be accepted. I agree with item 17 and 18. It is wise to have an integrative planning. Together we can share a lesser footprint. Item 20. Reclamation should incorporate / accommodate post mining elements. I support item 21. Very important in terms of supporting biodiversity values.
	I am in alignment with the expected outcomes. The Macyk and Drozdowski 2008 document only outlines what the oil sands operators have accomplished or tired with respect to reclamation, I think it would be worthwhile to complete a comprehensive document which encompasses all reclamation efforts in the oil sands including research which has already identified challenges with respect to reclamation. The Technology Transfer Synthesis document is a good place to start with this type of initiative. I would consider the workshop a success if the leading reclamation experts and oil sands

	operators were all able to sit in a room and discuss reclamation challenges and realistic end land uses and identify a time line in which to conduct reclamation within.
	Yes, I agree with them. However, there is still too much to bite off in one day. These are very large topics. Also, there is a lot of work already done on these topics through CEMAs RWG. The workshop will be successful if you can get through all these topics and get some valuable ideas written down that haven't already been discussed over and over again in other venues. But, I guess the intent is to get them written down in your venue, even if they have been said elsewhere. If you have people involved in the workshop who are very knowledgeable of the issues then perhaps it will be easier not to get too bogged down into philosophical discussions and get some clear ideas/concepts down on paper.
	1. landscapes need to be defined …reclaiming oil sands developments to create landforms that can carry the desired landscape patterns and the functional ecosystems. Add a point to Determine or define what an acceptable outcome(s) of reclamation is.
	My big concern with the Expected Outcomes is that #1 presupposes that people agree with the goal of reclaiming to *functional boreal ecosystems and landscapes*. I think this needs to be tested, especially given that the key focus of the Dialogue is on identifying alternate uses. Focus of the workshop should remain on #3 and #4 I would consider the workshop a success if * we got people to agree that alternate uses would be considered * we got some suggested alternate uses that people would find useful * we got some suggestions from people on how to measure success in reaching the alternate use (or were told that these measures need to be developed)
	There is a recognition that there needs to be much for information made available to the public on all aspects of oil sands reclamation. There is recognition that we need much more specific and binding reclamation rules to drive reclamation performance. We have a frank discussion on the 40 year history of reclamation in the oil sands. Is this an issue that has received the attention it deserves? Is the current status of reclamation in the oil sands a success story, or an embarrassment? What have we done well? What mistakes have been made? Why is there only 1 reclamation certificate? Have companies accelerated reclamation as a result of public pressure? Why did it take 40 years to implement Directive 074?
	5.1 – some consideration could be made to differentiate between some of the different types of areas to be reclaimed such as tailings ponds vs. over burden dumps.

	5.2 – continuing on the comment above, there should be some consideration on what types of attributes/land uses could be expected on these different types of sites (ponds, dumps…)
	I am in alignment with the expected outcomes. I think the challenges needs to be identified such that myths are dispelled and real issues are worked to achieve a common goal. There needs to be a balance on subjectivity of reclamation attributes and being too prescriptive on achieving the attributes. End land use needs to be agreed upon with local stakeholder interests at the forefront.
	It may be worthwhile to add the issue (or challenge) of managing and containing contaminants as a separate outcome. As currently stated, the first outcome would answer "the challenges and required timelines in reclaiming to equivalent capability" as defined in Section 3 (Key challenge), but it may be useful to have a separate outcome that would relate more directly to "the challenges and required timelines in managing and containing contaminants" (again as defined in Section 3).
	The statements infer that these dialogues have not taken place through the course of the development of the oil sands. This is far from the case as there has been and continues to be a high level of interest and ongoing discussions about the amount and type of development. The *Fort McMurray – Athabasca Oil Sands Subregional Integrated Land Use Plan* was approved by Cabinet in May 1996 and amended in June 2002 was one of the initiatives designed to solicit dialogue concerning the development of the oil sands region. A revision to this plan is a current initiative by the Government of Alberta. The plan "Responsible Actions: A Plan for Alberta's Oil Sands" (http://www.treasuryboard.alberta.ca/docs/GOA_ResponsibleActions_web.pdf) outlines some of the discussions as well as approaches that are being considered concerning the development of the oil sands reserves. I would consider the workshop to be a success if there is: • A better understanding of the oil sand development constraints, • A better understanding of reclamation successes, • An understanding of the extensive amount of reclamation research that has transpired, • An understanding of the ongoing research work, and • An understanding of the level of active involvement by the oil sands industry in regional stakeholder forms. These initiatives are an integral part of the ongoing efforts by the oil sands companies to ensure the responsible development of the oil sands reserves.
	I think that the "expected outcomes" are well articulated, fascinating, and will generate excellent discussion. I think that thinking that outcome #2 can be achieved in a half-day, given the years of work that have already gone into this debate, and the current lack of

	certainty around these issues, is unrealistic, but I think that it is admirable and supportable to try to advance this discussion. I would consider the workshop a success if there were clear, and clearly documented resolutions, action items, etc. associated with each outcome. I would not consider it a success if the result was a transcript or discussion/workshop notes, with no clear path forward.
	I agree with the outcomes listed. As I indicated in Request #1 I would like to see an additional outcome to address recommendations that would implement the first outcomes through policy and/or regulation and advice to Industry. I believe this would be the driver to "make it happen".
	If the conclusion of outcome 1 is that developments cannot be reclaimed to functional boreal ecosystems and landscapes in an acceptable timeframe, or the conclusion of outcomes 3 and 4 is that no acceptable and feasible end uses for reclaimed land can be identified - what are the implications for further development of the oil sands?
	1. "Identify challenges". I'm not really aligned with this outcome for the reason that these have been discussed for several years, and are generally already known. Does it need to be repeated? 2. "Define attributes". Similar to comment above. 3. ok 4. ok I would consider the workshop a success if we did not re-hash discussions of the past; and if timelines to meet agreed upon outcomes were proposed with input from the broader stakeholder community.
	These are worthwhile outcomes. #4 – the expression "alternative end land uses" pops up but I'm not sure where this comes from. #3 says identify potential end land uses. What does "alternative" mean? To me, it implies that other than functional boreal ecosystems. - It may be useful to use a values system to get at the bottom of potential end land uses. By assigning values to all potential end land uses, it may make decisions easier. Consider adding this as #5.
	#2 resonates with me. What metrics can we use to quantify whether the proposed future landscapes are acceptable, particularly when assessing/reviewing closure plans.
	In support 2 refer to objectives. Suggest 1and 2 look at objectives and outcomes Suggest the workshop examine priorities for objectives/outcomes. Are some things must haves? Public safety, commitments for traditional uses etc.

	This provides a context for interpretation of the results.
	1. …to functional boreal ecosystems and landscapes that resemble pre-disturbance features and where this is not possible to land uses that are desirable and acceptable to future end land users. 2. Agree 3. NEW: Define the values of end land users that comprise a functional and healthy ecosystem (for example, water may meet water quality objectives but not be perceived to be of a quality to drink untreated; a man-made lake can be viable (functioning) for fish habitation but key consumption species may not be present; certain traditionally used berries may not be present in a functioning reclaimed landscape; animal movement corridors may be relocated or not present). 4. NEW: Identify targets, indicators and timelines for successful reclamation that would be reportable to stakeholders. I would consider the workshop a success if: 1. There is good representation from all stakeholder groups (government, industry, aboriginal groups, environmental groups) that are well informed that are willing to work on tough issues even if that means putting their organization's position to the side 2. We clearly define how the outcomes will come into effect
	1-3. Agree. Suggest change to #4. Identify related challenges in achieving the potential end land uses identified in #3. Note – Landscape <u>design</u> per se isn't the issue, rather how do we make it happen. I would also like to add: 5. <u>Identify potential solutions</u> to address the challenges identified in #4. Not enough to identify the challenges, we should also explore and identify some potential solutions.

■ **Input Request #4: Assumptions** (Section 6) **PLEASE PROVIDE YOUR FEEDBACK TO THE ASSUMPTION STATEMENTS.** Consider — Are you in alignment with these Assumptions? If not, which ones do you disagree with and why? What other key Assumptions need to be added that are missing? Please refer to the assumption number in your response so we know which one you are referring to.
On 2. The upgraders will be operating long after the mines are done – in-situ production will then feed upgraders and we might well have petrochemical complexes around the upgraders.

	Also processing plants occupy much smaller areas than mines and ponds. So, less need to focus on the upgraders On 12, is it true that there are "numerous regulatory agencies with different expectations"? On 13, need to address naphthenic acids but there are and will be other problematic contaminants e.g., in recent years biological activity has been surprising. There is a lot on land reclamation but not much on water. There are major aquifers in the mining area that will be contaminated. There is also water movement and need to consider movement of contaminants in water throughout the mining area.
	Effective sustainable reclamation is not possible without restoration. You need to rebuild the ecological processes that sustain the ecological foundations upon which human (and other biota) uses of the landscape are based. Landform restoration should re-build naturally shaped landforms. This should be followed by re-establishing soil and substrate conditions that will support patterns of revegetation that are congruent with those in the surrounding undisturbed areas. Solutions to the fluid tailings problem need to be developed so that effective restoration of these areas can be achieved. Successional processes have been restoring disturbed sites in the oil sands area since glaciation. Models of successional trajectories need to be developed so that they can be mimicked on the reclamation sites.
	See comments below. There are many good points raised in this section; I agree with those I have not commented on. 6.1.1 The use of the terms reclamation and restoration may not totally reflect what is possible in the oil sands industry. Reclamation as defined here has a strong human use focus, however in reality it can include significant native ecosystem and biodiversity values. Restoration implies that something has been 'restored' – again, not necessarily correct (depending on what level of detail you are measuring). Whist both may be relevant to some extent, reality for much of the impacted areas will probably be somewhere in between. It is probably worth checking the literature (e.g., ICMM and others) for the accepted definitions of Reclamation, Rehabilitation and Restoration so that everyone is clear about which of these are relevant in which instances. 6.1.3 I agree that all of these aspects are very important for planning and management; but please note that learning comes from the 'ecology' and 'engineering' components, provided effective monitoring and research programs are implemented. 6.2.4 See comment 6.1.1. above. Check and understand the definitions. Don't see them as 100% separate – they do overlap, e.g. for some species and elements of the biophysical systems. Also, it might be a good idea to not get too hung up on definitions when outcomes are the important thing. Use definitions for general guidance.

	6.2.5 Some older forest reclamation conducted using somewhat outdated methods (e.g., at Suncor) is actually very good, and it is reasonable to expect that reclamation established using more current methods will perform better – perhaps much better – than this. If the industry uses accepted world leading practice, including a commitment to continuous improvement, very good outcomes should be possible. It is important to regulate *processes* that will deliver good outcomes. Regulation aimed at very specific outcomes, as is often the case in the US, can be fraught with difficulty and stifles creativity in situations where the industry is still learning. The best rehabilitation outcomes in Australia and many countries in South-East Asia are achieved by companies that are committed to exceeding regulatory requirements, and are very transparent in relation to public awareness of what they can and can't achieve. Regulation should mainly be used to ensure minimum standards from those companies less willing to lead by example! 6.2.8 Uncertainty – a more general comment - I agree long-term liabilities are an issue here and elsewhere. One approach to signoff of legal responsibilities is to use a risk-based approach to understand risks, determine costs of addressing all 'what if' scenarios, and require that the mining company establishes a trust fund so that resources are available for ongoing management or repair, as required. Under a scenario such as this, regulators and stakeholders may feel comfortable alleviating the company of ongoing responsibilities. However, this should not be an excuse for not doing its absolute best to ensure that no management problems or historic legacies are left. 6.2.9 See my comments in Section 4 re progressive rehabilitation/reclamation; specific timelines are difficult but progressive rehabilitation should be strongly encouraged, even insisted upon, where possible. Incentives can include bond return for reclaimed areas, if such a system exists or can be developed. 6.2.10 This is an important research question (presumably pertaining to forests). In Australia, species that are present in the first 3-5 years following establishment remain for a very long time; therefore it is very important to get the composition 'right' at the start. In North America successional processes are more likely to follow classic successional models. I would be surprised if healthy growing plants *didn't* produce seeds and second generation plants, and those will obviously only establish if conditions are suitable. Various successional models have been used in Australia to examine long-term development of ecosystems following mine rehabilitation. 6.2.12 I am not familiar with all the specific details however this is a very important point. Sharing of information and clear definition of institutional roles, co-operation between Industries is critical. CEMA, the RWG's etc. are some of the best examples of co-operation I have seen and should be used and built upon to ensure effective interaction between industry, government, academia and the public. 6.2.13-15 Are all important and were addressed in the recent review of the 2007 Wetland Reclamation Guidelines.

	6.3.18 As someone with 30 years experience in native ecosystem mine reclamation/rehabilitation/restoration, I would say, as a counter 'over generalization', that whilst the reclamation examples I am aware of are very good and probably sustainable, this statement seems a little over-optimistic! Given current emphasis on transparency (hopefully on all sides!) industry will need to be careful not to 'oversell' rehabilitation outcomes. 6.4.22 Take care with public access; it should happen – and be appropriately regulated – when the reclaimed or restored ecosystems are able to handle it without affecting ecosystem sustainability. Unrestricted 4WD access, overfishing etc. can have significant impacts on established ecosystems. 6.4.24 Absolutely. For this reason it is essential that companies accounting systems have provisioning for this. Shareholders will not want to be left with an uncosted liability! See earlier comments on progressive reclamation. 6.4.26 Largely correct but regulation should be a minimum requirement. Expectations, and companies' willingness to achieve them, should be higher than this. 6.5.28 I am not sufficiently familiar with the system to comment but from my limited understanding I believe there is room for further development in regulations and guidelines in relation to reclamation certification. 6.5.29 In some regards this may well be correct but I would be surprised if it were true in all instances; regulators and industry should take care not to be too 'smug' about past achievements, given that the oil sands industry is still relatively young. True world leaders recognize that lessons can often be learnt from elsewhere, e.g., ICMM Good Practice Guidance, Australia's Leading Practice Sustainable Development Handbook series (e.g. on Monitoring, Biodiversity, Mine Closure..) etc. 6.5.31 Depends how you define 'natural'! 6.5.32 Absolutely, this is a critical point. Successful reclamation is a life-of-mine process. 6.5.33 Agree – think more broadly at the various scales when planning reclamation.
	This section is poorly written and confusing. My points are far too numerous to even begin commenting. Really disappointing to read this section as it is such a vital section in the document.
	Are there additional assumptions required that relate to the balance between economic viability for Alberta and the goals of reclamation?
	For the most part, I agree with all assumptions, with the exception of: 1. Reclamation vs. restoration: the debate around the definitions of these terms and their relation to one another has a long history and it is unlikely that this issue will be resolved at the workshop to the satisfaction of all participants. Key issues are: (a) To what extent is restoration a condition for successful reclamation. How, for example, can the land surface be

	returned to some form of beneficial use if there is no ecological integrity? (b) The concept of a beneficial use to humans begs the question of which humans? The local First Nations, the people of Fort McMurray, or the public at large? These issues also relate to Assumption 4. 23. Some end uses will require that there is a "developer" and a development proposal. Such lands may require continuing active management. This is not an acceptable outcome in my opinion. The crown should not assume liability unless reclaimed systems are self-sustaining and not releasing contaminants into the environment. 30. Alberta is accountable to current and future generations of Albertans in all matters related to reclamation. Alberta is accountable to **all** Canadians and indeed all citizens of the world. Contaminants can be transported by air, water, and migratory species to very distant places. Furthermore, they can bio-accumulate to unacceptable concentrations. Release of CO_2 from mining activities affects everyone. This relates to Assumption 33.
	Assumption #1 – this is a frustratingly repeated misunderstanding of the definition and goals of "restoration". Looking at the definition of restoration from the Society for Ecological Restoration Primer (available at http://www.ser.org/content/ecological_restoration_primer.asp): *"Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed."* It is clear that this does not differ substantially from the goals of reclamation in the boreal forest oil sands region. If you then go further into the attributes of restored ecosystems, they are almost identical to the attributes described in reclamation principles and guidelines in the oil sands. Why would we perpetuate this misunderstanding when it is evident that information about restoration would actually assist what we are trying to achieve in reclamation activities? Also – why is the definition of reclamation human-centric? This removes a set of end land uses particular to wildlife habitat and other ecosystem services that have little to do with human use. Assumption #6 – not all regulators agree on this as a "foremost priority" e.g., ERCB whose priority is access to and extraction of oil sands ore. Mine planning has to work within often competing priorities. Assumption # 9 – EPEA approvals are only one aspect of regulatory control – this statement is naïve about the range of documents e.g., ERCB mine plans, C&R plans, EIAs that work in concert with the EPEA approval to regulate reclamation activities. Assumption #10 – Even "failed" reclamation sites demonstrate successional processes – in this case to pioneer or early states that are not considered desirable. Successional processes

	are evident in the boreal forest on a constant basis – the key issue is aligning successional processes with desired end land uses. Assumption #13 – Agreed, and closure drainage and water quality plans consider this. There is a commitment to ongoing research, monitoring and management in every EIA and approval. Assumption #26 – what gets regulated gets done, but sometimes the regulation misses important issues that turn out to be more appropriate for the goals of reclamation, and get changed over time. The quality of the regulation matters a great deal – results-based, or prescriptive? Adaptive or rigid standards? If it is regulated rigidly to certain prescriptions, then the good and bad outcomes of that have to be lived with, and room for innovation and best management evolution is lost.
	1and 4. The government of Alberta uses a different definition for reclamation: It implies the re-establishment of natural ecosystems. 2. Access roads, even with the involvement of the best engineers in the country, will often affect water flow when present in wetlands. This causes a change in water levels of a few cm on both side of the road, and is enough to affect ecosystems drastically by killing plants on one side of the road, and encouraging the establishment of new ones on the other side. By reclaiming roads, we will re-disturb again the environment. Is there a better way to deal with this? Should access roads be a totally different reclamation scope? 10. Very true. We probably rely too heavily on models, especially when dealing with climate change, and the length of time for a forest ecosystem to reach the desired successional stage. 13. Is naphthenic acid really a problem? I thought it degraded rapidly, and could be addressed by phytoremediation. 18. Healthy is hard to define 19. Reclamation liabilities will have to be passed on to future generations. 25, 26, 32. We should follow the example of the forest industry in the early 90s. $$ are kept aside right at the start to take care of liabilities, as part of the "reforestation/reclamation bank account"
	Item #1. My old definitions of reclamation versus restoration are a little different than what's stated here. We were always taught that restoration was returning what was there before development. I'm not sure where this definition "ecological principles to promote the recovery of ecological integrity" comes from. Item #10. I think the problem with successional models is that all reclamation to date is based on the premise that we can put down a starter community in year 1 after reclamation and it will eventually grow into a suitable community down the road. I wonder how practical this is for forested communities when the soil has been totally changed from the initial soil. We may have to open our minds to the need for "maintenance reclamation" at a later date.

	Item #21. I don't like the term "buried". The key is that contaminants (either natural like salinity or man-made like naphthenic acids) must be left in a state that they do not compromise sustainable, functioning ecosystems developing. Item #23. Any end land use that requires continuing active management will also need to be a sustainable end land use without that management just in case the management doesn't occur.
	Statement 1 – I believe that ecological sustainability is more important than achieving specific human use benefits. Statement 6.2, 5 – The information before the public is what is delivered by regulators and ENGOs. If they are misinformed, then that can be corrected by proper communication. Statement 6.2, 7 – I disagree that there are an alarming range of challenges. Reclamation of all open pit mining areas provides challenges, most of which were well known before the first oil sands mine was developed. The specifics of chemicals and reclamation in boreal forests have been clarified by developers. The challenges continue, but I do not believe they are alarming. Statement 6.2, 8 – This statement may have been valid a year ago, but it is not valid any longer. Even though the changes in tailings management are new, what is apparent is that the operators and other interested bodies will ensure that there is a viable solution. Therefore, the regulators and public can be confident that reclamation will be successful. Statement 6.2, 9 – I disagree that so-called "binding targets" are required. There are valid operating approvals and there is methodical review and scrutiny of compliance with approvals. Expectations for reclamation, for resolution of uncertainties and for progress on issue resolution are high – both within the regulatory world, stakeholder world and the developers world. Statement 6.2, 10 – I disagree with the "certainty" of the statement. Conceptual reclamation plans are based on a plant succession model; however, the focus of current reclamation area monitoring programs, as well as research programs is to identify the actual results from the area. Every Closure, Conservation and Reclamation Plan includes the statement that the results from monitoring and research will be used to adapt reclamation programs, as required. Once further information is available, the conceptual plans will evolve, including a modified plant succession model for the oil sands reclamation areas. Statement 6.2, 14 – the success of pit lakes should not be a huge focus. Pit lakes have been established in a variety of applications throughout the world, and the success of those lakes (i.e., what they can develop into in an ecological sense) is not much of an issue. The unknowns are exactly what the ecological outcomes of the oil sands pit lakes will be. The lakes have a variety of functions in terms of water management, water treatment, ecological interconnections and ecological outcomes. While some of these are yet to be defined, others are not.

	Statement 6.2, 15 – I do not see this as a big issue. If peatlands cannot be developed on oil sands mine reclamation areas, other wetlands will be, and those wetlands have very valuable ecological outcomes. While I agree that research on the potential for developing reclaimed wetlands is valid; developing a reclamation and closure plan that requires development of a component that likely has a low probability for ecological resilience is not a good path forward. Statement 6.2, 16 – The costs of reclamation are the business of the developers; and the assurance that those costs are correct and that the required liability bonds are adequate is the job of the regulators. We do not need stakeholders directly involved – we must learn to trust those we have empowered with certain duties. Statement 6.4, 21 – It is important to remember that almost all of the contaminants are natural, from the deposit, not introduced into the process. The oil sands area is naturally capable of dealing with the contaminants at some level of concentration. Statement 6.4, 22 – It is more important to allow reclaimed areas adequate time to stabilize and begin maturing than to immediately allow access. For some systems, such as fish habitat areas, the development of the system may mean that access for a decade or longer would be required to allow maturing of the system, as well as detailed monitoring to ensure the systems is developing as planned. Statement 6.4, 25 – The definition of productive use is important – this must not just be focuses on human use; ecological productivity is more important. Statement 6.5, 29 – Alberta is a world leader in **oil sands** reclamation research and innovation. Statement 6.5, 31 – I have an issue with the use of the phrase "natural state". To a state of ecological resilience makes more sense. The concept that reclamation will make it like it was is unlikely to be achievable.
	Overall the assumptions reflect a higher level of pessimism than I feel is the situation related to reclamation in the Oil Sands. 4 – There is a clear difference between reclamation and restoration and the history of reclamation practice in Alberta for all industries is that it is reclamation not restoration that is being done. 5 – Don't agree. Public expectations are based largely on what they see/hear in the media. I feel that current regulations DO require the return of areas to a reasonable level of pre-disturbance character. 6 – After 40 years of reclamation practice in this province I think there is a reasonable level of agreement on what reclamation actually means. 7 – Regulation challenges – Don't think the situation is as bad as this statement describes it.

	10 – Successional models – Disagree that there is little evidence of natural plant succession in current oil sands reclamation.
	Agree with the definition of the terms **6.2 5** Public expectations are framed by the discussions in the media. Corporations are forced to deal with the economic considerations, while the general public discussions do not take into account costs. The public expectations may be different if the questions include economic impacts on the province, jobs, and the economic system in general. Properly phrasing the question is important. **6.2.7** Agreed **6.2.8** Do not agree with this – the technologies exist, it is the implementation and timeline requirements that are not yet in place. Firm, reasonable expectations from regulators will result in the elimination of these concerns; however this will take time as major systems take several years to develop. A focus on supporting the process at the right stage (i.e. commercial technology development as opposed to base research) is the critical component needed to meet the medium and long range objectives. **6.2.15** Why the focus on "peat-forming"? These cannot be proven within a reasonable timeframe, but may develop over the long term regardless of the initial reclamation efforts. Full restoration to systems within a short time period that took millennia to develop naturally should not be imposed. **6.3.17** This is an easy statement to make, but governments will need to develop legal frameworks which reduce the risk of increased liability when the effects of reclamation efforts cross legal boundaries
	I think we could take exception to 28 and 29 points under 6.5. The UofA and the province have made a big deal about the participation of the Helmholtz institute in oil sands development and reclamation. I believe that this is the first time they have made such an effort in other than a third world country. If that is true, then who in their right mind would assume we are leaders of anything.
	Statement 1: Neither statement is consistent with regulatory requirements; in fact the requirements are a blend of each. The blended requirements are needed because of requirements of the act to meet equivalent capability suitable for preexisting land use capabilities incorporate a bit of reclamation and restoration: landform design plus soil and vegetation. Treaty 8 requirements would not be met with the statement definition of reclamation. If the development lands had been farmland it would be much easier. Statement 2: Anything disturbed to serve a commercial or industrial development is a responsibility of the operator. Statement 3: Feasibility is the accumulated cost of development and reclamation measured against the profits generated by the investment.

Statement 5: Mine reclamation requirements are specified in regulatory approvals. Mine reclamation is heavily influenced by landform design upon which soil and vegetation is placed.

Statement 7: The Alberta public sentiment has taken a critical perspective of oil sand mine development progress and regulatory agencies are listening to the public. Deficiencies of environmental performance have been commented on in the international media on a regular basis as well, so it's not just that some people are overly critical.

Statement 8: There is uncertainty regarding tailings management. The oil sands industry insisted that CT would work. Industry has worked on the CT technology for approximately 15 years that has resulted in marginal performance so far however given sufficient effort it may be successful. The public sees process affected water and tailings covered lakes to be a toxic liability that is not appropriate.

Statement 9: There are no deadlines for closure requirements to be met.

An appropriate mine development plan should have dates when each area of the mine development will become available for reclamation, when it will be certified for reclamation and when that land would be returned to the province.

Directive 74 helps to move the landscape towards reclamation as each DDA will have dates established for completion, and a life expectancy established for each pond.

Statement 10: Regardless of which ecosystem succession model is considered the vegetation established would evolve based on its own physiology, environmental conditions and disturbance vectors. The level of vegetation diversity would be low, long into the future, due to the slow rate of species dispersal and the absence of species survival in soil stockpiles; however diversity could be improved significantly through the salvage of live forest floor with immediate placement to prepared reclamation areas. Successful use of LFH on a widespread basis would be required if improved results are desired for biodiversity, wildlife habitat and traditional land use capability. Other cost effective options for vegetation establishment of important species could involve planting propagated species from seed sifted from topsoil or wildland forest collections and rooted cuttings.

Statement 11: Interacting with statement 10 is the concept of ingress. Far too much of an expectation exists in the industry that ingress will being new and desirable species to reclaimed areas. A few native species will ingress depending on the proximity to the native forest, however most species move at a glacial pace and meaningful results will not be visible for this generation or the next. Leaving stands of mature aspen at the edge of development areas would provide an opportunity for aspen seed to ingress into reclaimed areas.

Statement 12: The intent of the statement is not clear and there is insufficient detail to determine what the problem is. Where one regulator establishes a barrier it may be because there is a need and for another agency to not recognize and address the problem may be inappropriate. The exercise needs to state the problems and for the regulators to work out the

solutions.

Statement 13: Naphthenic acids are one of the groups of chemicals within the process affected waters that have the potential for long term toxicity if it is not removed. Water quality standards need to be established to limit the type and amount of Naphthenic acids permitted in release waters, closure water bodies, and streams. Does any other jurisdiction have release water standards for naphthenic acids? There should be maximum timelines established for process affected water constituents to reach acceptable water quality guidelines so that public lands are not tied up for centuries while natural degradation is used as the treatment strategy.

Statement 14: End pit lakes need to be defined. Operators have proposed water covered tailings proposed as lakes, pit lakes without tailings but with process affected water, and pit lakes with clean water. Research on water covered tailings and pit lakes with process affected water has been proposed however the research required to prove that they would be suitable environmental assets has not been conducted, and what research has been conducted would indicate that they may present long term environmental liabilities that continue to contribute toxins to the receiving waters long past the closure date.

The best approach would be to establish the acceptable process affected water quality release criteria to natural receiving waters, water covered tailings proposed as lakes, pit lakes without tailings but with process affected water, pit lakes with clean water, and any water entering the environment.

Statement 16: The people of Alberta should be aware of the environmental security systems that exists for each oil sand mine. Alberta needs to determine abandonment requirements so that industry can plan steward to the requirements for abandonment.

How the existing liability for contamination is addressed for each mine and plant site? Relevant policies should be a transparent process open to viewing by the people of Alberta. The people of Alberta should be aware of how the performance bond, or equivalent, is determined and what is held by Alberta now, for each mine. This information should be posted to the GOA portal so that people have access to it.

Statements 19 & 20 are critical to the people of Alberta.

Statement 23: The reclamation strategy should be to establish an appropriate sustainable closure landscape of landforms, watershed and watercourses with ecosystems. Once the site is certified reclaimed it should be quickly returned to Alberta to manage. If a next land use is applied for and deemed appropriate then the GOA will determine an appropriate lease and operating conditions.

Statements 24, 25, 26: This is correct.

Statement 27: My comment for Statement 23 is relevant here and it is true that mine reclamation requires a specific design for many components, and some components are more expensive than others to implement. It costs much less to implement key structural landform,

	soil and vegetation attributes the first time rather than have to go back and retrofit. Statements 28, 30, 31, 32: I agree with each of these statements. Statement 33: End land use capabilities are local and regional opportunities made up of a spatially diverse mix of land resources. Having more of one opportunity on a reclaimed mine site as compared to another would be acceptable depending on the starting point. The suitability of a closed mine site for multiple land uses will be dependent on the predevelopment resources of soil, the amount and area of chemically challenging materials left on or near surface that affect the soil and the landform designs that promote sustainable and functional landforms. The quality of a closure landscape is dependent on the operator's diligence to use the resources available and to address the environmental liabilities encountered during mine development and closure. Integration with neighboring mines is a responsibility of every mine, even if they are the first to develop, and there are difficulties with temporal alignment such coordination should be required.
	1. It's not that cut & dry; reclamation needs to return ecological integrity and be sustainable. It is not just doing what we can; it considers ecosystem function 3. Agreed, there are some realities not recognized in "pipe dreams" 4. Yes 5. Public doesn't know what to expect and I don't think all agree that current state has under delivered. 6. Must be balanced with resource recovery 10. Disagree – for the most part vegetation plans target apex communities 11. Agreed 12. Yes 13. Yes, but perhaps include other substances as well 14. EPL's are successful in other industries and a lot is known; oil sands specific materials are the unique "unknowns" here. Need to educate people on this. EPL are ok. 15. Research is underway however – not just ignoring this – lots of activity 22. Must consider public safety from operations perspective as well. 23. Not currently but certainly possible – examples already in province.

	1. Disagree. Reclamation has yet to be defined by the Province as being something other than equivalency. 5. Public expectations are much higher than what can be expected of any mining operation in terms of timing. 8. That may be true but what is missing is any contextual framework about other liabilities the public carries. Sometimes that liability is by design or unforeseen and I am curious why this feels like OS reclamation has to be singled out. 9. I disagree. There is ample evidence to assume that natural succession will occur. 18. Do they need to resemble native ecosystems? Many areas will be unhappy if roads are reclaimed and can't be used for SUVs etc. What other end uses make more sense? 19. The timing factor makes it mandatory that the liability will be passed on to future generations. The question is how the benefits do also? 22. Why? 28. I disagree with this. The procedures are onerous and not effective in incenting plants to reclaim. 31. Why is the First Nations the only stakeholders' expectations that this whole section mentions? 33. I disagree. Why make this more complex than it needs to be. The objective is simple and should be kept so.
	I am in alignment with the assumption statement, with the exception of: **Definitions of reclamation and restoration.** Reclamation is much more than the return of land to some form that is beneficial to use to humans. The definition of reclamation needs to be inclusive of the establishment of an ecosystem function that is different than what existed prior to disturbance. For example, reclaiming a wetland in an area that was upland prior to disturbance. Restoration is where you return/restore the "same" ecological functions that existed prior to disturbance (e.g., a graminoid fen wetland restored to a graminoid fen wetland). **Public Expectations** – It is important that the public realizes that the reclaimed areas will look different than what existed prior to disturbance, because the reclaimed sites are on an early successional trajectory. The public also need to recognize that even in a natural boreal forest there are disturbances such as fire, that cause the forest to not always look the same. As a result of this constant change the site will look different from year to year, which makes it a little bit more difficult to define success parameters and measure progress. **Regulation Challenges** - The state of current policies and practices is not as grave as the 6.2.7 The work being done by CEMA, CONRAD, AENV, ERCB and ASRD to address the uncertainties needs to be recognized by OSRIN.

	6.5.31 "Mined land needs to be reclaimed to a natural state to get the reclamation plan approved and meet First Nations expectations." Although First Nations expectations are extremely important in the mine reclamation, this statement should incorporate the word "stakeholder" as there are groups other than First Nations that will need to have their expectations met?
	6.2-5 The public wants accountability and this is very expensive for companies operating in an environment of high uncertainty (oil prices, poor understanding of long term reclamation success, medical threats of chemicals, government changes, First Nations claims). There is a long history of mining companies cutting and running in the north, leaving the public responsible for final cleanup of mine wastes, in fact, this is almost the norm. The public could demand sufficiently large bonds (held or insured) to prevent this. They could also make mining incremental to only allow progressive mining as reclamation targets are reached. Mine operators could take a tip from other large companies and put 10% to 12% of profits into R&D on reclamation when oil prices are high to prevent the oncoming train wreck of environmental accountability. A careful analysis of the history of the presentations and intentions of oil sands reclamation is illuminating. Presentations from 1996 show glowingly optimistic reclamation plans of "virtual mine sites" that were very hopeful. They succeeded in mollifying opponents and regulators alike before they faded away, some say, their goal achieved. The public will have a hard time not being cynical as very small (relatively) things like dead ducks make the news but when a major event occurs, as is likely at some point, regulations could change very fast under a moratorium vote. This is the policy catastrophe that companies need to be working to prevent right now. 6.2-15 There is some progress in peat forming wetlands but it is very slow at this latitude and may not be appropriate given climate alterations. We may see these systems as relictual and not relevant in future decades so the target may not be good. 6.2-16 The honesty of this statement is appreciated. Transparency is indeed missing. If these bonds are to remain silenced, the public deserves to know why. Last calculations made public suggested less than 10% of the reclamation costs were bonded. 6.3-19 Too late. We have now been mining oil sands for one full generation (figuring 30 year work career in the oil sands). There are a few cases of grandchildren working alongside their grandfathers in Fort McMurray. The next generation has already inherited reclamation liabilities. 6.3-25 Beware of the "getting it right" statement. That is a cop-out statement for buying time in the GOA and is a favorite rhetorical catch phrase of politicians these days. It is a way to avoid timely accountability. It means that one can never fail because sub-par results are simply on the road to "getting it right" when in truth, they might just be old time failures. 6.4-21 Buried is often good but just because something is out of sight doesn't mean it is

	harmless. Mobilized salts, naphthenates, metals, sulphur and gases can still emerge. They are not as stable as bitumen under 75 m of overburden. 6.4-24 - Amen. This is a critical policy goal.
	6.1 – I think there are many misconceptions regarding the definition(s) for restoration and reclamation and even within the same community it may be difficult to find resolution. To avoid the confusion, perhaps we need to define for ourselves and then proceed to more important matters. 6.2.5 – I don't know that we really know what the public expects. Or perhaps this is the same public which feels outrage when fires occur in our national parks 'sterilizing' the protected landscape. We need to elevate the underlying knowledge of these discussions before we can have articulate discussions in setting desirable and achievable outcomes for reclaimed areas following industrial development. 6.2.6 – Recovery of landscapes after mining should be the foremost priority in reclamation planning (not in 'mine planning'). Mine planning needs to be well linked to reclamation planning and have capacity to explore alternative scenarios to development not only to understand implications to mine development but implications to final landform and landscape function. 6.2.7 – There is agreement that there are many challenges for which the immediate solution(s) are not currently available or for which there is no immediate answer. These need to be identified and there must be programs in place to respond to the challenges (e.g., tailings closure and reclamation, water remediation, establishment of diverse ecosystems). 6.2.8 – There is less certainty than implied, however, some technologies which are demonstrated and available may have other impacts which preclude their use (centrifuges or farming MFT in thin lifts outside of final landform placement position <cost and GHG emissions>). 6.2.9 – EPEA approvals are not the place to put binding reclamation timelines. More formal reference to approved cumulative disturbance and reclamation schedules could be in approved plans. However, they should retain capacity for flexibility as mine development rarely proceeds as planned beyond short-term horizons. This is true for mine development worldwide. 6.2.10 – The writer of this statement tends to believe that relay floristics is the dominant successional model in the boreal forest. However, there may be more evidence that initial floristic or tolerance models of succession are more common in natural boreal ecosystems. The current reviewer would suggest that approximations of primary succession such as that found during reclamation are more likely to 'over time' have assemblages of species which are naturally replaced with new species and associations. 6.2.12 – While there has been effort to align expectations and objectives of regulatory agencies, it must be recognized that government doesn't represent the only institutional

	barrier. Silos exist within companies among different groups (mining, long range planning, operations, tailings, etc…) and these groups also need to work together. 6.2.13 – In the long term, depending on water management issues and the potential for water treatment technologies being adopted, accumulated salts may present a greater challenge to reclamation depending on landform design and groundwater management considerations. 6.2.15 – the statement would be clearer if it stated, "areas directly within the footprint of surface mines leave no remnants of wetlands" and "there is currently no demonstrated success in reclaiming peat-forming wetlands following open-pit mining".
	Assumption 8. I disagree. Technologies exist to create a solid surface and if one throws enough money at it you can reclaim (but maybe not restore). Assumption 10. Have there been no successful reclamations worldwide? i.e., even though it has not yet been done in the oil sands are there examples from other areas that one could extrapolate from? Assumption 13. I disagree with the emphasis on NAs. NAs are important, but they also degrade over time and there are other soluble components in the water that are of concern. Assumption 21. I disagree. Burying something does NOT make it disappear. Assumption 22: Disagree: time for reclamation must be driven by reclamation needs, not demands for public access. Therefore, I agree with assumption 25. I cannot comment on statements 28 and 29 as I don't have enough to compare to … but they seem somewhat over stated.
	Generally in alignment with these assumptions. A few points to consider further… 6.1.1. I have trouble reconciling the idea that reclamation does not need to consider ecological integrity. Especially given that reclaiming to equivalent land capability means land uses that are "similar to the ability that existed prior to an activity being conducted on the land". If reclaimed land only needs to be of "some" form that is useful to humans, how do we decide which humans they should most support? 6.2.15. Additional info to consider … While operators do not leave remnants of wetlands to recover, opportunistic marshes (not peatlands) often initiate on oil sands leases and are naturally colonized by some native wetland species (marsh and a few fen species). 6.3.19. It would be nice to make the assumption that reclamation liabilities will not be passed to future generations, but this has already happened. Some yet to be reclaimed sites are older than 40 years. Some personnel trying to reclaim these sites are under 40 years old. The life cycle of a mine is a generation or more. 6.5.28. Alberta does not have effective reclamation regulation and certification procedures. Only one landform has been certified as reclaimed after 40+ years of operations. The ratio of disturbed to reclaimed land also suggests we do not currently have effective reclamation regulation.

	I would add one thing to consider – changes of landscape characteristics from the present lowland boreal to upland boreal and completely lack of peat wetlands as the main change in the reclaimed landscape and implications to the land use and ecosystem function from this change. The assumption number 18 is an empty one as it is already apparent from the present snail tempo of reclamation that these liabilities accrued few decades ago are still not being reclaimed, and the expectation is that it will take much more years to reclaim this land.
	#1. I agree with the definition. In fact when we should target more towards restoration than just reclaimed. #2. I agreed that companies should also reclaim all access routes and associated facilities. #3. Feasibility should also include a social responsibility. #4. We should make it clear that we are operating in the green zone and practitioners should use the term restoration more often than reclamation. Reclamation by itself does not mean much. Restoration is a science and an art, making it more challenging. Reclamation is the easy way out. #5. Not only Albertans, but the world is watching. We have an opportunity to show the world that we are leaders and we can take care of our environment and clean the oil sands image. This may lead to future economic opportunity, once we get our act together. #5, 7. Agree # 8. We should work harder, more forward rather than each of us guarding our turf. This approach does exist within the now OSRIN and get to be cleaned up. Similar we should all work together rather than safe-guarding out personal interest. An African proverb says "if you want to go fast, walk alone and if you want to go further, then let's walk together" Hope the message is clear. #9. Timeline. In approximately 12 to 20 years, the site should we be at the climax stage. Within the upstream oil and gas, a site can be certify by about 7 years and I believe if the right plant material are used, we can have a site certified in about 12 to 15 years. If we start right at the beginning, we will be well on the right trajectory. Instead, we want to skip the trajectories and jump to trees, forgetting the stratified layer of vegetation that plays an important function. Our approach has been naïve so far. It is a different issue with wetlands as there are chemicals that one has to deal with unless one knows the end point is safe. Are there plants that can sequester naphthenic acid for example? How do we keep it from entering safe water, etc? These are indeed challenging. But for uplands, in 12 to 15 years, we should have certification.

	#15. Disagree. There are good examples in the east demonstrating reclaimed peatlands using the sphagnum moss transplanting method. In about 12 years, there are good trajectories and one can see the beauty of a reclaimed peatland in ~ 15 to 20 years. #16. Agree. Should be more transparent. Reclamation takes second place. Should change that if they want access to more lands. 6.5 # 30. Really?
	I am in alignment with all of the assumptions except 5, 7, 10, 21, 22, 24 Assumption 5 – Although I think it is correct that the public have higher expectations that what is being delivered, the public doesn't have all the correct information. The oil sands operators need to do a better job of distributing information regarding what they are doing instead of just what they are not. I think people would be more accepting if they knew how many efforts were going into reclamation. I do agree that the regulations should be more specific to give the public more assurance that reclamation will be achieved. Assumption 7 – I don't think the general public need to be involved in discussions prior to reclamation because this would delay any type of development indefinitely. Assumption 10 – Not enough time has been allotted to ensuring a "climax" community can develop. Succession on a natural landscape can take decades before the "climax" community is developed and there are not enough areas fully reclaimed for that length of time in the oil sands to make this conclusion. I think it will be the operators' responsibility to help succession occur to ensure the correct species are present for the desired end land use/ecotype. Assumption 12 is very important!! If the institutional barriers can be broke down it will make a significant difference towards achieving reclamation success. Assumption 16 – there is also no guarantee that there has been enough money put into trust/bonds to ensure that reclamation can be achieved for the current amount of disturbance. This should be made public. Assumption 21 – if we are going to bury either natural or man-made things we need ensure that it is safe to do so. This can severely affect our water supplies and have implications with regards to leaching, capillary rise, etc. Assumption 22 – public access should be the least of our concerns. Assumption 24 – the cost of reclamation is independent of what the oil is worth! Progressive reclamation helps, but companies should be paying to a fund to ensure there is money for reclamation at the end of the day!!! Assumption 26 –WHAT GETS REGULATED GETS DONE! This is important. We need to ensure our regulations have the proper requirements because it is the only thing that companies/operators must adhere to.

	Assumption 32 – Reclamation NEEDS to be an integral component of mine planning prior to disturbance!!! This is not currently being given enough thought.
	#1 – Restoration implies return of what was there… not just ecological restoration, but in how the land looks too. Some NGO's and First Nations think that restoration should be the target. There is absolutely no way the oil sands mines can do restoration as we're significantly changing the landscape. However, through reclamation we could restore some of the ecological function. So, I don't really agree with how you've explained the differences. Also, the EPEA legislation and its Regulations only require reclamation – not restoration, and AENV clearly communicates this fact to stakeholders. #2 – But of course. #3 – Another consideration of feasibility as spatial and temporal constraints. Due to the complexities of mining we can't do some things because the timing just doesn't work out. Or, we can't do something over here until something over there is done. But one thing people often forget is the temporal issue – these are long term operations and planning over that time frame, with incorporation of significant changes to operations/mining/technology over that time frame, will always impact feasibility. #4 – Again, there is no confusion with what the legislation requires. All we need to do is clearly articulate that for the stakeholders. AENV and the operators know what the difference is and that the requirements are for reclamation, not restoration. #5 – The public doesn't realize what we're actually doing so their perceptions are misconceptions based on inaccurate or incomplete information. Historic rules were lesser, yes. But today's rules are more strict and detailed… so we need to communicate that times have changed and what we request now is more reflective of public expectations. #7 – In the end, approvals and the conditions therein is what really force hands and make the operators do things. #8 – Wow… that is a statement that will stimulate response… #9 – And so they should be. Plans are all that are needed, with some tool to hold companies more responsible to the timelines but we should not start going non-compliance with operators that don't meet timelines because of weather impacts or other impacts out of their control. The annual reporting changes we've made will help show progress or lack thereof. #10 – There is more use of LFH and all operators are required to plant native trees and shrubs. I don't necessarily agree with this statement completely. #13 – NA's aren't the only constituent of concern. #14 – For sure! #15 – But EPEA approvals are requiring operators to reclaim fens … we're heading in the right direction so don't lose all the good work that is going on.

	#16 – True. And don't spend too much time discussing this until we know if the MFSP will be accepted by GOA. There is no need to hammer on the existing program if it is going to change. And there's no point in guessing what the new program will address/include because it's not public yet. #21 – HUH? Why would we want to burry man-made things just so it's not in the biosphere? You're just transferring issues from the surface to the ground. Anything man-made and buried needs to be guaranteed to be inert or you can have groundwater issues. What is the Natural Step? #22 – You don't always want to make the land available to the public as soon as possible. You may want to ensure there is time for the reclamation to establish – vegetation and soils to develop before you let the public in because some members of the public you just can't trust to be responsible. #23 – Then we probably shouldn't consider them. The goal is self-sustaining… no maintenance. #24 – Yes and no. In the end the companies are still responsible for reclamation, and what does it matter where they get the money from as long as they have it. #26 – Yep. Companies don't typically do more than what they are told they have to do. #27 – Not necessarily.
	1. Reclamation describes the general process whereby ANY land surface (DISTURBED or UNDISTURBED) is returned to some form that is of DIRECT beneficial use to humans. …restoration is… of the landscape, LANDFORM or ECOSYSTEM and is guided, the recovery of ecological integrity OF A LANDSCAPE, LANDFORM, OR ECOLSYSTEM REGARDLESS WHAT TYPE IT IS. 3. Don't agree, feasibility equals cost; engineers can deal with the many challenges in landscape design and development if cost is not an issue. There is a distinct disconnect between mine operation and reclamation which can obstruct the success of reclamation. 4. Do not agree. On public land there should be no discussion or confusion about the issue we need to restore the ecosystems to functional systems resilient to disturbance as we cannot separate those form the surrounding natural systems which will continue be driven by natural disturbance regimes. BUT … 5. ….there needs to be education on the expectations as there are false expectation given to the public by industry and government 6. Agree and planning should include more details on progressive reclamation 7. Unless the public is better educated on the issues a broader public discussion will likely fail 8. This statement could be true, added uncertainty is climate change

	10. This statement should refer to resiliency to disturbance and not CLIMAX communities the impacts of climate change should also be addressed. 11. See point 5 12. Important are also the rifts in expectation between departments within companies (e.g., operations vs. reclamation) and government (e.g., Environment vs. SRD) 28. Fair to whom? I think there is still some work to be done. 29. Not sure about that, but we have some very good people working on it with very little support from the Province. 31. It sometimes feels like it 32. I agree with the statement but I am not sure how real it is. The extraction costs and profits are likely much higher than the investment into reclamation
	#1 – need to change text to read *Restoration is the (exact) replacement of the original conditions* #5 – not sure this is the case, in part because the general public doesn't know what reclamation is actually being done. I would however agree that there is probably a desire on the part of the public to have a mix of upland and wetland/waterbody reclamation that is closer to the natural ratio (even if this is simply not feasible) #9 – presupposes that these are needed in an approval. Instead, the approval and its related oversight focus on moving lands that are ready to reclaim to reclamation in a timely manner. A larger problems is that many people incorrectly believe there is a huge backlog that industry is not addressing #10 – see earlier comment about the appropriateness of the goal of re-establishing a boreal forest ecosystem #11 – the key here is that expectations about timelines around certification are managed (i.e., we won't wait until succession has been completed to certify land). This in turn requires people to be confident that we are "on the path" #14 – need to add "presence of tailings" as one of the uncertainties #16 – change focus to be on costs to reclaim, not the reclamation security #18 – see comment on #10 #19 – based on the longevity of oil sands mines and processing plants this is not achievable; liabilities will flow to the next generation. A better statement is that reclamation will remove liabilities for future generations.
	I have not seen enough information to be able to agree with 28, 29, 30 I would have large doubts about 30 based on the current system

	I would assume that costs are likely a significant driver for industry and bare minimum reclamation to meet requirements would be implemented rather than higher cost superior reclamation. For example, are tailings solutions not being implemented if they are perceived as too costly?
	6.2.6 – I don't believe it needs to be the foremost priority in mine planning. Let's just start with planning. Reclamation and closure planning needs to have a financial implication to the companies before it is placed as a priority. The daily mining operations are normally "King". Mines have a hard time sticking to a weekly/monthly plan, let alone a closure plan. The initial material movement and placement is critical for this closure/reclamation planning. 6.4.21 – what is "natural step"? 6.4.27 – I believe the government of Alberta owns the resource on behalf of the public, not the other way around.
	Assumption 1 – agree Assumption 2 – agree. However, if you talk to local stakeholders, roads or other features that allow better access to the reclaimed or adjacent land may be beneficial and desired. Assumption 3 – agree Assumption 4 – disagree. In a mining operation, reclamation is understood. Assumption 5 – disagree. Approvals dictate the requirement to reclaim to equivalent land capability and it is being done. The public's expectation is driven mostly be sectors of the public that have never set foot in the boreal forest or have seen industry's reclamation success and have an agenda against the oil sands industry. Assumption 6 – agree Assumption 7 – agree. A coordinated discussion on what are the key challenges and an agreement on how best to address them would be beneficial. (Similar to what the BC forestry industry did to address public concerns in the 1990s) Assumption 8 – disagree. The technology exists. Implementation of the technology in a cost effective manner needs to be refined. Assumption 9 – disagree. Approvals have reclamation timelines. Assumption 10 – disagree. Established reclamation at Syncrude and Suncor has proven this works. Research monitoring is optimizing this practice. Assumption 11 – agree Assumption 12 – agree. Good example: AENV and ERCB have competing objectives. Assumptions 13 – 20 - agree Assumption 21 – disagree. Burial of all original buried material and man-made is not feasible.

	Assumption 22 – agree Assumption 23 – agree, if alternate land uses are agreed to and approved. Assumption 24 – agree Assumption 25 – generally agree. Assumption 26 – 28 – agree Assumption 29 – agree if pertaining to oil sands specifically Assumption 30 – agree Assumption 31 – agree if "natural state" means equivalent capability Assumption 32 – agree Assumption 33 – disagree. If you broaden the context of reclamation to a large geographical context then it dilutes equivalent capability to "boreal forest" and local, significant features at the site level could be lost. (i.e., peat forming wetlands, lakes, etc.)
	I would disagree with Assumption 1 (reclamation versus restoration) as I find both definitions too restrictive. Also I am not sure about assumption 28 (Alberta has fair and effective reclamation regulations and certification procedures). If it were the case, why would we need this dialogue?
	1) The assumption that "*restoration* is far less associated with the utility of the landscape and is guided by ecological principles to promote the recovery of ecological integrity" is but one interpretation of the term "restoration". Restoration is often interpreted as a return of like for like. This has been interpreted to mean the exact same ecosystem in the exact same place with the same functions as existed prior to development. With the altered landform that results from oil sands mining this is not physically possible. While the reclaimed lands with the reestablished ecosystems are certainly functional and in tune with the Boreal forest, true restoration is not a feasible option. 7) Regulation challenges: An assessment of the current policies and practices governing oil sands mine reclamation reveals an alarming range of challenges, uncertainties and risks that deserve immediate attention and broader public discussion. I would argue that the reclamation Acts and Regulations and their implementation in Alberta is one of the most advanced sets of regulations in the world. This does not negate the fact that reclamation challenges exist, but that they are being managed in a responsible manner so the risks are being addressed and mitigated. 10. Successional models: Many oil sands operators rely on plant succession models to generate the establishment of climax communities, which are communities of plants that are stable and capable of perpetuating themselves. There is little evidence,

	however, that natural plant succession — where an assemblage of species is naturally replaced with new species and associations better suited to the prevailing site conditions — is likely to occur. The older oil sands reclamation sites are demonstrating that natural succession is taking place with native plant species infiltrating and becoming dominant in the reclamation vegetation mixture. The following assumptions are missing: A) That the reclamation is proceeding as planned and as approved by the Province of Alberta. B) That the reclamation has and will continue to return the land to a viable and ecologically productive land base that is in tune with the ecological functions of the region. C) That the landforms that are being created although altered from the original land forms are integrated into the land base design to form a functional whole. D) That the oil sands operations closure planning and reclamation planning processes are addressing the need to incorporate traditional land use into planning and reclamation.
	1 I would say that *reclamation* is guided in large part "by ecological principles to promote the recovery of ecological integrity" – the distinction in my mind is less that of utility versus function than that of fidelity to detailed pre-disturbance characteristics. In reclamation, we attempt to replace function and broad characteristics, but admit that the specifics will differ from pre-disturbance, whereas restoration seeks to mimic pre-disturbance conditions as much as possible, in all details. 2 Sure. But, industrial features with lasting utility (e.g., upgrading/processing plants, access roads) may be in demand for continuing use after mine closure. Thus, although reclamation of these features may be required, that may not mean that they will be reclaimed. 3 Agreed. In fact, in my opinion the constraints of engineering and ecology, although posing substantial challenges and uncertainties, are the most transparent and assailable constraints, and large numbers of professionals work very hard to understand and reduce these constraints to achieve successful outcomes. In stark contrast, regulatory/economic constraints are far murkier – we do not have rigorous tracking, metrics, or documentation around regulatory decision-making, nor around actual costs of reclamation. 4/5 I believe that approvals do suggest/require "return…to close to…pre-disturbance states", but, as per previous comments, these requirements may: 1) not be applied in practice, or be diluted through interpretation; and/or 2) not have a practical influence on achieved outcomes. See discussion above on equivalent capability. 6 I believe that operators, government and stakeholders should agree on reclamation objectives and assessment of achievement of these, more so than on "what reclamation

	actually means". Maybe these are the same thing? 8 I am not certain whether reclamation of fluid tailings will proceed on a timely basis, but past experience from all previous Canadian mining jurisdictions suggests that liabilities associated with impoundments (and other mine features) *will* be inherited by the public, at least to some extent. I believe that we are accepting a level of risk when we approve these projects, and that risk will/may be translated to liability. 9 On the soils/ecology end, this is true. 10 There is little evidence that the concept of climax communities is a useful one in Alberta's NE boreal forest, pre or post disturbance. However, let's say that oil sands reclamation relies on the idea that certain soil moisture/nutrient regimes support characteristic plant communities, and that these communities will be to some extent replicated on the reclaimed landscape. I believe that over the long term (>100 years), this assumption is valid (ignoring the issue of stable climate), but there are certainly challenges to its achievement in the shorter term, and there is little evidence to date of reclaimed plant communities closely resembling pre-disturbance plant communities. It is possible that these reclaimed plant communities will evolve into "novel ecosystems", rather than resembling adjacent/pre-disturbance non-industrial communities. 11 I don't think that this is really a core issue – natural succession rates in a boreal environment are in fact not that slow – a severely burned forest will be a mature forest again in ~80 years, and this process of disturbance and recovery has been going on for thousands of years. Perhaps the issue is more one of the timeframe associated with an "even-more primary" succession, more closely resembling ecosystem recovery from glaciations. So, maybe communication *is* needed to ensure that expectations match "natural realities of reclamation", but I would say this alignment is needed not only to help guide expectations for reclamation, but also to inform assessment of the true environmental impacts of oil sands extraction projects. 15 Agreed, at least in the larger intent. 16 Agreed, heartily. It is my experience, almost to the point of a truism, that the public is always over-exposed in mining projects, and is frequently left dealing with costs that outweigh any bonding program. 17 Need to define/agree on "integration". I do not believe that post-closure ecosystems need to be independent of lease boundaries, but I do think that ecological requirements and objectives should have more weight than administrative and legal constraints. 18 I agree with the first section of this statement. Whether or not these ecosystems provide a "multitude of values for all Albertans" is of less importance (and maybe indicative of one of the perpetual, damning flaws of western civilization). Or, perhaps I could agree wholeheartedly, depending on the answer to the question, are non-human organisms living in Alberta "Albertans"?

	19 We're really getting philosophical here! Regardless of the direction in which Gro Harlem Brundtland steered us, the fundamental nature of the human industrial enterprise is to extract benefits for the current generation, and to leave liabilities for future generations. I agree that this should be a part of the "reclamation vision", and agree that if we do not find a way to achieve visions such as these that we will ultimately fail as a species. But I do not believe that we will achieve it in Alberta's oil sands. 20 Agreed. 21 I am not familiar with "Natural Step", but the principles here seem a little too fundamentalist for my taste, and appear to view humans as somewhat apart from "nature". I think that we need to take an intelligent, integrated, and informed view of our activities, their potential costs and benefits, and perhaps compare them to a "natural range of variation" (what happens in the absence of large-scale industrial activities) taking into account different non-industrial processes and multiple time scales. Then decide on appropriate actions. The principles also seem in part in fundamental opposition to the oil sands mining enterprise. 22 I wholeheartedly disagree, except perhaps for specific and agreed-upon exceptions. We have extracted our "pound of flesh", so to speak, from this landscape, and need to learn to be a little less demanding. Reclamation will be, in some ways, fragile, and will need nurturing to establish. 24 Let's turn this on its head – the value of oil should account for the cost of reclamation, and oil extraction should not occur under economic conditions that do not allow satisfactory reclamation. However, yes, I agree that the public is far less exposed if reclamation is conducted during the period in which operators are generating revenues, and that progressive reclamation is one way to achieve this. 25 relates to 22. I don't think that "productive use", by humans, is a priority, for the most part. A more fulsome discussion would require further exploration of the definition of productive use. 26 I agree with the first part of the sentence, but I would say that the reality of mine reclamation is not "what gets regulated gets done", but, in large part, "you get what you get". 28 It is my belief, informed by the position of the community of Fort McKay, that government regulators too often do not operate truly as "public servants", and that certification procedures are somewhat opaque, and not truly inclusive of public interest. It is Fort McKay's position that, as a long-standing and long-term occupant in the region, that that community should have direct input into setting certification objectives and direct participation and influence in certification decisions. 29 Agreed. 30 Alberta and the Federal Government are accountable to the planet for all matters related to reclamation.

	31 From the First Nations' perspective, this is generally true. 32 Agreed. 33 Agreed.
	1. Restoration in its truest sense is returning what was there before operations took place. This is not possible given the timeframe over which the landscape developed. Reclamation is returning the capability to allow the return over time. 2-4. Accept 5. The public needs to be better informed on what is possible over what timeframes. 6-8. Accept. 9. Timelines are required to initiate the process. 10-11. Evidence of succession needs time and depends on many external factors such as climate over which no one has control. The public needs to be informed and understand this. 12-27. Generally accept 28-30. Accept while acknowledging that procedures need to adapt over time. 31-33. Accept while acknowledging that "things" change over time
	3) Aspects of "feasibility" include obligations under conservation-related legislation, and consistency with Aboriginal treaty tights. 4) & 6) Clarifying expectations at onset is indeed vital to ensuring continuing social acceptance of a project. However, it is important to be clear what "onset" means - to minimize risk, expectations should be clarified at the earliest stage of project planning. 11) Communication on reclamation realities is needed before new impacts are made. 16) Similar uncertainty is reflected in accounting and securities regulator standards (and corporate interpretation of these standards) for corporate reporting on tailings liabilities. It is unclear what costs are envisaged for full reclamation, and what provision companies are making for these costs. 18) Regarding ensuring reclaimed land provides values for all Albertans - does Alberta not have a separate and distinct duty to Aboriginal peoples created by treaty and constitutional rights? 19) This assumption of intergenerational equity in reclamation is appropriate but has not been observed in practice. 21) The Natural Step is a relevant framework to consider in the reclamation context – not only for dealing with current reclamation liabilities, but for planning future development to avoid creation of reclamation liabilities.

	23) Is the implication here that it may not be necessary to reclaim to "equivalent capability" if a further development is proposed that would not require this standard? Presumably "development" end uses will require new regulatory approvals. 24) This is an important assumption. As noted earlier, there are concerns regarding disclosure of the financial provision that is being made by companies for reclamation. 25) What is meant by "productive use" here? Are end uses relating to ecosystem services, conservation objectives or obligations under Aboriginal treaty rights included envisaged under "productive use", or is it only industrial development that is envisaged? 26) In addition, what gets monitored and reported gets managed. 28) The increasing divergence between active and reclaimed area suggests that there are issues with either the content of the regulations or their enforcement. 29) Alberta may be a leader, but so far reclamation has not been delivered at a rate that keeps pace with disturbance. It is worth noting in this context that, by conventional measures, reported R&D intensity among oil sands companies is low compared to the energy sector as a whole, and even lower compared to the Canadian industrial average. Research and innovation are not necessarily translating into rapid commercialization of new techniques and technologies. 31) What does "natural state" mean; can it be achieved through reclamation; how does it relate to treaty obligations, impact and benefit agreements between companies and Aboriginal peoples, and Aboriginal expectations; and is it actually what is specified in the reclamation plans (given earlier references to "equivalent land capability"?
	Especially in alignment with 3. Feasibility 5. Public expectations 9. Timelines 16. Reclamation costs 19. Reclamation liabilities are not passed on to future generations 24. Cost of reclamation borne by value of oil I appreciably agree with 4. Expectations – reclamation versus restoration 6. Intentions 11. Reclamation timelines 12. Institutional barriers 14. End Pit Lakes

	I generally agree with all the rest, with the exception of 28. Alberta has fair and effective reclamation regulations and certification procedures. If the regulations and procedures were effective the current conversation would not be required. Fortunately, there is a broad desire to improve the current systems, and we have the means to effect any necessary changes.
	Overall, good summary of assumptions. I wholeheartedly agree with #7 - #9 is not an assumption. It is fact. - #13 – Salinity is a bigger issue than naphthenic acids for reclamation - #29 – There is a big problem with oil sands reclamation which is the failure of those involved to realize that many other jurisdictions are doing a better job than us in Alberta. Europe and Australia have a lot to offer. - #31 – We have no idea if this is possible. We are moving away from saying that reclamation will be comparable to natural. This is misleading if we don't know if it's even possible yet.
	#1. Restoration also implies putting back what was there before. #9. What are the appropriate timelines for reclamation? We shouldn't necessarily be pushing for "faster" reclamation and ending up with something unacceptable. Some types of reclamation (e.g., some wetlands types) are unproven in the field. #12. there are barriers even within a single company across mine planning, operations and reclamation #20? #22 see #9 and #25
	6.1.1 and 6.2.4 I see restore to be a higher bar. Oxford – Attempt to bring back to original state by rebuilding … Rather than to bring back to where it is capable of being as productive as the original. Restoration of most biological functions will take decades or centuries after reclamation certification (to get old growth forest components reestablished) 6.2.5 Regulations are general the policies and approvals do require something much more specific without being too prescriptive.
	1. "Reclamation" in the oil sands is not interpreted as 'returning to some form" – for example, it is no longer acceptable to reclaim to a monoculture of mercantile timber. Stakeholders and Albertans are pushing for reclamation that resembles restoration. 2. It is my understanding that companies are NOT required to reclaim the plant site area. 3. Agree but institutional arrangements can be changed, economic incentives provided and more acceptances gained through demonstrability).

4. Refer to #1
5. Agree
6. Agree
7. …discussion and resolution
8. Agree
9. …approvals and need to be addressed
10. Should change the word ‘prevailing’ to ‘new’ as the reclaimed landscape will be different – however with a target of pre-disturbance ecosystems the goal should be not to replace different plant communities but to strive to replant native, naturally occurring species.
11. Agree
12. …independently due to fear of loss of competiveness
13. Agree
14. REMARK: stakeholders do not see EPL as a solution – the move should be to dry tailings
15. Agree
16. Agree
17. Agree
18. Agree
19. Agree
20. Agree
21. Disagree – contaminants should be minimized, eliminated or treated. No burial of contaminants should be allowed unless treated to the extent that they do not pose any potential threat to ecosystem or human health.
22. Agree
23. Agree
24. Agree
25. Agree
26. Agree
27. Agree
28. Alberta has clear, progressive and effective reclamation and certification procedures that adapt with changes in technology.

	29. Agree 30. Agree 31. Agree 32. Agree 33. Agree
	1. Reclamation vs. restoration. I agree with the Restoration definition. The definition of reclamation is too narrow. Reclamation describes the general process of returning intensively disturbed land, to a healthy and productive endpoint (which may or may not require remediation). The endpoint of reclamation may or may not be "useful" to humans. It may have similar endpoint as restoration or it may be something else that is useful to humans. 2. Reclamation scope – good. But also restoration is relevant to surface oil sands mining but this gets little attention – oil sands mining impacts on wetlands may occur due to dewatering, contaminant seepage, air borne emissions and these impacts that alter wetland health and integrity will require restoration during or after the life of the mine. 5. Public expectations, especially local and First Nations have high expectations which should influence the desired outcomes and goals. 15. Wetlands – The reclamation of marshes, shallow water wetlands and swamps is currently feasible on large portions of the reclaimed landscape based on the state of current reclamation science and the capacity for the landscape to support these wetland types. However, there appears to be a lack of knowledge or desire (Low value LCCS???) to plan for and develop these wetland types. Mine reclamation planners seem to have a very limited view of the landscape and there is a pervasive upland-dominated focus for defining reclamation goals. Peat-forming wetlands – highly desirable reclamation endpoint since dominant wetland type pre-disturbance, high First Nations value. Pilot scale research stage to determine feasibility of their construction. Regulatory role needed to require the development of these riskier projects (currently in EPEA approvals), also our expectations need to start lower – e.g., reclamation success if these sites can accumulate peat, support some peat land species etc., as knowledge and techniques evolve so do our expectations. 22, 23. Questionable reclamation principles. 26. Government also has role to enable and promote achieving reclamation excellence, not just setting the minimum standard, but help to identify and remove barriers to allow industry to go beyond the minimum standards, and ensure high environmental outcomes that meet the needs and expectation of Albertans. 31. Mined land needs to be a reclaimed to a healthy state, less emphasis on natural although this is desirable.

■ **Input Request #5: Critical Questions to Address** (Section 7)	
PLEASE PROVIDE YOUR FEEDBACK TO SOME OR ALL OF THESE CRITICAL QUESTIONS. Please feel free to respond only to those questions that most interest you. Consider — In addition, what other questions should we be asking regarding the challenge of reclamation of the oils sands area? Please refer to the question number in your response so we know which one you are referring to.	
	Pass – I'm short on information in this area
	Development of techniques for the re-establishment of productive peatland ecosystems will be essential for effective restoration of oil sands mining. Understanding the natural successional trajectories for both soils and vegetation is critical to effective restoration of the sites disturbed by oil sands mining.
	7.1 Good question. Include a focus also on knowledge gaps, this is very important. Somewhere, the Dialogue participants need to focus on issues related to two scenarios: • 'We can't do it because we don't know how' (Knowledge gaps), and • 'We can't do it because of some known reason' (operational issues, equipment availability, resources, regulatory, etc.). 7.3 Perhaps add '… or is further definition/clarification of desired rehabilitation outcomes required?' The other questions are very relevant. Extra questions worth considering: • How should industry, regulators and stakeholders address the question of *sustainability* of reclamation – i.e., sustainability in isolation, and under particular human uses including recreation, traditional Aboriginal use, and economic use? • Does the current certification and signoff system provide sufficient assurance that reclamation will fulfill long term land use objectives and not pose a future liability for Albertans?
	Listed as Input Request 6 in the document… Question is the key one…it is what companies are required to accomplish. Question 4 is trivial as we have professionals whose job it is to determine whether or not a company can apply for a reclamation certificate. Of what relevance is it what anyone else thinks? Can a lay person 'see' equivalent land capability? I like questions 5 and 6!

	Question 2 seems trivial and unambitious. Seems to be saying that all we want to do is make sure the contaminants don't go anywhere. Consulting companies are paid huge bucks to make sure that does not happen, so why would we consider this question? Managing and containing contaminants in a healthy biosphere has a really odd ring to it!
	I think that the critical question to address is Statement 1. The rest of the statements are challenges that may be part of the key challenges. Statement 1 also assumes that the disturbed landscape can be returned to a functioning boreal landscape. Has this been established?
	What are the top four challenges in reclaiming oil sands developments to functioning boreal ecosystems and landscapes? 1. A lack of adequate decision support tools in the planning process. There are tools in addition to the LCCS that can inform reclamation practices. There is, however, no requirement that these tools be used, nor is there a formal process for determining which tools are best suited and then mandating that they be utilized. 2. No clear definition of what a functioning boreal ecosystem and landscape actually is. 3. No clear definition of equivalent capability. 4. No consideration of climate change.
	Suggest we add the question: How do we balance competing end land use values?
	1. I think we have to create new ecosystems; we won't be able to reproduce what was there. 2. We have to consider each contaminant separately. 6. I think in some aboriginal culture it is the site that is important, and reclaiming n area will not increase its value. Another challenge is operational, we may have recommendations but they do not help if operators (contractors actually doing the work in the field) do not understand the purpose of these activities. Important details may be overlooked. A lot of knowledge transfer is necessary.
	Those are all very good questions for now and in fact there are probably too many so the last thing I'll do is ask some more.
	The four top challenges are: 1. Understanding the maturation process for created mining and tailings landforms. 2. Understanding the variation in chemical constituents within the created oil sands mining and tailings landforms, as well as the interactions of those constituents between the landforms, as well as with the areas external to the mining operation. 3. Agreement on the acceptable outcomes of reclamation and the timelines associated with those outcomes.

	4. Increasing the public and stakeholder awareness of the mine and closure planning process, adaptive processes and decision making on outcomes for specific operations. The development of a process for balancing the wishes or demands of various stakeholders on outcomes is necessary to allow finalization of a plan for each development. The understanding of contaminants and the management of those contaminants is fairly well understood (and processes are in place to gain understanding where it is required). Developing acceptable systems for management of contaminants as integral component of sustainable closure plans is an on-going process that continues to require efforts. The current systems (with the consideration of adaptive management) are adequate. Areas that continue to need to be addressed are the capabilities of wetlands areas as integral components of the reclamation landscape (and the function of many of these wetlands as contaminant treatment systems). I believe it is relatively easy to identify a site that has achieved equivalent capability. Such a site will have matured for a number of years (1 to 2 decades minimum), be functioning in terms of landform sustainability, sustainable vegetation cover, and use of the area by wildlife. Assuming the ecological systems are functioning, the area should have the potential for use by humans. End land uses have been defined many times. I believe it is most important to achieve ecological resilience, after which the diversity of human uses can be considered. The most important challenge is developing the understanding that acceptable or desired end land uses will not all be achievable at every site. Achievement of some uses will mean others cannot be achieved. The important decision is how are the defined uses for an area going to be selected (defined); who is going to make the final decision? A key factor is to remember that defining the exact use for an area, needs to be decided early in the process as the initial mining operation may establish a landform type that narrows the range of available end land uses. This becomes very important when defining specific end lands uses for existing developments. The range of options is unlikely to be a great as what can exist for an area prior to development.
	1 – The top challenge is to define and agree on expectation and to regulate and monitor on an ongoing basis. 2,3 – Yes 4 – Based on a number of parameters related to landform, soils vegetation. 5,6 – Numerous
	1. Timeline expectations – it is not reasonable to assume we can demonstrate fully restored and balanced ecosystems within the lifetime (i.e., individual career, governmental mandate, generation of employees) of those within regulatory or corporate body. Lack of specifics in reclamation requirements

	Insufficient number of full scale field operations for validation and iterative learning Lack of clear vision and support from governments and the public 2. Yes, but this needs to be viewed as acceptable impacts under varying timelines. For instance, zero discharge during operation has very little precedent. Cities do not operate this way. Specifics calling for minimal impact, with the potential for escalating requirements once operations in the area decline and cease 5. Any land use that supported by the lease owners, regulators, and the public. These could include industrial parks, housing developments, golf courses, farms, commercial forest, wetlands, parkland, etc. 6. There are few effective methods of having this type of discussion in the public eye such that a well-represented set of opinions is provided. Special interest groups (corporations, NGO's, and regulators) all come with agendas and hence a desire to control the message. The general public has no way to determine what forms a balanced discussion and what is "spin". Another key challenge is the assumption that we can "design" a long term landscape and know/dictate what that landscape will look like at each stage of the development. In many cases "natural" recovery of a landscape represents the most sustainable process for reclamation. Perhaps the adoption of a "Do No Harm" approach could be looked at, with the guidelines being to produce landforms with appropriate drainage and soil quality of a sufficient level to encourage natural incursions of successful, local plant communities. These would come in at a sustainable pace controlled by the environment and adapt to changing conditions as required. Remedial measures would be required only when conditions were found to be the result of the operation's work (i.e., high erosion rates, contaminated releases, etc.) or where conditions were deemed such that natural processes could not reasonably provide solutions.
	1) a. Lack of a consistent regulatory environment; b. Government departments at cross purpose; c. The dogma that we need to go back to the boreal forest; d. Lack of government expertise to evaluate industry directions. 2) Yes 3) Unfortunately that is probably all it does. 4) You do not, local stakeholders come to that agreement 5) Who knows ... let's make this a central point in the discussion 6) Get all available materials on the agenda for supporting the reclamation efforts, including the high sulphur coke and the coke itself. Has anyone asked the question of the local stakeholders about alternative end land uses and in what context?

1. The top 4 reclamation challenges for oil sand mines:

A. Contamination by salinity creates a challenge to the land capability for land use due to oil sand mining; Saline discard materials should be put in pit or be encapsulated within clean overburden to reduce environmental contamination post closure. Trading land capability of class 5 wetlands in the predisturbance situation for an equal area of saline affected class 5 lands in the closure landscape is not equivalent capability. Alberta loses. The management of fluid fine tails and process affected waters that effect out of pit landforms, watercourses, pit lakes and groundwater has the capability to contribute contaminants to the environment long after abandonment. (Naphthenic Acids, other hydrocarbons and salts).

B. Fluid tailings materials proposed for water capped tailings which contribute toxins and unsuitable chemistry to the lakes they are stored in, and receiving environments, for generations. All fluid tailings materials should be converted to trafficable landforms prior to closure. Terrestrial capture of contaminants could dramatically slow the release of salinity and other contaminants to the environment as compared to a water based storage option.

C. The design of sustainable, functional landforms and watersheds is fundamental requirement.

D. The return of quality soils and diverse vegetation communities.

2. Yes, but it takes the will and the planning that would require a greater investment than the present approach.

3. No. The LCCS was developed to assess a landforms suitability to grow trees on upland sites. The LCCS is used (as discussed in 1A above) to assess land capability and CEMA has proven (2004/5) that the LCCS has no ability to predict the productivity of reclaimed soil.

A separate system is needed to assess wetlands. If the LCCS is used to assess all sites then all upland and lowland sites, wet, dry should be assessed separately to reveal the landscape level issues of sites that are chemically contaminated.

For a reclamation certificate an assessment of a landform is needed to assess;

- Is the landform safe and stable? Are there safety risks for the public or wildlife?
- Will there be robust ephemeral watercourses to sustainably transmit water off the structures? is the water collection system around the landform a ditch or a watercourse? are there erosion gullies?
- Is the landform appropriately integrated with the surrounding environment or other leases? Is the lease boundary with adjacent mines a trench? Is the closure landscape functional?
- What is the water quality; is it appropriate to release off lease?
- When does the groundwater quality get assessed?
- Is the ecosystem functioning, sustainable and appropriate?

- Are there restricted or noxious weeds that should be controlled?
- Is the site contaminated?

4. Equivalent capability for the oil Sands region would have the following attributes;

- Provides a functional ecological resource of importance to the area: i.e., a lake that all fish species of the region and other biota can thrive in for a lifetime and not be toxic to people, no risk of biomagnification of toxins.

- Landforms that are functional, safe and stable, self-sustaining with a non-erosive watershed design, slump or soil creep is absent, appropriate soil that supports ecosystems typical of the region, integrated with the surrounding areas. e.g., A dry trench between two leases would not be suitable. Rolling hills are more appropriate than Aztec temples of benches and pyramids.

- Vegetation communities with representation of the types of ecosystems typical of the predisturbance development that are as productive, drought tolerant, fire resilient and free of disease or weeds as the predisturbance situation.

- Water is an essential component of the environment. Water from closure landscapes should be suitable to support down slope and downstream vegetation communities. Consideration should be made for landform designs that will provide appropriate water quality of surface and near surface runoff. Hydrocarbon affected materials placed near surface will contribute to the water quality of runoff to the environment.

- It's ok to have components of the landscape that vary within the natural range of variation, but reclamation should reflect that same ratio of predisturbance variation, not just the low end of the class.

- If I rent a vehicle I pay a fee for its use and I have to return it in fundamentally the same shape as when I picked it up, that's the deal Alberta expects from oil sands development.

5. Appropriate reclamation should give a landscape of rolling hills, and forests suitable for wildlife, productive forests for timber those future generations could appreciate and obtain a living from. Closure landscapes should not require on-going maintenance because of the landform design, quality of reclamation or liabilities left in the landscape.

6. Key Challenges to landform design

The key issues are that industry has not implemented the type of reclamation planning to demonstrate that they have accepted responsibility for the creation of functional landforms and landscapes. Regulatory agencies need to work together to advise the industry exactly what they want, what does success look like, what isn't acceptable?

- Inter-lease landform coordination and overlap is an important step that industry doesn't appear to support: because it's not happening except for some perspectives where there is revenue to be generated. As stated before the oil sand energy lease dendritic pattern with two drainage ditches in trench between leases isn't acceptable, neither is a trench between leases where there is no watercourse. That's not functional.

	- Discard materials affected by challenging chemistry from overburden and oil sand processing are contaminants that should be captured and sequestered underground. Saline material should be placed either in pit or within discard structures and save the good quality discard to encapsulate the contaminants. A saline environment is not an equivalent capability of fresh water wetlands or non-saline upland forests. - All tailings material should be progressively converted to dry landforms for reclamation because of the long term liabilities that would be created. For all the tailings material research conducted to date there is not a reasonable level of science to indicate that water covered tailings materials will be safe for the environment because of the hydrocarbon and byproducts. - Addressing the closure and reclamation challenges in today's mineable oil sand development area may cost more than it did a decade ago because in the past very few attempts were made to meet all the regulatory approval clauses for a reclamation area and of the past lack of understanding about what the standards are. - What is the impetus for the creation of closure landscapes with novel land use capability, would it be cheaper to create a novel use than an equivalent to predisturbance forested landscape that the oil sand mines originally proposed and were approved for? - If the requirement to maintain the Green Area as predominately forest were to be set aside then what is the highest end land use that the reclaimed lands could support? What industries? Are there stakeholders who wish for potential novel closure land uses that would be more lucrative than the forest matrix and traditional land uses can provide? Is it relevant if the land is not capable of supporting such activity? Reclamation of the area will result in mostly low quality soils (Class 3 & 4), and much of that developed with a peat/mineral mix soil. The organic content of a peat/mineral mix soil will break down quickly with tillage and/or forage production, so that doesn't work. The short growing season and limited rainfall further hinders agricultural potential. Any agricultural endeavor will have high costs due to the poor soil. All livestock husbandry would be challenged because of the proximity to the infected bison from the WBNP. The bison of WBNP have tuberculosis, anthrax and brucellosis which prompted Alberta to pass legislation to prevent bison farming north of Twp. 88 on crown lands and other livestock would have the same issue. Earlier studies indicate that livestock is also challenged because of the intensity of the biting fly problem which results in stressed livestock. - In conclusion; The most appropriate use of the reclaimed oil sand mines post-closure is a multiple land-use strategy of a Forest matrix managed for clean water quality, timber, non-timber values and traditional land uses. Intensive management of the forest landbase in partnership with the non-timber values would promote the highest value end uses for the next economy. Forestry and recreational tourism may be the most sustainable and fiscally attractive alternatives available in the oil sands closure landscape.
	1. A) Reference condition that reclamation should be compared to both spatial and temporal

	B) Specific criteria & indicators to evaluate and determine success C) Material limitation related to oil sands region & specific sties D) Disruptive use of reclaimed land i.e., quads, 4x4 – these scar natural lands too 2. Yes; but need risk assessment as part of review process 3. Yes, these are limitations to what the LCCS can tell you, but overall the tools & systems are ok 4. Great question use LCCS on other measures; need criteria and indicators. Not sure we (public, Gov't, industry) has a good answer to that 5. Whatever the public accepts. Golf course, lake, dirt bike track, tree plantation, berry farm, etc. 6. Public paradigm that companies are looking for "cheapest way out" - Risk and liability between operators down to shareholder - Physical limitation due to material types, disturbance footprint, material properties, geotechnical stability and too much promised on every hectare of reclaimed land.
	Why haven't we asked what are the top 4 opportunities? Could it be that we actually understand the problem and have what it takes to solve it might be another? Other than that, the questions are fine.
	Question 1 – water quality release criteria, liability concerns surrounding release of water onto neighboring leases, peatland wetland reclamation, incorporating regional land use planning objectives into reclamation planning. **Question 5** – wildlife habitat, traditional use, recreation, forestry.
	7-1 Top 4 Questions a. What policy process will be used to decide what is fair to the Alberta public in terms of economics, legacy costs, and environmental quality? b. Are the current beneficiaries (mostly out of province investors) of oil sand products carrying a fair share of the responsibility for reclamation needs that are borne disproportionately by Albertans? c. Are costs and benefits of reclamation properly framed across time periods? Can OSRIN manage this dialogue process with sufficient independence from special interests to maintain public trust, stakeholder buy-in, and industry support?
	7.3. I might add "… including the use of objectives stated in approved closure plans, revegetation plans, etc…" in helping to define equivalent capability. 7.6 change "alternative end and uses" to "possible and desirable end land uses"

	Q1. 1. Creating self-sustaining ecosystems 2. the sheer size of the areas involved 3. how to manage while mining is on-going 4. creating dry surfaces from fluid tails Q2. yes (but expensive) Q3. No Q4. Decide what the criteria are and see if they have been met Q5. Return to wild forest. Q6. ? For design. Education for acceptance.
	1. I see five top challenges: i) scale of disturbance (expensive to move that much material around), ii) salts (most boreal landscapes are not salty), iii) wildlife sensitivity (populations of species at risk will be extirpated from the region while we wait 40 years for reclamation), iv) no proven post-mining fen creation techniques, v) hydrology (how do we make sure uplands and wetlands receive enough water in sub humid landscape). 2. I don't think we do yet. Chemists have just learned how to properly measure the complex mixture of contaminants referred to as naphthenic acids (NAs). We don't even know which fractions of oil sands NA mixtures are causing toxicity, so learning how to manage these toxic fractions and contain them to create a healthy biosphere will take at least several more years of intensive research. 3. The LCCS should not be used alone to determine equivalent capability of boreal ecosystems. The LCCS only addresses upland landscapes and so it is biased against wetlands (which have lower tree production). Wetlands comprise at least half of the pre-disturbance landscape and need their own value based classification for equivalent capability. 4. At the site level: native vegetation, potential to adapt to climate variability, wildlife value, At the landscape level: landscape biodiversity, sustainable ratio of upland to wetland 5. From my perspective, any landscapes that have natural analogues in Alberta may be ok. However, there needs to be effort to reclaim at least some of the lease areas into end uses that very closely resemble pre-disturbance habitats. Non-natural systems (e.g., golf courses) are possible, but I would not be in support of them.
	Only one additional question: how we as a society (Province, country) ensure that the leaseholders/corporation's reclamation liabilities won't end up being societal/government liabilities if corporations refuse or will not be able to fulfill their responsibilities?
	1) a. Creating an integrated landscape, b) turning lowland areas into upland areas with the materials at hand, c) wetland creation, d) species diversity 5) Forestry, wildlife habitat, wetlands, These are good questions and will result in good discussion.
	#1 – That we won't know for a long time whether the work we're doing now will lead to

	success in the future. That we don't understand the water dynamics of reclaimed landscapes and we have competing priorities for water (uplands vegetation vs. wetlands). That we don't know if end pit lakes or even some tailings issues (particularly legacy tailings) will be addressed/will work in the end. #2 – This is dealt with through the EPEA approvals. #4 – CEMA RWG is working on Criteria and Indicators that fall within the newly approved Framework. This will take time to develop for things we don't already have C&I for. #5 – Remember overlapping end land uses … they are not independent of each other. Wildlife, recreation, First Nations use, forestry, all can occur at the same location. #6 – We must understand what we have to work with… dykes, dumps, end pits, etc. Just need to better explain mining. Planning up front for landform considerations is hugely important.
	1.a) sub surface conditions (e.g., salts and water availability) b) Climate change and drought conditions anticipation of future climates and vegetation selection c) maintaining water table for wetlands d) re-introducing species that do not have long distance dispersal 3. No. 4. Difficult question that needs still a lot of research and discussion 5. Why do we need to discuss desirable land uses if re-establishment of ecosystems should provide us with a wide variety of potential uses for the future and would give us flexibility to do so? What happens if we can't achieve those?
	Again, the emphasis of the workshop should be on #5 and #6. We will spend way too much time on the first four and then not reach our desired outcome of discussing alternates. Reword #5 as What are possible and desirable end land uses for reclaimed land? Are these consistent with your view of equivalent land capability? Are any of your desired end land uses compatible (i.e., two or more could occur on the same piece of land) or mutually exclusive?
	1. It has never been demonstrated, the public doesn't know how much it costs, tailings, we don't have the regulations, or the political will to demand high standards. 2. We don't know, data isn't publicly available 3. No, and it creates bias against wetlands 4. When it can be demonstrated it has the characteristics of a early successional natural site 5. Need to have that discussion with affected stakeholders, particularly First Nations to which promises have been made. It depends on the land use decisions that have been

	made on other lands – such as establishment of conservation areas. 6. Regulatory inertia. Political risk of breaking promises for existing approvals. An unwillingness to discuss trade-offs or permanent impacts of oil sands development.
	1. reclaiming tailings ponds; identifying what a functioning boreal ecosystem is; determining end land use; dams (when will the new landforms become naturally sustaining); overcoming the number of stakeholders/agencies…and being able to move forward with a direction forward (hard to get agreement). 2. I think we say we do, but I am not aware of any success stories to learn from. 3. In my opinion it doesn't'. We don't know what the site will look like in 30 or 40 years. We need the data over time to validate our predictions. 4. I couldn't. We need to further clarify equivalent capability and develop some working level criteria for applying it. 5. Commercial forestry, wildlife habitat, recreation, water courses and water bodies, essentially anything the public wants to see out there on the landscape. Ideas and desires change over time. What we allow as end land uses should be things that will still be desireable in 100 years. Getting agreement on things, ensuring a regulatory system is in place, balancing values.
	1. Challenges: Fluids management, water release criteria, fluid fine tailings reclamation & regulator/stakeholder expectation 2. Yes. Industry has proven this through its R&D in the past 20 years. The public, regulators and stakeholders need to allow for the required time for this to happen. 3. No. The LCCS is not applicable in determining equivalent land capability, as it was originally an agricultural tool that is trying to be applied to the boreal forest. 4. Compare the reclaimed land to a natural area of about the same age, composition, etc. 5. Whatever the <u>local</u> stakeholders want. (Agricultural, commercial, boreal forest, etc.) 6. How rapidly "equivalent land capability" will be established.
	The greatest challenge is to define clear criteria to assess reclamation success.
	The predevelopment landscape in the Athabasca Oil Sands Region was dominated by the Boreal Forest. The end land use that captures the return of the ecological functions that existed prior to the development of an oil sands mining operation is possible, and arguably the most reasonable goal for reclamation of oil sands mining. Open pit mining of oil sands will create an altered landform from the landscape that existed previously. Reclamation is the key to return this altered landscape to a productive end use. Start of the reclamation process is the Closure plan which outlines the end land-use objectives. The replacement of cover soil is a start to the reclamation process with revegetation

	implemented to return the desired ecosystems and functions on these post mining landforms. Natural processes aid in the evolution of these reclaimed lands, which trend through time to emulate the natural undisturbed forests adjacent to the mined lands. One of the perception challenges the oil sands industry faces is that the reclamation is not meeting a long list of desirable outcomes immediately. Reclamation areas will evolve through a period of several decades. If we consider that following logging a cutover area is expected to mature at 120 years, oil sands mining and reclamation is a very recent phenomenon.
	1. Top 4 challenges: a. We need a better understanding of soil moisture and nutrient regimes across the three-dimensional reclaimed landscape, and thus how plant communities are likely to establish and respond. b. Related to a., we need a better understanding of moisture demands of maturing plant communities, and how communities will be affected by the moisture demands of adjacent communities, e.g., how the moisture demands of a maturing upland forest will affect an evolving wetland at the toe of a slope. c. We need a better understanding of post-reclamation vegetation trajectories, or of vegetation successional patterns of the reclaimed landscape. The current Revegetation Manual sets targets for required number of characteristic species, but we are not sure how these targets will be achieved, nor how this indicator will change over time. d. We need a better understanding of salt dynamics (weathering, flushing, etc.) on the reclaimed landscape. 2. Don't know. 3. I think, for reasons discussed above, my answer is "no", pending semantic discussions on how to define "functional boreal ecosystems", as all reclaimed landscapes will "function" at some level, and may by definition be both "ecosystems" and "boreal". However, although the LCCS helps guide the use of higher-quality soil materials, I do not believe that our state of knowledge has advanced to the point where we can say with any confidence that we can reclaim to forest ecosystems that have similar function and form to those that existed in the pre-disturbance landscape. We have made progress, and by addressing items in 1., above, we can continue to progress this knowledge. 4. I'm not sure that that is a question that can be answered by one person on a form, but here are some contributions (note that these would need to be applied and understood across the regional reclaimed landscape, not just on at the stand or polygon level): a. Range of natural variation is a critical concept, to embrace the idea that the pre-"disturbance" landscape was not only not static, but included frequent and severe disturbances. Thus, reclamation performance should be understood relative to this

range, rather than compared to static measures.

b. I think equivalent capability, at least for forested/vegetated ecosystems, could ideally be measured by Net Primary Productivity or carbon fixation, indexed against pre-disturbance and adjacent conditions, and understood as a trajectory from disturbance (fire, logging, and mining) through juvenile vegetation communities to mature stands to re-disturbance. If we could do this, we would measure the functional capacity of the ecosystem to supply the energy, water and nutrients necessary for development of these plant communities, but truly capture the spirit of the "capability" part of the clause – that is, the capacity to support similar ecosystems as those that existed in the pre-disturbance ecosystems, even though the *form* of these ecosystems may not be identical.

c. Further, if we want equivalent capability for organisms (wildlife, humans) that evolved in concert with the pre-disturbance, Holocene landscape, then we do need to approximate the form of these ecosystems. So, I think we need to measure presence and abundance of species characteristic of the pre-disturbance landscape on the reclaimed landscape. Again, this could be best understood as a trajectory, where initially there may be few characteristic species on a reclaimed landscape, with this number increasing as reclaimed vegetation communities mature. Actual assessment could work in one of two ways:

   i. Assessment against ranges of natural variation for vegetation species composition metrics derived from mature, pre-disturbance communities. We would expect that initial similarity (e.g., number of characteristic species on the reclaimed landscape) would be low (i.e., the bottom end of ranges of natural variation, or even below these ranges), but would increase over time as these communities mature.

   ii. Assessment against ranges of natural variation for vegetation species composition metrics derived from an understanding of pyrogenic stand dynamics. For equivalent capability, we would expect reclaimed metrics to be within ranges of natural variation, but would expect that these ranges themselves would change with stand age. Of these two options, the second is probably the safer one, as continued indexing and assessment of adjacent pyrogenic dynamics protects against assessment versus targets that are no longer achievable due to large-scale systemic alterations such as climate change.

5. Personally, I do not find the concept of "end land use" to be a particularly useful one, as it presumes that we have some knowledge of what humans (and other organisms?) might be doing on a landscape 100 years from now. For instance, will the concept of commercial forestry, as defined by today's merchantability limits, be a useful one in a future world where vegetation is harvested for biomass energy production rather than pulp or sawlogs? I would prefer the approach taken in #4, above, where we say, if we can create communities that have similar function and form to non-mined (adjacent or

	undisturbed) communities, then these communities will be capable of supporting a range of possible end land uses, some of which we probably can't conceive of at the moment. Nevertheless, I think the primary end land uses that should be considered for the reclaimed landscape are wildlife habitat and traditional use, which are probably inseparable and highly related. I think that what has been the primary end land use guiding reclamation, commercial forestry, is of little interest, except that it allows application of standards (stocking, growth rates) that provide proxy measures of Net Primary Productivity. I think that there may be some value in discussion of "alternative" end land uses, such as intensive motorized recreation parks or high-management, high-yield plantation forestry, but don't see these as being potential significant components of the reclaimed landscape. I think that the important element in considering "alternative" end land uses, at least the ones I considered above, is recognizing the trade-off of relinquishing some "equivalent capability" – e.g., a motorsports park may not have equivalent capability for *any* ecological values, and plantation forestry may not have equivalent capability as wildlife habitat or for traditional use – for achievement of some other values on some other landscapes. This takes us beyond the reclamation debate, and into the land-use planning, LARP arena. For instance, we may recognize that protection of ecosystems on some proportion of the landscape from any industrial development is crucial for the maintenance of ecosystem integrity, and for the maintenance of our understanding on non-industrial ecosystem conditions. However, such protection may require a reduction in the AAC of forest licensees. To compensate for this, we may wish to try to grow and allocate increased cut on an already disturbed reclaimed environment (whether this increased yield is achievable in these environments is another question). Or, we may recognize that maintenance of ecological values in the non-mine environment requires limitation of motorized access to this environment, but wish to provide an "outlet" for recreational users of motorized vehicles. The challenge here, then, is to contextualize the trade-off, and accept a reduction in reclaimed equivalent capability in order to achieve broader goals.
	1. Improving information to the public; current perceptions do not tell the whole story. Industry needs to pick up the pace; RC's are needed to demonstrate the good work done. Government needs to follow through in applying/enforcing requirements (Tailings). Research needs to focus on issues in the field – it has to be applied. 2. We have the capability; we need the will to apply it. 3. Equivalent capability will lead to functional ecosystems given the time to do so. 4. Applying the criteria and refining them as required recognizing the timelines for ecosystem development are long. 5. Forestry, Wildlife habitat including Wetlands.

	6. Public acceptance including First Nations. The will of Industry and Government to make it happen and communicate the results as they happen.
	1. Key challenges: unclear if such reclamation can be actually be achieved; unclear if it is economically feasible; unclear if adequate provision is being made to cover the costs, increasing inventory of area to be reclaimed. 2. Managing contaminants is not the same as creating a healthy biosphere. There are unresolved differences of opinion about the success of companies' current efforts to keep contaminants in check. 3. So far, the current reclamation requirement does not appear to have produced reclamation to functional boreal ecosystems and landscapes on a large scale. 4. Recognizing achievement of equivalent capability presumably requires baseline information on the capability of undisturbed landscapes. This implies need for strategic assessment of land use capability, and for support of monitoring initiatives such as Alberta Biodiversity Monitoring Institute. 5. Desirable end uses are for Alberta stakeholders to determine. As noted earlier, is there a need to distinguish the weight that should be assigned to end land uses, based on whether they are merely "desirable", or backed up by the need to comply with legislation such as endangered species habitat provisions, or to respect Aboriginal constitutional and treaty rights? Limitations on possible economic uses include the relative isolation of the region. Institutional limitations include the need to coordinate planning of the reclamation of entire landscapes so that the plan is acceptable to all relevant stakeholders, the best technical outcomes are achieved, and the cost burden is shared equitably among companies. In this context, it is worth noting that multi-stakeholder initiatives in the oil sands have a patchy history of success.
	1. Four top challenges 1. Timelines must be determined, and be implemented 2. Adequate liability management practices 3. Acceptable post-operational land use decisions 4. Public acceptance of expansive changes to the landscape 3. LCCS is probably close to achieving the expectation of a healthy boreal ecosystem 4. Achieve equivalent land capability – the lack of accepted adverse effects; buy-in by informed stakeholders including taxpayers that will cover any liability cost associated with current decisions. 6. Key challenges – semi-solid landforms; limited nutrient supply; public reluctance to accept any change from "pristine" pre-disturbance conditions

	#1 – The greatest challenge is our gaps in knowledge, which affect assurance that we will reach acceptable reclamation outcomes. Reclamation takes generations to mature. The conundrum is that certification must occur before this maturation occurs. We don't know what initial conditions we need to set up to achieve final outcomes. We don't know what final outcomes will look like; depending on which initial conditions we set up. Essentially, we don't have the equations that describe the relationship between initial conditions all the way to end outcome. Years of research are needed to establish this. Good pilot reclamation sites are needed to advance this work. Another challenge is the lack of knowledge as to what is expected of reclamation, although this is a big focus as CEMA currently. #2 – No comment #3 – We are very far from "achieving a functional boreal ecosystem". Having equivalent as a statement is useful to set some very high-level direction. However, it seems that this stops short of providing real directions since the common criticism is that no one knows what this means. Thus, at this time, equivalent capability does not achieve much. It needs to be defined – not only in words, but in terms of empirical knowledge. The LCCS does not come close to achieving the stated goal. #4 – The million dollar question. You would need the empirical relationships as per #1 above. #5 – The range of possibilities is unknown. End land uses that require "zero maintenance", such as sustainable and functional boreal ecosystems, may or may not be achievable, especially considering climate change. I'm reasonably sure that high maintenance end land uses are possible, such as nurseries, etc. Since the land is already disturbed, it may make sense to use this land for human uses rather than clearing new land. There are many examples in Europe of communities living alongside of reclamation. #6 – The lack of dialogue.
	#4 can be broader. What metrics can be used to determine whether the landscape is functioning appropriately and natural processes continue?
	3 LCCS is overemphasized in this question as its role is no longer to predict productivity. Suggested wording; Does the current approvals system achieve the expectation of having functional boreal ecosystems and landscape?
	1. (1) Managing tailings; eliminating wet tailings (2) reconstructing wetland features (fens, bogs, muskeg) (3) returning landscapes to as close to pre-disturbance as possible (4) speeding up reclamation 2. No 3. Functioning – maybe; but what we want is health, functioning ecosystems that meet stakeholder expectations for a variety of end land uses; doing the minimum is not

	acceptable 4. Need a set of indicators; in Fort McKay we have reclamation keystone cultural species that would indicate success – the presence of beaver for example or ratroot 5. That needs to be discussed by all end land users 6. These have been discussed above
	1. Top 4 challenges – a. Defining a clear definition of reclamation goals and desired outcomes on a regional scale and site-specific scale. This is particularly important for wetlands because wetlands constitute such a large proportion of the pre-disturbance landscape, yet current reclamation plans indicate that they will be reclaimed to a much smaller proportion of the landscape. 2. Required capability to manage contaminants. Need much more work and research on potential of wetlands to act as waste water treatment areas for dealing with processed tailings water. Generally insufficient study and knowledge on this key issue. 3. Equivalent capability, LCCS – Concept that does not clearly translate into setting clear, consistent and measurable goals for achieving reclamation success. LCCS is forestry-focused and sends a confusing message for defining desirable reclamation outcomes for wetlands. 4. Site has equivalent land capability if has similar attributes to natural, healthy, similar seral-stage ecosites. Also the proportion of ecosystems on the landscape is similar to pre-disturbance conditions. 5. Possible and desirable end land uses – Wetlands that are healthy, functional, with similar biodiversity and community composition. Wetland types - marshes, shallow water wetlands, swamps, and if possible early successional peat-forming wetlands. Desirable - The proportion of wetlands on the landscape should be similar to pre-disturbance conditions, within what is feasible given mining operation best practices – e.g. end pit lakes, volume of overburden, landform capability etc. 6. Key challenges to achieve these desired end land uses – a. Institutional acceptance in government and industry to recognize wetlands as a highly desirable end land use. b. Development of regulatory policies to clearly define desired reclamation goals (influenced by the community) and outcomes that is clear, consistent and measurable so that they can be easily understood, implemented, monitored and certified.
	The oil sands are a world class resource that will attract attention, investment and controversy for decades and generations to come. The mines are the most, and will likely to continue to be the most visible and productive component of the oil sands. Reclamation of the mines will be a high profile topic for years.

Where ever management chooses to go with reclamation, a few basic characteristics should underpin the development, validation and implementation of the entire system.

a) Scientifically Credible – the research and operational implementation system needs to be built on a foundation of scientific credibility. This credibility needs to be actively maintained and must include independent peer-review that is conducted in an open and transparent manner;

b) Coordinated Approach – This is an area that should not provide or be thought to provide different companies with a competitive advantage. The entire system should be developed and managed in a systematic, deliberate, and coordinated manner to maximize learning, maximize success, and expedite successful reclamation. Reclamation should be a community undertaking.

c) Independent and Objective – Consider having the knowledge systems (research, compliance monitoring, and performance monitoring) that underpin reclamation management operate at arm's length from oil-sands stakeholders including industry and the regulator. This organizational structure would be tasked with using world-class science to support reclamation. It would also produce trusted, factually based results in a value-neutral way;

d) Standardized Repository for Data and knowledge – high quality data and information management is housed and managed in standardized place to ensure broad, timely and accurate access;

e) Transparent Operations – the science must be transparent and trusted;

e) Public Access to Data – research and performance monitoring must be publicly accessible. Compliance monitoring should be made publicly accessible to the degree practical;

f) Intuitive and Understandable – The science behind reclamation and reclamation assessments should be communicated to the energy industry, regulator, and the public (where appropriate) in a simple, intuitive and understandable manner.

g) Relevant – the systems must be specifically and deliberately designed to address the needs of stakeholders in the minable oil sands. The organization responsible for the science must be committed to providing relevant products as part of its core business.

h) Cost-effective – the knowledge system should be developed in a coordinated, and therefore, cost-effective manner. If the science can also be used to support reclamation in other parts of Alberta and Canada – that would be good.

Other considerations (recommendations primarily come from the United States' National Research Council) :

a) Consider that the research, compliance monitoring and performance monitoring systems associated with reclamation be managed in a non-regulatory and non-industry organization. A monitoring system housed within a regulatory agency or industry will face problems of internal conflict of interest (particularly around communication),

changing priorities, and data confidentiality. Optics around credibility will likely be an issue also.

b) The organization responsible for the reclamation knowledge system needs to make it the highest priority internally and in its presentations to stakeholders.

c) The organization needs to have predictable, stable, long-term funding devoted to the business of reclamation research, compliance monitoring, and performance monitoring. The funding model must be robust to changing political priorities and economic down-turns. Large fluctuations in funding will seriously damage the program.

d) The reclamation knowledge system should have a strong administrative and scientific team capable of providing the initiative with high-quality leadership that is required for such a large and highly visible challenge.

e) The organization running the reclamation knowledge system should have strong familiarity with the resource types being evaluated. This can occur through internal capacity or through having timely and open access to such expertise.

f) The organization running the reclamation knowledge system should have a strong scientific and management reputation, making it easier to attract and retain top professional staff.

g) The organization running the program should be in close communication with agencies that will administer management and policy (e.g., the management system).

h) The organization running the program cannot be an advocacy organization. It must remain entirely value neutral – this may be challenging if the organization(s) are housed in a regulatory government ministry, industry, or the environmental community.

Input Request #7: Next Steps (Section 8)

INPUT REQUEST #7: DO YOU HAVE ANY QUESTIONS REGARDING THE NEXT STEPS. Do you have any other questions or comments you would like to share?

I think we need to be looking at restoring ecological processes so things like nutrient cycling processes are much more important than "equivalent capability" (whatever that means). Resilience to and re-establishment of natural disturbance elements is critical for creation of fully functional ecosystems.

I think there are basically two main elements that are challenging restoration of oil sands sites - the lack of social / spiritual values incorporated in the design of restoration programs and the failure to recognize the value of early serial species in re-establishing natural ecological processes and services.

	Basically you will see that I think the whole personal and cultural values side of holistic ecological restoration is missing - you can get all the science stuff right, but if you don't get the social and cultural (and I would add spiritual) things right you will not achieve effective restoration.
	No questions regarding Next Steps. Overall, this looks like a very good approach and, based on my observations of how well the Biodiversity Workshop went in September, it should provide very useful guidance. One final suggestion – there is a lot to cover so when preparing the agenda I suggest you make it a long day! Perhaps followed by a dinner where participants can discuss issues amongst themselves, always useful for networking across institutions. Email: Please find attached my thoughts on the Dialogue discussion approach. Overall it is very sound and should provide the basis for very good outcomes, assuming of course that the day itself is well structured, facilitated and tightly managed.
	Lots of questions for a 1 day workshop! Make sure you have a strong facilitator or little will be accomplished! In spite of my numerous criticisms, congratulations on tackling the key issue of considering alternate land uses in the oil sands! Bonne chance!
	It will be critical to initiate some dialogue regarding in situ recovery. This is not something to be addressed in the workshop, but will be needed in the future.
	I hope everybody will be heard, and not only the most vocal and extraverted well-spoken individuals. There are many great ideas out there that are often overlooked. Scientists sometimes treat the environment as a business and are territorial.
	I think we need to be looking at restoring ecological processes so things like nutrient cycling processes are much more important than "equivalent capability" (whatever that means). Resilience to and re-establishment of natural disturbance elements is critical for creation of fully functional ecosystems. Basically you will see that I think the whole personal and cultural values side of holistic ecological restoration is missing – you can get all the science stuff right, but if you don't get the social and cultural (and I would add spiritual) things right you will not achieve effective restoration.
	I'll do my best to have something written and submitted by then. Unfortunately, I have a briefing meeting with Minister Mel Knight that day which conflicts with the Challenge Dialogue but I'll be there in spirit and text.
	No questions – just a statement that I am very willing to participate in the planned May 27th workshop.
	I am curious to see how this process will relate to the overall effort of reclamation in the oil sands.

	I appreciate the opportunity to participate in this survey, and look forward to seeing the process develop.
	How do you decide who will participate in the next steps?
	The discussion points to the need for regulatory agencies to collaborate on how to achieve an alignment of mandate and objectives to resolve the problems that we see. Additional steps will also include the need for regulators to work with industry and stakeholders in an iterative fashion while assessing the alternatives and criteria to achieve the objectives.
	Reclamation is successful both in the oil sands and other large surface disturbances in our province. It is important for the public to recognize the difference between reclamation and restoration and be amenable to a variety of land uses based on need and feasibility.
	No
	No questions or comments.
	Sec 7. 1. We need appropriate plant materials to jump start the trajectories. 2. We do have the required capability to manage and contain contaminants to create a healthy biosphere. 3. We have to see if it works, but do believe. 4. Sustained productivity and providing values it is intended for. 5. Not only trees, but the various life forms, aesthetics, recreation, aboriginal way of life, etc. 6. Well, we want our children to know these lands the same way we have known it. Should I say we are borrowing this lands form our children. Hope you get the meaning. **INPUT REQUEST #6: PLEASE USE** Transparency is important thorough all projects if we are to succeed in restoring oil sands disturbances for the benefit of future generations. At the end of the discussion, we should have a platform where we can work together and not in silos.
	What type of workshop are you intending to facilitate?
	Will the final report be provided to all those who participated (written an in person) or just released on the website?
	I think it is important to highlight that oil sands reclamation is a very large experiment that is now underway for many projects over a 600 km^2 area, given that successful reclamation of

	tailings have never to my knowledge been adequately demonstrated. Shouldn't regulators demand performance for existing projects prior to approving more disturbances?
	Very interesting exercise. I hope that my input is of some value.
	Thank you for the opportunity to participate. I commend OSRIN for initiating this process and strongly encourage its continuation in the long term. I also strongly believe the results of this process need to provide recommendations on policy/regulation to Government as well as field recommendations to Industry.
	Is it required to travel to Edmonton for any follow-up, or will it be possible to participate remotely? Is participation in this exercise confidential? As far as possible we prefer to disclose our participation in any policy initiatives

APPENDIX 3: Progress Report

A summary Progress Report was issued as well as an Appendix that provided all of the content of the progress Report plus more details. We have reproduced the more detailed Appendix here.

PURPOSE OF THIS APPENDIX

This Appendix serves as a detailed companion document to the more abbreviated Progress Report. This document contains the same summative material that is found in the Progress Report but also includes more detailed analyses and more unattributed illustrative quotes from the feedback we received to the Challenge Paper. While much greater in length this document follows the same structure used in the Progress Report.

SUMMARY OF THE FEEDBACK RECEIVED

Forty-three (43) people provided feedback on the Challenge Paper. In many case the feedback was very complete (many people responded to all aspects of the Challenge Paper) and rich with diverse reactions, suggestions and other questions. The Organizing Team very encouraged with the extent, depth and calibre of the responses and hopes that even the raw response information in the Consolidated Feedback document will be immediately useful resource materials for the with their own work.

The table below summarizes the feedback we received.

Input Request	# individuals providing comment	# pages of comment received	Comment
Key Challenge	43	11	
Background	43	28	Between 4 and 20 responses were received for each statement
Expected Outcomes	42	10	
Assumptions	43	29	Between 8 and 26 responses were received for each assumption statement
Critical Questions	41	20	Between 18-28 responses for each question
Next Steps	23	3	
Total	42 individuals	101 pages	

The 43 individuals providing comment are affiliated with a diversity of organizations: 12 with the Alberta government, 9 with academia, 7 with consulting firms, 6 with industry, 6 with research-technology organizations, 2 with non-government organizations and 1 working with First Nations in the oil sands area.

We assume that among those who have not yet provided feedback, most if not all, of you will still follow the Dialogue and are interested in seeing how this journey evolves and where it might take us. Your comments on this Progress Report are appreciated.

We commit to honour and respect your contribution by:

- using your feedback to shape the next steps of the Dialogue including the Workshop
- working creatively to expand and sustain an open, frank Dialogue
- assisting participants to gain alignment around some priority ideas concerning an reclamation in the oil sands area

We invite you to hold us to this commitment.

KEY CHALLENGE FEEDBACK

The original proposed Key Challenge for this Dialogue was:

To engage a diverse set of reclamation-related domain experts and stakeholders in a purposeful conversation that is focused on: (1) identifying challenges and required timelines in managing and containing contaminants, and reclaiming to equivalent capability; and (2) exploring the feasibility of creating alternative desirable end land uses.

Degree of Alignment and Nature of the Feedback Received

Everyone who provided feedback (43) responded to the Key Challenge Statement. A number of the responses were comprehensive. Twenty-two (22) people were aligned with the Key Challenge statement, some with minor caveats. Another fourteen (14) were somewhat aligned offering adjustments or suggestions for addition. Four (4) respondents were not-aligned each with constructive suggestions for improving its relevance, scope and emphasis.

It is very clear to the Organizing Team that you spent considerable time and energy in reviewing the Challenge paper and providing thoughtful feedback. A number of things became quite apparent in reviewing the feedback:

- many of you these are not just subjects of interest or professional curiosity, they are matters that evoke strong, passionate feelings
- there are some very strongly held and widely divergent beliefs on certain topics that will require dedicated discussions to fully and effectively explore them
- we tried to roll too many important challenges into this one Dialogue

The overall sense of the feedback taken as a whole is the absence of a systemic view of the reclamation challenge. Nearly everyone expressed a deep understanding of parts of the challenge, but often what was missing was putting those parts into a systemic context. The feedback reads rather like the story of the blind men and the elephant. In describing the elephant, each concluded that the elephant was like the part of the elephant that he could feel. The leg was like a tree; the tail like a rope; the trunk, a hose; the side; a wall; and so on.

Reflection on the Feedback to the Key Challenge and the Dialogue Overall

As a result of these observations we conclude that the remainder of the Dialogue (including the June workshop) can proceed in one of two ways:

1. Focusing on one particular challenge topic such as the feasibility of creating alternative desired end land uses, or the concept and application of equivalent land capability, or the challenges related to the timeframe to achieve reclamation success; or
2. Focusing on the exploration of a more integrated and systemic view of these same challenge topics (listed in '1') as they relate to and affect the success of reclamation.

We feel the latter approach is preferable for two reasons. First, it has the potential to identify some immediate actions that OSRIN, and others, can take to explain, design and develop the desired system within which oil sands reclamation should occur. It also has the potential to create a framework within which we could start to synthesize an oil sands state-of the-art summary (a clear desire of many respondents) and to identify critical knowledge, technical, or process related gaps.

This approach for the moment would utilize a less in-depth look at the key issues already identified by participants in the dialogue in order to explore key linkages and interdependencies within the system. Thus we will discuss alternative desirable land uses, equivalent land capability, and the timeframe-related considerations for reclamation success, not in isolation, but in terms of the overall reclamation system and how decisions in one area impact other areas.

We suggest that the more in-depth examination of individual topics, identified in the comments to date or that surface in the workshop, be addressed in subsequent venues. In particular, OSRIN is already exploring a separate workshop-format discussion of equivalent land capability.

Discussion of the Feedback

The revised Key Challenge statement reflects a more holistic view of the challenges facing the reclamation community of practice than the original. The feedback suggested that a more systemic approach was needed.

- *I would like to see also some kind of overall idea for a plan and a "reclamation vision" for the whole mining area, a goal to achieve, an end point that should more clearly reach beyond the "equivalent capacity" objective, some kind of a holistic approach that would combine ideas of the general public, Albertans, and local communities including aboriginal groups.*
- *I don't see a good vision for what this exercise is trying to accomplish. Is it "responsible use of Alberta's oil sands"? This would greatly assist me in directing my comments.*
- *The statements also don't recognize the natural Life cycle of mining and how the current reclamation matters relate to that.*

The initial focus of the systemic view is on the desired end state of reclamation, i.e., what constitutes success. We assume this end state is the end-land use that is the aiming point for reclamation.

The original key challenge statement was focused on specific aspects of remediation and reclamation and as such missed the many of the broader, more systemic concerns of the group. In other words the original key challenge focused on some discrete topics out of context.

Land-use Options

Among a number of similar reactions the following three comments illustrate the importance that some Dialogue participants place on this topic.

- *I am thrilled that the notion of alternate land uses is being explored by OSRIN. This is a topic much overdue and hopefully no imaginative alternate land use ideas will be discounted.*
- *Would like to see the overall objectives discussed (i.e., under what conditions could alternative closure objectives be considered?)*
- *Creating alternative end land uses will be a lot easier than reclaiming to equivalent capability (or something that looks natural). Do you want to explore the feasibility or have a dialogue with stakeholders to determine if this is acceptable and what it may look like?*
- *It was apparent from the feedback that there were different views on whether or not alternative land uses were an option under the legislation, or, if they were an option, whether they should be allowed.*
- *Environmental Protection and Enhancement Act requires that the land should be reclaimed to a condition similar to pre-disturbed conditions. Why are we deviating from the legislation?*
- *What is the impetus for the creation of closure landscapes with novel land use capability, would it be cheaper to create a novel use than an equivalent to pre-disturbance forested landscape that the oil sand mines originally proposed and were approved for?*
- *Are there stakeholders who wish for potential novel closure land uses that would be more lucrative than the forest matrix and traditional land uses can provide? Is it relevant if the land is not capable of supporting such activity?*

There seems to be general alignment around the view that the overall reclamation goal is to return to a self-sustaining productive boreal forest ecosystem. Understandably therefore some people wondered why options would be considered. These are important questions to answer because they set the boundaries within which mine reclamation planning, and related public dialogue on suitability of reclamation plans, are carried out. Without answers to these questions companies will continue to propose the same (self-sustaining productive boreal forest ecosystem)

reclamation goals rather than risk undue delay while the general concepts of alternative land uses are debated. As a result regional stakeholders may lose the potential opportunities that alternatives could bring.

- *In conclusion, the most appropriate use of the reclaimed oil sand mines post-closure is a multiple land-use strategy of a forest matrix managed for clean water quality, timber, non-timber values and traditional land uses. Intensive management of the forest landbase in partnership with the non-timber values would promote the highest value end uses for the next economy. Forestry and recreational tourism may be the most sustainable and fiscally attractive alternatives available in the oil sands closure landscape.*
- *Alternative end uses - …We believe the return of Boreal forest ecosystems on our reclaimed lands is a reasonable and prudent end land use.*
- *… we need to explore allowing alternate end land uses before we can explore their feasibility. Is there not an expectation by Al-Pac that the end land use is a functioning forest ecosystem? So are bison pastures acceptable? … I trust end land use is an issue separate from equivalent land capability.*
- *Creating alternative desirable end land uses assumes that there's a strong desire or a need to change current planned end land uses. … What needs changing? With the understanding that there is not a lot of flexibility of end of mine life landforms and where they are/what materials remain (unless technology changes significantly), ask how end land uses can change. The current overarching goal is return to locally common boreal forest… would the changes still persist within that goal?*

Some people asked "Alternative to what?" Some people asked if this meant allowing different uses in a reconstructed boreal forest ecosystem (e.g., forestry, hunting, fishing, berry picking, hiking, camping, quadding, etc.) or if it meant creating something different than a boreal forest ecosystem with a specific use in mind (e.g., a bison ranch, an ATV park, a golf course, a campsite, an industrial park). In a similar vein, some people asked if this was about allowing temporary uses with the idea that the land would then be returned to a productive boreal forest ecosystem (i.e., the reclaimed area has the capability of a boreal forest ecosystem) or if these were permanent changes (i.e., the capability has been restricted to one or more specific uses).

- *Alternative to what? Are we talking about end land uses alternative to the commonly cited options of commercial forestry, traditional use, and wildlife habitat (e.g., intensive-recreation sites, industrial parks, high-management plantation forestry), or are we simply discussing creating different end land uses on the post-closure landscape? Nevertheless, I am intrigued.*
- *Does this mean designing the reclaimed landscape as golf courses and feedlots and sandy dune parks for ATV use? Or does it mean creating alternative ecosystems? (e.g., saline marshes instead of freshwater fens).*

Some people pointed out that selecting appropriate land uses is a public, values-driven process. Once the decision is made on appropriate land use the mining and reclamation specialists can then get engaged to deliver the reclamation plan.

- *… stakeholders should set the direction and technical experts should work on the problem as defined by the stakeholders. This is a model that works well if it is well defined. Related to this, I don't disagree with the intent of the two statements (i.e. identifying challenges in reclaiming to equivalent capability and exploring the creation of alternative end land uses). However, these require two different skill sets. The first is very much a technical debate. The second is not. This all comes back to the same question: Do you want to look at the problem from the top-down or bottom-up. I would recommend a top-down (stakeholder-driven) approach for now which would be a debate about what would be acceptable outcomes for the reclaimed land (define what equivalent capability is exactly). A second phase would have technical experts examine the challenges in this endeavour.*
- *End land uses are derived on a value basis by stakeholders – what is valued by one may not be as valuable, or even more valuable to another. Most end land uses are less alternatives than a balance of values that will change over time as the land (and reclamation) develops.*
- *Currently EIAs for new projects come with pre-set end land uses. Where can we feed into the discussions, where can changes be made, and when/how and by whom do these changes get recommended/suggested when we are looking at a specific project application?*

If alternative land uses are to be considered we need to explore the following line of questioning:

1. What uses should be considered (and what uses should not be considered)? Are there examples in Alberta of alternative land uses being allowed and being certified?
    - *…several other jurisdictions (west coast of Australia, Europe, etc.) allows for a variety of industrial site remediation, including conversion to public use (parkland, recreational areas, farms, shopping districts, sports facilities, etc.) with full support of the local governments and general public. One argument used is that it is better to develop on already disturbed land than to disturb additional areas.*
    - *Any land use that supported by the lease owners, regulators, and the public. These could include industrial parks, housing developments, golf courses, farms, commercial forest, wetlands, parkland, etc.*
2. Are there any specific constraints that should guide the selection and approval of alternative land uses? For example: (a) Where in the region are alternatives most/least appropriate? (b) Which landform types are most/least suitable for alternative uses? (c) Will the Lower Athabasca Regional Plan say anything about

land uses? (d) What existing policy documents describe land use outcomes and decision processes?

- *Consideration should be made to the scale of the reclamation. If we are considering creating alternative desirable end land uses, is this on a site, project or landscape level.*
- *The key piece that is missing in this challenge statement … is how the broader land use framework will guide/inform what alternative land uses are desirable and where they should be placed. The foundations for creating these alternative land uses exist on a lease scale, but there is little guidance on how to plan for and integrate these land uses across the region.*

3. What criteria should be used to determine if an alternative use is viable and useful (i.e., meets the test of equivalent land capability)? For example: (a) Who does the option benefit? (b) Is there a viable proponent for the option who has the capacity to continue management of the site
   - *Is this for the good of the people of Alberta today or in 1000 years? Is it the people residing in Calgary, working at the oil sands sites, or those living within site of the facilities? How much consideration needs to be made for those living in other parts of the world, supplying the materials and services used here, or purchasing and utilising the products produced?*
4. What is the process for approving the alternative use (current practice and recommended practice)?
   - End land use needs to be agreed upon with local stakeholder interests at the forefront.
5. What regulatory land management requirements need to change if an alternate land use is approved?
6. What criteria are available, or need to be developed, to certify alternative land use areas?

Interestingly in all of the feedback only one person mentioned the recommendations of the Oil Sands Mining End Land Use Committee. Perhaps a review of those Recommendations, plus discussions around the above questions, would help shape this component of the Dialogue from this point forward.

Ultimately is might lead to the formulation of different policy options that would guide industry on what land use options could be considered for oil sands mine reclamation and the preferred process for considering and approving such options. If the recommendations are that further work is required OSRIN could work with government, industry and other interested parties to identify specific research opportunities.

Equivalent Land Capability

Equivalent land capability was a major element of discussion for many participants. It is evident from the range of views that there is significant variability in how people interpret the definition of equivalent land capability in the *Conservation and Reclamation Regulation* and how it is applied to oil sands mines or boreal forest areas. Since this is the foundation of Alberta's regulatory approach to reclamation there is a critical need for a focused dialogue on what this means for oil sands mines in a boreal forest setting.

- *Equivalent land capability is a poorly understood term which is so vague as to mean many different things to different people*
- *Determining reclamation success in equivalent land capability in the oil sands is a major challenge the operators are currently being faced with.*
- *Maybe this challenge should include developing a working framework for "equivalent capability".*
- *Any discussion of "challenges and timelines" in reclaiming to equivalent capability must start with an exploration of how to truly define equivalent capability in such a way that its achievement can be assessed and documented. I think that this is also an appropriate part of the discussion.*

Three different approaches could be taken to this important discussion.

1. We could make the focus of this dialogue on further examination of the concept of "capability" and its application to reclamation.
2. We could focus the dialogue on a broader discussion of the "reclamation system", which would include further exploration of capability.
3. OSRIN could develop a separate Challenge Paper incorporating the feedback you have provided and use it to initiate another workshop in the fall to discuss this issue and develop recommendations.

Again, we believe that the second option of focusing the dialogue on the reclamation system has the greatest promise. The discussion of capability in that systemic context would provide significant additional input to a subsequent workshop should that still be desirable.

Timeframe for Reclamation and Defining Reclamation Success

Issues related to the time required to initiate reclamation and achieve success are at the core of much public concern about oil sands development. It should be evident that given enough time mined sites would be returned by natural processes to a natural equilibrium state. Indeed, one respondent even suggested that this might be considered a viable approach.

It seems virtually impossible that the hundreds to thousands of years that such an approach would take would be socially acceptable. That said, it is extremely important that the public have an understanding and realistic expectations regarding how rapidly mined sites can be

returned to a natural state. It might be instructive to consider the length of time required for reforestation of cut blocks to the point where they would be considered adequately reclaimed. Certainly the time required to reconstruct the landscape itself and then for vegetation to become established and mature to the stage of being considered" natural" should be longer than that required for re-establishment of a post-cutting forest. Are we allowing ourselves to be held to unrealistic expectations by the public because of a lack of information?

An additional element of timeframes for reclamation involves understanding why existing mine plans call for most reclamation to occur very late in the life of the project. This necessary delay in significant reclamation activity creates understandable concern over ensuring that the reclamation actually occurs. This leads to consideration of the system of financial surety by which the Province ensures that the mine sites are reclaimed at the end of the project.

At least two additional issues emerged that relate to reclamation timeframes.

- *…I would argue that decisions around what/how much/and over what time frames lands should be available for development, and what areas are too important to mine, deserve equal attention.*
- *Reclaiming to equivalent capability within prescribed timelines, - Without reference to timelines, "equivalent land capability" is essentially the same as "feasibility of creating alternate ELU". The lack of directed timelines is a widely recognized current weakness, should be identified, and will play an important differentiating role between "capability" and feasibility"*

The first is around the desire to have specified regulatory timeframes for reclamation to occur. There are different views on whether or not timeframes currently exist or if they would be useful. There seems to be an underlying belief that lands are not being reclaiming and therefore timeframes are required. There is a belief that the ERCB's Directive 074 is a good start in setting a reclamation timeframe.

- *Although reclamation is nominally required, I am not aware of any binding requirements for achieving an acceptable rate of terrestrial reclamation, and no ramifications for operators if progressive reclamation is not achieved.*
- *Where reclamation requirement timelines are not stipulated, and where no other disincentives to "defer" exist, reclamation is often slow to proceed.*
- *EPEA approvals are not the place to put binding reclamation timelines.*

The second is around when reclamation can be assessed as successful and therefore can be certified. CEMA is undertaking work on the reclamation certification process and certification requirements so further work by OSRIN may not be warranted at this time but we are open to suggestions.

Contamination and Remediation

Many people correctly pointed out that the issues of remediation and reclamation are separate and are addressed by people with very different specializations. There were different views on which chemicals were the ones we should be concerned about – salts and naphthenic acids were the ones most frequently mentioned but other pointed out that other (unnamed) chemicals were at least as problematic as naphthenic acids. There appears to be some uncertainty around the timeframe within which naphthenic acids are a contaminant of concern.

- *Dealing with contaminants is often considered to be remediation and not reclamation, and this topic (remediation) has generally not been discussed in the document so it seems to come out of nowhere.*
- *Managing and containing contaminants is an industrial operations issue (i.e., sulphur, coke, process-affected waters), not necessarily a reclamation issue (although it is linked at some point). One deals with contaminants through remediation, not reclamation.*
- *There is an understanding that "reclaiming to equivalent capability" means that contaminants will be dealt with through reclamation. Keep it simple*
- *I am not certain as to the definition envisioned for the term "contaminants" – for the purpose of my response I have interpreted the term broadly, and taken it to mean not just hydrocarbon-related substances, but also more ubiquitous substances associated with mine wastes such as salts.*
- *One issue I have is in calling tailings or oil sands process affected water "contaminants". There is nothing that is added to the oil sands extraction process, in significant amounts, that is a contaminant. The toxicity issues are due to industry's practice of recycling process water for extraction. This concentrates the constituents that exist in the natural deposit; namely salts and naphthenic acids. Through retention time and managed water release, these constituents can be managed so as to have no negative effect to the environment. (However, no off site discharge criteria currently exist).*

We believe that a separate Challenge Paper and workshop could be very useful in identifying the key contamination and remediation challenges facing oil sands mines (including plant sites) and in identifying the current remediation expectations and capabilities. Arising from this Paper and workshop may be recommendations on the need for greater availability of information on key contaminants and the need to clarify the application of province-wide remediation standards or the development of oil sands specific remediation standards.

Proposed Revised Key Challenge

Based on the above line of thinking we have revised the Key Challenge statement for this Dialogue as follows.

> To engage a diverse set of domain experts and stakeholders in a purposeful dialogue to create a systems view of oil sands reclamation.

In this context, a "systems view" requires us to step back from our specific technical, regulatory or professional interests and look at the larger picture and connect all the "components" of reclamation into a system. One of the ways to do that is to ask a series of questions to help identify the parts of the system, such as:

- Why are we reclaiming?
- What are we reclaiming (e.g., overburden, tailings, pit lake, plant)?
- What are we reclaiming to?
- When should reclamation occur?
- How does it occur?
- What must happen before reclamation?
- How do we know it has been successful?
- When do we know it has been successful??
- What are the regulatory processes,
- What are the opportunities for public input, etc.?

We can then decide if we want to break each of the questions into sub-questions and so on until we are comfortable we are eliciting and have identified the key parts of the reclamation system. We can then ask ourselves – are there any of these components we don't understand, or that we need more information on.

A system map is an excellent way of presenting a picture of the parts of the system and their linkages and dependencies. There are several ways to create such map depending on what perspective you want to emphasize. As we reviewed and synthesized your feedback, recurring patterns and some common themes emerged. We have presented the 10 themes and the key discussion points within them into a very rough diagram (Figure 1 in section 4.2). This is one expression of the "oil sands reclamation system", but it does not show explicitly linkages or dependencies.

Figure 2 in section 4.2 presents another more process-oriented view of the "reclamation system." It identifies linkages and dependencies but does so in a rather simplistic and linear format (note, this Figure is provided solely to stimulate discussion and does not necessarily represent the actual way things are done today).

BACKGROUND STATEMENTS FEEDBACK

Twenty two (22) background statements were listed in section 4 of the Challenge Paper. Respondents were asked to state which statements they agree with, which ones require more clarification, which ones they strongly disagree with, and what other background information needs to be recognized. Following is a summary of the responses followed by a more detailed description and illustration of people's reactions.

Degree of Alignment and Nature of the Feedback Received

Overall there was general agreement with most of the 22 background statements, however typically with many caveats. In addition, we were alerted to several items that were missing from the background. Following are some of key points raised for three background statements that particularly raised some concerns.

- Background statement #3 regarding the cumulative extent of mined and reclaimed area (text and graph) raised more questions than it answered.
- Background statement #7 – there was almost universal agreement that the Land Capability Classification System (LCCS) is not appropriate or adequate.
- Background statement #8 and #10 – views were split about even – agree / disagree regarding the reclamation implications of the phrase "similar to pre-disturbance boreal landscapes" (#8) and regarding the reclamation requirement – "Under the government of Alberta's reclamation standards, companies are required to reclaim and remediate land to a state capable of supporting the same kinds of land uses as before disturbance" (#10).

Summary Tables of Responses for Each Background Statement

Between 5 and 22 responses were received for each background statement. Many responses were very detailed and elucidating. These are tallied below in series of tables, one per background statement starting on the next page. They note where there was agreement, conditional agreement and disagreement with the statement. For each background statement, we have also highlighted the key discussion points (themes) and the areas where people felt information was missing.

Agree	*Agree but...*	*Disagree*	*Σ*	***#1. SUMMARY OF MAJOR REGULATORY CHANGES AND DOCUMENTS*** ***The evolution of reclamation practice or progression of reclamation techniques over time is based on the changes in regulations and guidelines and overall government policy combined with research and experience gained through operational practice. The figure on the next page provides a summary of the major regulatory changes as well as "criteria" and "system" based documents used to provide guidance with respect to reclamation practice and mechanisms for measurement of reclamation success.***
5	**6**	**0**	***11***	**General agreement, most felt it was a useful summary.**

Selected Comments (not always verbatim):

- Also important that industry learn by doing, be adaptive - monitor, review, revise practices
- Mining and reclamation occurred prior to 1963
- The history demonstrates that regulations and reclamation strategies and practices are based on an agricultural model which hinders standards and approaches on disturbed forestland systems

Missing:

- Useful to also know drivers, objectives, future state intention behind these policies as they evolved
- Landscape Design Checklist[2]
- Athabasca Land Use documents.

Agree	*Agree but...*	*Disagree*	*Σ*	***#2. DIRECTIVE 074*** ***This directive sets out new requirements for the regulation of tailings operations associated with mineable oil sands. It is the first component of a larger initiative to regulate tailings management. The directive specifies performance criteria for the reduction of fluid tailings and the formation of trafficable deposits. These criteria are required to ensure that the Energy Resources Conservation Board (ERCB/Board) can hold mineable oil sands operators accountable for tailings management. Operators may use a suite of technologies to meet the requirements of this directive.***
4	**7**	**0**	***10***	**General agreement with the intention of Directive 074, a good start.**

Selected Comments (not always verbatim):

- Ability to achieve it soon uncertain, has to be proven, concerns investors too
- Contaminants - effects on people, water bodies?
- Needs follow-up and enforcement
- Is this part of reclamation process?

Agree	*Agree but...*	*Disagree*	*Σ*	***#3.* CUMULATIVE EXTENT OF MINED AND RECLAIMED AREAS** ***Cumulative Extent of Mined and Reclaimed Areas: The area being reclaimed is increasing slowly as lands become available for reclamation. Large increases in active area reflect the development of new mines or new mining and processing areas within an existing mine.***
-	**-**	**-**	***13***	**The statement and the graph raised more questions than they answered making judgment of the degree of agreement inappropriate.**

Selected Comments (not always verbatim):

- Unchanging progressive reclamation regulations should be encouraged
- Need to recognize mining life cycle affect on reclamation
- Easiest sites will be reclaimed first, most difficult last
- Area of land reclaimed is very disjoint small patches that add-up to good % but hard to imagine lease as a whole
- Likely that reclamation will increase linearly while mining exponentially
- Little publicly available information to validate this
- Foundation underpinning reclamation – equivalent capability – to a functional, similar post-closure landscape is untested
- Need to prevent tailings creation

Missing:

- Break the data down by mine, plant site and tailings impoundments
- Show time land is use for mining and time to reclaim

[2] See: http://www.cemaonline.ca/index.php/research-library/cat_view/305-research-library/308-reclamation-working-group-rwg/309-rwg-recommendations?start=5

- Show % increase over time
- Of these show those with certificates
- Significant portion of these reclaimed areas are "temporary" – the landform and materials will be changed / reworked

Agree	*Agree but...*	*Disagree*	*Σ*	***#4.* DEFERRAL OF RECLAMATION** ***Over the long term, many mine plans defer much of the reclamation towards the end of the mine life, with unreclaimed land largely comprising the most challenging areas represented by tailings impoundments and cells.***
6	**10**	**6**	***22***	**General agreement but deferral implying conscious delay concerns some.**

Selected Comments (not always verbatim):

- This is due to economics
- The tailings pond challenge is about the cost, not the technology
- Social license will be lost if not dealt with – progressive reclamation
- Typical of expanding industry but unwise to not aim to progressive reclamation
- Still lots of uncertainty – lots to learn
- Nitrogen emission and climate change effects positive and negative
- Deferring increases company default risk
- Mine plans reflect this reality, deferral not about reducing liability
- Companies need these lands for other operational purposes – when that use ends they will be reclaimed
- Directive 074 will help, but need other legislation to deal with legacy
- Dyke reclamation issues a concern
- Again, need to recognize mining life cycle effect on reclamation
- Development plans have not adequately considered alternatives which would reduce the active mining land area and permit more progressive reclamation, no policy to drive alternative mine development technologies that might help reclamation schedule
- Motivation to reclaim if site is no longer making money?
- Large areas used for infrastructure – the production landbase (tailings ponds, plant site) cannot be reclaimed until the end of mine / plant life
- Deferral implies earlier opportunity, there is not
- Decommissioned landforms ready for reclamation, are reclaimed
- There is a balance between reclamation objectives and realities of mine design and operation but expectation of faster reclamation exists in local community, specific timelines needed in approvals
- Lack of transparency to investors of long-term costs corporately and regulations allow discounting of long-term reclamation liabilities and obligations, changes could incent shorter timeframes

Missing:

- Why is this the case – not a fundamental choice by operators especially given posting reclamation security bonds for disturbed land
- Two key steps – End Land Use Plan Report and Recommendations adopted by Alberta Environmental Protection, and requirement for soils salvage in approvals (2006)
- EIAs generally predict 40% to 45% of area will be revegetated with last of oil sands removal thus deferral a necessity until end of mine life

Agree	*Agree but...*	*Disagree*	*Σ*	***#5.* RECLAMATION CERTIFICATION** ***In the Athabasca Boreal region only one company has applied for reclamation certification to date.***
3	**9**	**0**	***12***	**General agreement.**

Selected Comments (not always verbatim):

- Probably desirable given uncertainty and province assuming liability
- Is a failure of the certification process – undefined and changing requirements, objectives and timelines – makes it difficult for companies

Missing:

- The one application received certification in an isolated area, others could be applied for but are cannot be segregated from current operations
- The Reclamation Certificate requires lands to be completely withdrawn from ongoing operations – constrains requests for certification
- What about areas mostly or partially reclaimed
- Reason for this – one aspect is the nature of the liability date transfer to GOA
- Not good for public image, get the recognition of the good reclamation that has occurred
- What about certification of pipelines?

Agree	*Agree but...*	*Disagree*	*Σ*	***#6.* EQUIVALENT LAND CAPABILITY (DEFINITION)** ***Equivalent land capability means that the ability of the land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but that the individual land uses will not necessarily be identical (Conservation and Reclamation Regulation, EPEA).***
3	**10**	**0**	***13***	**General agreement with definition but much missing.**

Selected Comments (not always verbatim):

- Probably the most important issue in reclamation
- Need unambiguous definition
- Could be defined functionally, structurally, or by goods and services provided, and at what scale – stand level is false, must be landscape level
- Equivalent capability is the "good-as-new" approach which expands in some approvals to "locally common, self-sustaining boreal forest communities" which may set unrealistic expectations, the other approach is "all-land-uses-have-costs approach" whereby there are a number of reclamation constraints, capability and the constraints realities determine reclamation outcomes, not the requirements set by approvals
- We can grow trees but does it support prior values – biodiversity, wildlife, aboriginal?
- This is an agricultural model, does not consider subsoil nor geohydrology
- What is missing is its real life implementation
- Definition and its intent is to allow alternative uses in place of original uses, many feel there is only one way – reclaim soils and landscape conditions then consider other uses after–vastly different costs, alternate use discussions are avoided
- What management actions will result in equivalency, how determined, measured, communicated?
- This is a general statement but needs a lot of challenging specifics which can stifle creativity
- Many varied sometimes contradictory interpretations of this
- What does 'conservation' mean in the definition?

Agree	*Agree but...*	*Disagree*	*Σ*	***#7.* LAND CAPABILITY CLASSIFICATION SYSTEM (LCCS)** ***There are five classes of land recognized in the LCCS, rated according to potential and limitations for productive forest use. Classes are based on adjusted Canada Land Inventory categories, with Classes 1, 2, and 3 being capable of supporting commercial / productive forests, and Classes 4 and 5 being non-commercial / lower-productivity forest lands.***
13*	**0**	**0**	***13***	***Near-unanimous agreement that the LCCS is <u>not</u> appropriate or adequate.**

Selected Comments (not always verbatim):

- Needs an overhaul or new system – wrong tool for the job
- Other systems must be in place to classify equivalent capability in a reclamation context

- Based on agriculture soil model with surface soil focus
- Too agriculture and forestry commercial-market focused, not other goods and services
- Poor correlation with forest productivity
- Focuses on upland forest land use, not well-suited to other uses on "poorer" quality lands
- Need a parallel system for alternate uses
- Need more sophisticated tool with two purposes – ability to consider 3D aspects of landform-landscape effects on soil properties and linkage between soil properties and plant community response to guide revegetation

Agree	*Agree but...*	*Disagree*	*Σ*	***#8.* "SIMILAR TO PRE-DISTURBANCE BOREAL LANDSCAPES"** ***In the oil sands area, the definitions of reclamation and equivalent land capability imply that post-mining landscapes will be similar to pre-disturbance boreal landscapes, with functional terrestrial and wetland ecosystems that provide (for example) biodiversity and habitat, and provide for public and First Nations requirements.***
6	**3**	**4**	***13***	**Split views but with a few more people aligned with the concept than not.**

Selected Comments (not always verbatim):

- Definition of 'similar' is a sticking point, there will be many different views
- How similar, over what spatial and time scale?
- The goal is capable of supporting self-sustaining, locally common boreal forest
- The post-mining landscape is going to look different and not the same proportion of uplands, wetlands (or types), lakes as previously but will be able to function as ecosystems
- What's missing is how to implement this in real life
- It assumes landscapes are static and what of climate change
- Many uncertainties such as with wetlands

Agree	*Agree but...*	*Disagree*	*Σ*	***#9.* WETLAND RECLAMATION** ***Wetland Reclamation is defined as the creation of wetlands on disturbed land where they did not formerly exist or where their previous form has been entirely lost. Wetland restoration is a process of returning wetland function of a remnant wetland site, as it was before disturbance.***
4	**3**	**4**	***11***	**Mixed agreement with the statement prompting several comments.**

Selected Comments (not always verbatim):

- Existing statement very confusing
- These ecosystems are important functionally (more than we may think) and require criteria in full landscape context
- Wetlands should be considered part of the landscape complex including water bodies, not separately
- Creating wetlands a significant challenge
- Post-closure wetlands will be fundamentally different from what was there before

Agree	*Agree but...*	*Disagree*	*Σ*	***#10. RECLAMATION REQUIREMENT*** ***A key requirement for areas disturbed by industrial development. Under the government of Alberta's reclamation standards, companies are required to reclaim and remediate land to a state capable of supporting the same kinds of land uses as before disturbance.***
4	**4**	**5**	***13***	**Almost equally split views – agree / disagree.**

Selected Comments (not always verbatim):

- There are several contradictory statements – "the individual land uses will not necessarily be identical" is the correct one
- Companies are required to provide equivalent capability not to a state that would support the same kinds of land uses as before disturbance
- Equivalent land capability does not necessarily mean similar to predisturbance

- Equivalent land capability provides the necessary latitude to permit a change in land use that has equivalent perceived benefit
- Why exclude potential new uses for the future
- What about rate of reclamation
- Under the current regulatory regime reclamation success is dictated by the mine plans which are dictated by making money, progressive reclamation is very difficult under the current regime

Missing:

- No mention of compensation / mitigation or credits or compensation ratios for lost habitats

Agree	*Agree but...*	*Disagree*	*Σ*	***#11. OPERATOR LIABILITY*** ***For an oil sands mine, operator liability for reclamation ceases upon issuance of a reclamation certificate. For an oil sands processing plant, operator liability for reclamation ceases 25 years after issuance of a reclamation certificate. For all sites, the operator remains liable for contamination forever.***
4	**3**	**0**	***7***	**General agreement.**

Selected Comments (not always verbatim):

- Contaminant should be better defined
- Most reclamation issues dealt with during primary mining and reclamation making it extremely difficult and impractical to "correct" unsatisfactory outcomes and therefore making liability an empty concept when can be no action to correct it
- Liability over 15 to 25 years is likely workable but in perpetuity is unrealistic
- Does contamination include salts?;
- What if certified reclaimed EPLs start-off-gassing H_2S?

gree	*Agree but...*	*Disagree*	*Σ*	***#12. APPROVALS*** ***EPEA approvals are renewed every 10 years. This means that the older operations are operating under approvals and approval conditions that may be out of date. It needs to be understood how new standards and expectations will be brought into effect in spite of outdated approval conditions.***
3	**11**	**2**	***16***	**General agreement with this being a challenge.**

Selected Comments (not always verbatim):

- The oil sands reclamation operation is significant and moving the goal posts creates very high business and investor risks leading potentially to closure delays
- Companies will adopt requirement changes for new reclamation even if they are not legally required to do so
- Changes cannot be retroactive
- Grandfathering is an option
- "Best available" at the time not "out-of-date"
- What teeth do EPEA approvals have, are they ever denied?
- The statement should focus on how to adaptively manage the process within and external to EPEA approve to help ensure timely implementation of best management practices
- There is some confusion around the date, the reclamation activity and the standard applied

Agree	*Agree but...*	*Disagree*	*Σ*	***#13. RECLAMATION PLANS – LANDSCAPE CONSIDERATIONS*** ***Reclamation plans need to consider the type, size and distribution of naturally occurring landforms when post-mining landscape designs are developed. Current life of mine closure plans do not always project landscapes that resemble naturally occurring boreal landscapes; whereas EPEA approvals do require a naturally appearing post-mining landscape.***
2	**9**	**2**	***13***	**General agreement with the statement but it involves many considerations.**

Selected Comments (not always verbatim):

- Landscapes and landforms are likely the most important part of reclamation – determine what can be established and what will be maintained in the long-run
- What is important is the creation of landforms that fit within the reclaimed site and are integrated with the adjacent natural (or reclaimed) areas
- Reclaimed landforms may be constrained by material and geotech
- Appearances are nice by functions are critical
- I believe mine operators are required to work together on overall regional plan
- Definition of "natural appearance" is challenging – natural landscapes are shaped by massive forces of nature at massive scales and refined for millennia whereas mining landscapes are formed by relatively small forces, small scales much shorter refinement periods

Missing:

- The key need is for functional landscapes and landforms – ones that can handle post-closure climate land use and natural disturbance – i.e., functional watersheds, quality soils, stable slopes to withstand effects of water, wildfire, forest harvesting and people
- What's needed: regional closure watershed design and requirements, inter-lease planning, appropriate out of pit structures, salinity containment, and progressive management of tailings and process affected water (EPL)
- Recognition that the mining and extraction process increases material bulk by 20-25% - therefore the reclaimed landforms will have areas that must be higher than predevelopment
- Unrealistic to expect closure plan to address this – it's a plan not a detailed design

Agree	*Agree but...*	*Disagree*	*Σ*	***#14. GUIDELINES FOR RECLAMATION TO FOREST VEGETATION The second edition (December 2009) of the Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region has recently been released as a result of ongoing research and monitoring programs. It includes decision charts and defines the edatopic grid, ecosites, site types, and their characteristic species. The manual also provides guidance on declaration of end land-use and revegetation targets plus recommended actions to meet these targets. Indicators of revegetation success and methods to assess these indicators on reclaimed landscapes are also provided.***
5	**3**	**0**	***8***	**General agreement.**

Selected Comments (not always verbatim):

- Considerable improvement over predecessor but no consideration of climate change nor how reclamation practices need to be modified
- Question on how this work is reconciled with background statement #15 regarding targets, criteria and indicators

Agree	*Agree but...*	*Disagree*	*Σ*	***#15. TARGETS, CRITERIA AND INDICATORS The mineable oil sands region currently lacks a complete set of targets, criteria, indicators and regulatory thresholds for reclamation including those related to values such as biodiversity, wetlands, wildlife habitat, end land-use, landscape design, landforms and other public values.***
10	**4**	**3**	***18***	**General agreement was the dominant response.**

Selected Comments (not always verbatim):

- These need to be established to support reclamation certification but they should be practical
- Setting targets could become too subjective or too prescriptive
- In many cases the outcomes are well articulated in the closure plan on a mine-by-mine basis with science-based criteria and indicators
- The need for these is not necessarily the case if regulators and industry are on the same page in terms of outcomes and expectations
- We are limited by our knowledge not a reluctance to targets
- A lack of these creates investor uncertainty
- Without clarity it is impossible to assess the scale of reclamation liabilities and obligations
- Lack of these after years of committee work does not reflect well on effort expended – effective?

Missing:

- Rates of change and timelines so progress can be charted, some indices would be useful similar to those used in forestry

Agree	*Agree but...*	*Disagree*	*Σ*	*#16. WETLAND RECLAMATION CERTIFICATION* ***Criteria for certification of reclaimed wetlands have not been established (as of December 2007).***
10	**1**	**0**	**11**	**Complete agreement.**

Selected Comments (not always verbatim):

- Thinking on this is progressing
- A Landscape Capability Classification System for Wetlands would help address LCCS shortfalls
- There is a question of whether peatlands should separate
- Fens are a challenge – knowledge gaps
- Should broaden this to wetlands and water bodies, wetlands have not been established successfully on a large scale

Agree	*Agree but...*	*Disagree*	*Σ*	*#17. LAND-USE FRAMEWORK* ***Alberta's new Land-use Framework is a comprehensive approach to better manage public and private lands and natural resources. It provides a blueprint for land-use management and decision-making to address challenges related to rapid growth in and competing pressures of economic activity in oil and gas, forestry, mining, agriculture, recreation, housing, infrastructure, etc. The intention is to create a better balance across these different and sometimes competing interests in the use of land. The framework embraces a cumulative effects approach that looks at the potential of all impacts within a region rather than project-by-project. While decision-making authority remains at the local level, decisions will have to be aligned with provincial policy set out in the regional plans. In the case of the oils sands, this means alignment with the Lower Athabasca Regional Plan.***
6	**5**	**0**	***11***	**No disagreement, but some important caveats.**

Selected Comments (not always verbatim):

- Legacy development, reclamation and reclamation practices pre-LUF much be in the right context when evaluating success in meeting land use targets
- Together we can share a lesser footprint
- Until the final LARP product is finalized it is difficult to judge whether it will have any practical effect on reclamation objectives or practice – will probably take the "good-as-new" equivalent capability approach
- Failure to address the cumulative impacts of multiple projects created reputation risk for the entire oil sands sector

Agree	*Agree but...*	*Disagree*	*Σ*	*#18. INTEGRATED PLANNING* ***Recent EPEA approvals require that mines integrate their planning with adjacent lease holders and undisturbed lands. Whereas companies have responded indicating that such planning activities are underway, these analyses are only recently being considered on broader regional scales for the design on landscapes, drainage systems, and the potential sharing of landform and reclamation material.***
6	**5**	**0**	***11***	**No disagreement, but some important caveats.**

Selected Comments (not always verbatim):

- How practical is this when neighbours are offset in time, sometimes decades, from each other
- You can often run into cross liability so a GOA legal framework for resolving this would be helpful
- Criteria are need to make integrated planning enforceable
- Other integration considerations include local and regional management planning, utility corridors and resource recovery – silica, topsoil, peat, timber, gravel and non-renewable resources should be regulated to prevent wastage

- Need better understanding of impediments – is it $, liability, timing of work?
- Regional reclamation issues should be mainly the responsibility of GOA, not delegated to industry
- No one knows what integration means and there are few explicit regional objectives

Agree	*Agree but...*	*Disagree*	*Σ*	***#19. LANDSCAPE DESIGN*** ***Landforms are typically at the one to ten kilometre scale and include things like overburden dumps, tailings dykes and settling basins, lakes, wetlands, and rivers. Landscapes are at the 10-100 kilometre scale. They include all that one can see from a particular vantage point, are typically thought of as oil sand leases and adjacent areas, typically consist of ten to twenty landforms and are usually designed through the closure planning process.***
4	**2**	**0**	***6***	**General agreement.**

Selected Comments (not always verbatim):

- Planning of landforms is a function of mine planning and closure planning, not just closure planning
- Operators are driven by the requirement for resource conservation

Agree	*Agree but...*	*Disagree*	*Σ*	***#20. MINING LANDFORMS AND WETLANDS*** ***The surface mining of oil sands in NE Alberta produces several landforms and materials that are relevant to wetland reclamation:*** • ***mining excavations produce end-pits, a range of gradients and overburden piles;*** • ***extraction of bitumen from oil sands produces process-affected tailings containing water, sand, silts, clays, soluble organic chemicals (such as naphthenic acids and hydrocarbons), ammonia, heavy metals and salts;*** • ***process-affected materials that cannot be recycled are stored in settling basins (up to tens of square kilometres in surface area), where subsequent settlement and redistribution produces sand edges, mature fine tailings and process-affected water;\upgrading of bitumen to crude oil produces by-products like sulphur and coke that are stockpiled in a retrievable manner;*** • ***the mining and extraction processes increase the volume of materials (natural soils and separated soil components like overburden and tailings) by 20-25% over the initial pre-disturbance volume.*** • ***These changes fundamentally alter the topography, geochemistry and hydrology of the land. Reclamation must incorporate or accommodate these post-mining elements.***
6	**8**	**0**	***14***	**General agreement but a number of important additions and considerations.**

Selected Comments (not always verbatim):

- Operations do not produce the listed materials, they liberate them (and may concentrate them), very few of these are added to the process – they are natural components of the ore body or overburden
- Aspects of this are discussed in the Guideline for Wetland Establishment (CEMA, 2007)
- Reclamation success depends on careful management of toxicity related to salts and naphthenic acids, which have many unknowns – e.g., how they change over time in soils and water
- Not clear that wetlands can be re-established as they were before
- Wetlands should be able to be developed on any and all landforms as long as geotech requirements met and water quality managed in accordance with targeted vegetation communities
- Re- process-affected materials and settling basins – the situation will change over time with Directive 74 (and its expansion to address legacy and new fluid tailings) which will slow accumulation of fluid tailings, new solid tailings will be converted to reclaimable landforms
- Public and GOA sentiment seems unwilling to accept that settling basins are not reclaimable and contents not untreatable

Missing:

- Broaden focus to include processing waste landforms (e.g., coke, sulphur, tailings)
- Water management and water drainage should be added

- Add 'naturally occurring' to 'soluble organic chemicals'
- increased volume range should be 10-25%
- a statement about costs should be added – with 30 EPLs to be built there will be GOA maintenance costs at the point of transfer of liability

Agree	*Agree but...*	*Disagree*	*Σ*	***#21. WETLAND HABITAT AND VALUES*** ***Natural boreal wetlands are a critical habitat for many important wildlife species, including woodland caribou, moose, muskrat, beaver, waterfowl (particularly diving ducks) and amphibian. They link to the traditional way of life of local Aboriginal people.***
5	**5**	**0**	***10***	**General agreement with a few important additions and considerations.**

Selected Comments (not always verbatim):

- Natural boreal wetlands implies peatlands which tend to not be good habitat for waterfowl – lakes, swamps and marshes are better for these

Missing:

- Something on development approvals improperly negating treaty rights to hunt, trap and fish plus obligations to protect habitat under endangered species legislation

Agree	*Agree but...*	*Disagree*	*Σ*	***#22. WETLAND EXTENT*** **Natural boreal wetlands are a critical habitat for many important wildlife species, including woodland caribou, moose, muskrat, beaver, waterfowl (particularly diving ducks) and amphibian. They link to the traditional way of life of local Aboriginal people.**
0	**0**	***5***	***5***	**Agreement, no comments.**

Additional Background Suggested by the Respondents

In the feedback to the individual background statements above a number of items were noted that were missing. It was brought to attention that we neglected to mention at least two other developments that are germane to the oil sands reclamation challenge.

Responsible Actions: A Plan for Alberta's Oil Sands – The most recent development is the Alberta government's strategic plan titled *Responsible Actions: A Plan for Alberta's Oil Sands*. This plan brings together the results of an extensive stakeholder consultation process described in three reports prepared in 2007. The Responsible Actions plan is aligned with the Land-use Framework and the Provincial Energy Strategy. The plan is being implemented through Alberta government ministries and is coordinated by the Oil Sands Secretariat and the Land-use Secretariat. The vision in the plan states that: Alberta is a global leader in the innovative, responsible, and collaborative development of oil Sands. The benefits of development continue to support clean, healthy, and fiber communities for Albertans and future generations. Communities and development reside together in a manner that balances progress with environmental stewardship. One of the three outcomes for the plan is for a reduced environmental footprint. This is particularly relevant to this dialogue.

There are six strategies in the plan and in one form or another all of them have some relevance to the reclamation of the oil sands: (1) Develop Alberta's oil sands and environmentally responsible way; (2) Promote healthy communities and the quality of life that attracts and retains individuals,

families and businesses; (3) Maximize long-term value of all Albertans through economic growth, stability, and resource optimization; (4) Strengthen our proactive approach to aboriginal consultation with a view to reconciling interests; (5) Maximize research and innovation to further support sustainable development and unlock deposit's potential; (6) Increase available information, develop measurement systems, and enhance accountability and the management of the oil sands.

All of key success factors are similarly relevant to this Challenge Dialogue: well-defined and stable regulatory structures; investment by governments and industry; increase collaboration and clear and responsive communication among stakeholders and all levels of government; and innovation fostered through research and technology.

Page 18 of the strategy is particularly pertinent to this dialogue where it lists goals and objectives regarding the cumulative effects of oil Sands development on the environment and the enhancement of reclamation and increased enforcement to minimize Crown liability and protect environmental health. Closely linked to this are two other objectives on page 19, one regarding increasing conservation and protected areas to maintain biodiversity in the oil sands regions and the other to strengthen organizations to collaboratively manage and monitor environmental performance.

Fort McMurray – Athabasca Oil Sands Subregional Integrated Resource Plan (2002) – From the Preamble it states: The plan presents the Government of Alberta's resource management policy for public lands and resources within the area. It is intended to be a guide for resource managers, industry and the public with responsibility or interests in the area, rather than a regulatory mechanism. Resource potentials and opportunities for development are identified with a view to assisting in the economic progress of Alberta. The plan is sufficiently flexible so that all future proposals for land use and development may be considered. No legitimate proposals will be categorically rejected. Energy resource decisions are subject to the application of regulatory approval processes under the jurisdiction of the Minister of Energy. This plan may influence regulatory decisions, but will not result in the categorical approval or rejection of energy proposals. This plan is currently being revised / reconciled with the Lower Athabasca Regional Plan under the Land-use Framework.

EXPECTED OUTCOMES FEEDBACK

The original proposed Expected Outcomes for this Dialogue were:

1. To identify challenges in reclaiming oil sands developments to functional boreal ecosystems and landscapes.
2. Define the attributes by which functional boreal ecosystems and landscapes can be recognized (these could include visual, biophysical and spatial attributes; ecosystem functions; indicative successional trajectories.

Once these objectives have been realized:

3. Identify and characterize potential end land uses in the reclaimed areas.

4. Identify related challenges in landscape design and in institutional, economic, and social and cultural acceptance for these alternative end land uses.

The participants were asked if they were in alignment with these expected outcomes and if there were others they would like to see accomplished. People were also asked what their expectations were for the face-to-face workshop.

Degree of Alignment and Nature of the Feedback Received

Forty-two (42) people provided reactions to the Expected Outcomes many of them being quite thorough. Fifteen (15) respondents appeared to be aligned with the Expected Outcomes more or less as-is, while 19 were generally aligned but offered additional thoughts on how they might be revised or augmented. Three (3) respondents were not-aligned with some aspects of the outcomes and made suggestions for improving their relevance, scope, emphasis and sequence. Fourteen (14) people provided thoughts on what they felt would constitute a successful workshop.

General reactions

While general support for the expected outcomes was expressed by a number of participants certainly some people felt they were ambitious. Others pointed out that these topics have already been discussed for decades.

- *I think expected outcomes are well articulated, fascinating, and will generate excellent discussion.*
- *These are desirable outcomes for topics that have been focused on for many years to which some answers are available... identifying challenges has been ongoing for the past 30 to 40 years*
- *I do not agree with the expected outcomes. We all have a broad sense of what the key land uses could be (i.e. traditional use, wildlife habitat, forestry, recreation, etc.) on a reclaimed landscape, but more discussion needs to take place on how you know you have succeeded in reclaiming land to a particular land use.*
- *I'm not really aligned with this outcome [#1] for the reason that these have been discussed for several years, and are generally already known. Does it need to be repeated? Note - same concern expressed for outcome #2*
- *These are very large topics. There is a lot of work already done on these topics through CEMAs RWG.*
- *I am in agreement with these expected outcomes. I think they are ambitious enough on their own, and that additional expected outcomes for the dialogue may be counterproductive.*

What is the overall objective here some asked – A few participants wondered about what the overall objective was underpinning this reclamation Dialogue. These same concerns were raised

in the reactions to the Key Challenge Statement and also surfaced in the feedback to other areas of the Challenge Paper.

- *[We need to] … determine or define what an acceptable outcome(s) of reclamation is/are.*
- *It is impossible for me to determine whether my views are in 'alignment' with the expected outcomes given what I perceive to be such lack of clarity in overall objective.*
- *[I] would like to see the overall objectives discussed (i.e., under what conditions could alternative closure objectives be considered?)*
- *Myths are dispelled and real issues are worked to achieve a common goal*
- *Add an outcome to address recommendations that would implement the first outcomes through policy and/or regulation and advice to industry*

Sequence and dependencies between the outcomes

At least seven respondents expressed concern with the order and the dependencies between the expected outcomes.

- *…if we start the process to "... define the attributes by which functional boreal ecosystems and landscapes can be recognized...", there is likely little point in proceeding with "... identifying and characterizing potential end land uses in the reclaimed areas."*
- *3 and 4 should become1 and 2… as it is now, if one and two are realized then there is no discussion required around 3 and 4 since we will have a boreal forest ecosystem just like the other millions of hectares.*
- *Points 1 and 2 to suggest that the end land use is a functional boreal ecosystem which to most people means forest... so are not points three and four trivial?*
- *[Regarding] #2 & 3 – note that one can plan end land uses in the reclamation landscape and then the functional boreal ecosystems which will provide the end land use objectives. Reading the text indicates it is always the reverse process and it doesn't have to be.*
- *I think it is necessary to iterate through these -- in particular we need to be realistic about what end land uses would be (objective three) when working on the first two objectives.*
- *Outcome #1 presupposes that people agree with the goal of reclaiming to "functional boreal ecosystems and landscapes." I think this needs to be tested, especially given that the key focus of the dialogue is on identifying alternate uses.*

Selected Outcome 1 specific comments and suggestions

- *… important that there be the understanding that the goal should be resilient ecosystems compatible with surrounding natural systems regardless of the similarity of those systems to the pre-development systems*
- *Landscapes need to be defined -- i.e., reclaiming oil sands developments to create landforms that can carry the desired landscape patterns and the functional ecosystems.*
- *[change wording to] … "to functional boreal ecosystems and landscapes that resemble pre-disturbance features and where this is not possible to land uses that are desirable and acceptable to future end land users"*
- *Number 1 isn't so much about the challenges it is more about the steps and work to be done to reclaim.*

Selected Outcome 2 specific comments and suggestions

- *Appropriate functions can best be recognized by:*
  - *the products they provide (water, carbon sequestration, soil structure and stability, nutrient uptake, plant community development, wildlife and habitat, etc.)*
  - *the services they provide (flood control, diversity maintenance, habitat connectivity, energy flows as in water-carried nutrients and carbon, fuel)*
  - *their response to altering effects (forest pests occur normally? fire frequency typical? plant and animal diseases and population fluctuations are normal? response to weather extremes the same as non-mined areas?)*
- *There should be some consideration on what types of attributes/land uses could be expected on these different types of sites (ponds, dumps...)*
- *What metrics can we use to quantify whether the proposed feature landscapes are acceptable, particularly when assessing/reviewing closure plans.*

Selected Outcome 3specific comments and suggestions

- *End land use needs to be agreed upon with local stakeholder interests at the forefront*
- *The key challenge is to gain agreement on the acceptability of various end land uses for a specific site, knowing that acceptable end land uses will not all be achievable on any one site (i.e., selection of one land use [that is acceptable to certain stakeholders], means other end land uses [acceptable to other stakeholders] cannot be achieved).*
- *NEW – define the values of end land users that comprise a functional and healthy ecosystems (or example, water may meet water quality objectives but not be*

perceived to be of a quality to drink untreated; a man-made lake can be viable [functioning] for fish habitat key consumption species may not be present; certain traditionally used berries may not be present in a functional reclaimed landscape; animal movement corridors may be relocated or not present)

- *• What does "alternative" mean? To me, it implies other than functional boreal ecosystems*

Selected Outcome 4specific comments and suggestions

- *Suggest change -- identify related challenges "in achieving the potential end land uses identified in 3." Note -- landscape design per se isn't the issue, rather how do we make it happen.*
- *Change 'alternative' to 'potential', so readers won't think the discussion may focus on end land uses different from those already identified as objectives of reclamation*
- *The Fort McMurray Athabasca Oil Sands IRP 2002 says: "all public land in the Fort McMurray planning area is within the Green Area. The Green Area was established by Order in Council in 1948, to be managed primarily for forest production, watershed protection, recreation and other uses." So alternative end land use options within the forest context would be appropriate. Many stakeholders would be affected by a change away from the Green Area approach. The forest industry is a long-term source of jobs which relies on staple forest land base. Traditional Use stakeholders rely on the non-timber values of the forest as does the public for similar uses*

What's missing, suggested additions, areas for emphasis – the participants offered a number of additional thoughts on other things they would like to see addressed or given more weighting. One particularly prevalent theme was that of getting a better understanding of effectively what we know and don't know about reclamation and communicating it among practitioners and to the public.

State of Reclamation Knowledge

While much may be known about reclamation, and people acknowledged that there is a lot of research underway at lab, bench or demonstration scales, many said it would be very useful to document what we know, what has been successful [and not] and to understand where the key knowledge gaps remain.

- *The expected outcomes are good as far as they go but I would like another dimension added... and assessment of how far along research and technology development are to meeting those challenges. After so many years of simply identifying reclamation issues, I would like to know how far along we are to solving... Let's talk... more action.*
- *I would add that we want to identify the success in reclamation and research to date as well.*

- *The Macyk and Drozdowski 2008 document only outlines what the oil Sands operators have accomplished or tried with respect to reclamation. I think it would be worthwhile to complete a comprehensive document which encompasses all reclamation efforts in the oil sands including research which has already identified challenges with respect to reclamation.*
- *There should be a very strong focus on the need to learn from existing reclamation regarding what is possible, and what will require more work, or may not be possible.*
- *There needs to be an education component to this process as well.*
- *There is recognition that there needs to be much more information made available to the public on all aspects of oil sands reclamation…*

In this regard, OSRIN is interested in knowing if there would be value in compiling a State of Oil Sands Reclamation Knowledge report, or if the work of the Cumulative Effects Management Association and other groups has provided enough information for stakeholders, regulators and industry. OSRIN notes that the production of the so-called Silver Bullet report on oil sands tailings is a good parallel – it summarized knowledge to date and was useful as a starting point for a new generation of work.

The other suggestions included a mix of topics as illustrated by the comments below.

- *The treatment of time frames and acceptable rates was not adequately covered. What are reasonable time frames in which to expect companies to reclaim damaged ecosystems to a functional basis? What repercussions will occur if they fail?*
- *Identify challenges in linking or articulating the relationships between planning, operations, monitoring, closure and certification requirements.*
- *Deficiencies around adequate definitions of equivalent capability in the pre-disturbance landscape condition must be addressed before outcomes can be meaningfully defined*
- *I think these [outcomes] missed the social/spiritual aspects of effective restoration. There is too much emphasis on the technical and not enough on social and spiritual aspects of restoration*
- *Some consideration could be made to differentiate between some of the different types of areas to be reclaimed such as tailings ponds versus over burden dumps*
- *Identify potential solutions to address the challenges identified in outcome 4. It's not enough to identify the challenges, we should also explore and identify some potential solutions.*
- *It may be useful to use a values system to get the bottom of potential end land uses. By assigning values to all potential end land uses, it may make decisions easier.*

Two additional outcomes were suggested:

- *Identify targets, indicators and timelines for successful reclamation that would be reportable to stakeholders.*
- *Challenges and required timelines in managing and containing contaminants*

Workshop expectations

There was no shortage of expectations and perspectives expressed for the face-to-face workshop. We will revisit these views as we move to design the workshop and its supporting Workbook. Four general themes are evident from this feedback:

1. Common understanding of the state of our knowledge — the need for this community of practice (and interest – i.e., stakeholders) to have a common, shared understanding and exchange of what is known, what is not known, what is not known but being researched. Illustrating this theme see below comments #1, 2, 6, (7), 8, and 9.
2. Reclamation outcomes — the need to have clearly defined, agreed upon, high-level reclamation outcomes. Tied closely to this is the need for a deeper understanding of some foundational concepts (e.g., equivalent land capability) with their supporting explicit definitions of key terms (e.g., functional, landscape, boreal, etc.). Illustrating this theme see below comments #4, 5, 10, 11, 12, 13, and 14.
3. Collaboration —an explicit or underlying desire to more effectively on our knowledge and expertise through better collaboration. Illustrating this theme see below comments #2, 3, 4, 8, (9), 12, and 14.
4. Collective action — a desire to share and build on what we know and to move forward with some collective action. Illustrating this theme see below comments #1, 3, (6), 7, 15, and 16.

Selected comments regarding workshop expectations:

- *Attendees understand and largely agree on what are the key challenges to reclamation (including current knowledge gaps), how might these be overcome, what might and might not be possible, how this can be linked to achievable, sustainable final land uses, and how a process for establishing achievable reclamation criteria could be developed.*
- *Come up with a common understanding of these stated outcomes, implying that we have educated each other about our different stakeholder perspectives. Respect for the differing values of stakeholders sometimes appears to be missing in other forums – it would be great to demonstrate it in this challenge discussion.*
- *There is good representation from all stakeholder groups (government, industry, aboriginal groups, and environmental groups) that are well-informed, that are*

willing to work on tough issues even if that means putting their organization's position to the side; we clearly define how the outcomes will come into effect.

- *Leading reclamation experts and oil sands operators were all able to sit in a room and discuss reclamation challenges and realistic end land uses and identify a time line in which to conduct reclamation within.*
- *An indication of what stakeholders (including government, industry, public, etc...) consider the most important objectives for reclamation…*
- *Some description/definition of what has been achieved or what is known relative to areas of reclamation practice... a lot of groups and agencies have been doing a lot of work for many years -- what do we really know for sure and what is left to be done?*
- *…some insight on areas for future initiatives to focus on knowledge/technology development (e.g., C&I initiatives, reductions, etc...).*
- *We have a frank discussion on the 40 year history of reclamation in the oil Sands. Is the current status of reclamation in the oil Sands a success story, or an embarrassment? What have we done well? What mistakes have been made? …*
- *I would consider the workshop a success if there is a better understanding of: the oil sand development constraints; reclamation successes; the extensive amount of reclamation research that has transpired; the ongoing research work; and, the level of active involvement by the oil sands industry in regional stakeholder forums*
- *Points 3 and 4 are the truly exciting ones and why I would attend the workshop*
- *A discussion around alternative habitat creation, and alternative land uses aside from the boreal forest*
- *Focus of the workshop should remain a number 3 and 4; I would consider the workshop a success if -- we got people to agree that alternate uses would be considered; we got some suggested alternate uses that people would find useful; we got some suggestions for people on how to measure success in reaching the alternate use (or were told that these measures need to be developed).*
- *Agreement could be reached on these definitions [definitions of equivalent capability in the pre-disturbance landscape condition] and how they impact expected outcomes*
- *We will be able to define what "good" reclaimed land in the oil Sands is; we will be able to identify main biological, economical, social and regulatory challenges facing successful reclamation; we attempt to suggest regulatory incentives and programs that would increase the effectiveness of reclamation; we try to look at the desired landscape not only from biological point of view but as well from human use point of view considering aboriginal needs and desires (i.e., human health perspective); we discuss financial implications of reclamation on corporations and government*

including discussion on how to ensure smooth cooperation between regulatory agencies with different expectations related to reclamation.

- *I would not consider the workshop a success if the result was a transcript or discussion/workshop notes, with no clear path forward.*
- *We did not re-hash discussions of the past; and if timelines to meet agreed upon outcomes were proposed with input from the broader stakeholder community*

Proposed Revised Expected Outcomes

While the original proposed outcomes are still desired objectives, we are proposing to address the issues they may have touched upon by refocusing the dialogue to accomplish the following expected outcomes:

1. Achieve alignment on the key elements, linkages, and dependencies within the oil sands reclamation system and how a lack of shared understanding and alignment is hindering its effectiveness.
2. Achieve alignment on and commitment to specific follow-up initiatives to be undertaken by OSRIN and others to increase shared understanding and help increase the effectiveness of the oil sands reclamation system.

ASSUMPTIONS FEEDBACK

Thirty-three (33) assumption statements were listed in section 6 of the Challenge Paper. Respondents were asked to state which assumptions they agree with, which ones require more clarification, which ones they disagree with, and what new assumptions may need to be recognized. Following is a general summary of the responses followed by a more detailed description and illustration of people's reactions.

Degree of Alignment and Nature of the Feedback Received and Summary Tables of Responses for Each Assumption Statement

The degree of alignment with the 33 assumption statements was considerably less than with the background statements. This was not a surprise since we chose some statements that we knew would be provocative.

Between 8 and 26 responses were received for each assumption statement. Many responses were very detailed, enthusiastic (whether for or against the statement) and spoke to larger issues. This is positive, suggesting the statements were effective in sparking interest and engagement in the topic, and that participants have a great deal of insights to share.

Below, an overview of the range of responses to the broad categories of assumptions is provided. This is followed with a series of detailed tables, one for each assumption statement. They table information notes where there was agreement, conditional agreement and disagreement with the statement. We have also highlighted the key discussion points (themes) and the areas where people felt information was missing.

Definitions

On the subject of definitions, there was reasonable agreement with the scope of reclamation (#2) and on the dimensions of feasibility (#3) apart from the importance in understanding constraints and social-cultural obligations. Not surprisingly, many opinions were expressed for the difference and relationship between the meaning and intent of reclaim vs. restore (#1). Among the many excellent this comment illustrates well one perspective: "In reclamation, we attempt to replace function and broad characteristics, but admit that the specifics will differ from pre-disturbance, whereas restoration seeks to mimic pre-disturbance conditions as much as possible, in all details." The same views were reinforced in the responses to assumption #4 on expectations concerning reclamation vs. restoration.

Agree	*Agree but...*	*Disagree*	*Σ*	***#1. RECLAMATION VS. RESTORATION*** ***The term reclamation describes the general process whereby the land surface is returned to some form that is of beneficial use to humans. Here lies the distinction between reclamation and restoration: restoration is far less associated with the utility of the landscape and is guided by ecological principles to promote the recovery of ecological integrity.***
3	**7**	**16**	***26***	**An important point with the large varying response the dominant disagreeing with the statement.**

Selected Comments (not always verbatim):

- Restoration in its truest sense is returning what was there before operations; this is not possible given timeframe over which the landscape developed; reclamation is returning the capability to allow the return over time
- Reclamation needs to consider ecological integrity given that reclaiming to equivalent land capability means land uses that are "similar to the ability that existed prior to an activity being conducted on the land"
- If reclaimed land only needs to be of 'some' form that is useful to humans, how do we decide which humans they should most support?
- The distinction is less that of utility vs. function than that of fidelity to detailed pre-disturbance characteristics – in reclamation we attempt to replace function and broad characteristics but admit that the specifics will differ from pre-disturbance; restoration seeks to mimic pre-disturbance conditions as much as possible in all details
- Stakeholders and Albertans are pushing for reclamation that resembles restoration
- Restore is a higher 'bar'; restoration of most biological functions will take decades or centuries after reclamation certification
- The reality for much of the impacted areas will probably be somewhere in between
- Some NGOs and First Nations think restoration should be the target – there is absolutely no way the oil sands minds can do restoration as we're significantly changing the landscape; we could restore some ecological function
- EPEA legislation and regulations only require reclamation and AENV clearly communicates this fact to stakeholders
- This definitional debate has a long history; key issues are to what extent is restoration a success for reclamation and the concept of beneficial use to humans – which ones?
- Society for Ecological Restoration Primer says "Ecological restoration is the process of assisting the recover of an ecosystem that has been degraded, damaged, or destroyed." – this does not differ substantially from the goals of and principles and guidelines for reclamation in oils sands area
- Why is the definition of reclamation human-centric – this removes end land uses particular to ecosystem services that have little to do with human use
- Effective sustainable restoration is not possible without restoration – rebuilding the ecological processes that sustain the ecological foundations that upon which human and other uses are based
- Neither statement is consistent with the regulations; the are a blend of each – these are need because of

requirements of the act to meet equivalent capability suitable for preexisting land use capabilities which incorporate a bit of reclamation and restoration

Agree	*Agree but...*	*Disagree*	*Σ*	*#2. RECLAMATION SCOPE* ***Companies are required to reclaim more than just the mine sites themselves. Reclamation is required in all disturbed areas including the plant sites, access roads, etc.***
5	**5**	**0**	***10***	**General agreement, some suggestions for additions and exceptions.**

Selected Comments (not always verbatim):

- Roads and other features that allow better access by stakeholders to the reclaimed or adjacent land may be beneficial or desired
- Industrial features with lasting utility such as upgrading / processing plants and access roads may be in demand for continuing use; although these features may be required to be reclaimed they may not need to be
- Road reclamation – roads effect water flow (in wetlands), affects ecosystems; they have unique reclamation considerations

Agree	*Agree but...*	*Disagree*	*Σ*	*#3. FEASIBILITY* ***"Feasibility" is much broader than ecology and engineering. It includes the many challenges in landscape design, landscape development and landscape function (terrain, soils, hydrology, vegetation, and constraints related to erosion and containment of contaminants); institutional arrangements (regulatory regime, legal liabilities, barriers to collaboration, and existing approval agreements); economic considerations (cost, responsible parties, alternative economic uses); and social and cultural acceptance.***
5	**7**	**2**	***14***	**Most agreed, the two that didn't preferred a cost / profit view.**

Selected Comments (not always verbatim):

- Disagree – feasibility equals cost; engineers can deal with many changes in landscape design and development if cost is not an issue; there is a disconnect between mine operation and reclamation that can obstruct reclamation success
- Engineering and ecology constraints, while substantial, are the most transparent and assailable; large numbers of professional work hard to understand and reduce them for successful outcomes
- Regulatory and economic constraints do not have rigourous tracking, metrics, documentation or reclamation costs for decision-making
- Institutional arrangements can be changed, economic incentives provided and acceptance can be gained through demonstration
- Learning comes from 'ecology' and 'engineering' components provided effective monitoring and research programs are implemented
- There are some realities not recognized in 'pipe dreams'

Missing:

- Social responsibility
- Obligations under conservation-related legislation
- Needs to be consistent with Aboriginal treaty rights
- Spatial and temporal constraints; complexity of mining affects timing and location; these are long-term operations with significant changes to operations, mining, technology over that timeframe

Reclamation Challenges

Regarding assumptions related to the reclamation challenges there was reasonable agreement the intentions of reclamation (#6), reclamation timelines (natural succession rates) in a boreal environment (#11), the negative effect of institutional barriers (#12), remediation challenges related to naphthenic acids (and other contaminants) (#13), end pit lakes (#14), and reclamation costs and the lack of transparency with the current security programs and reclamation plans (#16). There was general agreement with assumption #15 on wetlands however the responses indicated that more specific information on the particular aspects of the wetlands challenge would have been more helpful. There are indeed challenges but they are often tied to the type of wetland; peatlands being the most challenging.

There was considerable disagreement with assumption on successional models (#10). Some feel there is ample evidence to their utility while others present alternative views on how succession works in the boreal and on reclaimed sites. This will be an important topic for further discussion.

Views on the high public expectations (#5) were split but leaned toward agreement. The public awareness and understanding is not high so there is a need to communicate and inform them better. But also transparency and accountability need to be improved.

Feedback on the reclamation challenges statement (#7) was also mixed but again tilted toward agreement. Some feel this gloomy viewpoint is overstated and in fact, while there are challenges, things are well in hand, for example – "the reclamation Acts and Regulations and their implementation in Alberta is one of the most advanced sets of regulations in the world. This does not negate the fact that reclamation challenges exist, but that they are being managed in a responsible manner so the risks are being addressed and mitigated." Public involvement is endorsed by some, not by others.

Feedback on the uncertainty with reclamation technology for dealing with the fluid tailings statement (#8) was also varied but leaning toward agreement. Some people feel it is being managed just fine while others see problems and serious environmental liabilities ahead.

Assumption #9 regarding binding reclamation timelines in EPEA approvals produced a 50-50 agree / disagree split but for many different reasons. Some feel these are addressed and managed with approvals and compliance. Some feel flexibility is essential given inherent uncertainties with mine development. Some feel progressive reclamation should be encouraged included adherence to more explicit timelines.

Agree	***Agree but...***	***Disagree***	***Σ***	***#4. EXPECTATIONS – RECLAMATION VS. RESTORATION Clarifying expectations at the onset is important; confusion often occurs between the two terms reclamation and restoration despite their many differences.***
5	**4**	**5**	***14***	**More agreed, those that didn't felt the terms and expectations are pretty clear in the regulations**
Selected Comments (not always verbatim):				

- Disagree – in a mining operation reclamation is understood; they are specified in regulatory approvals; there is a clear difference between reclamation and restoration and the history of reclamation practice in Alberta in all industries is that it is reclamation not restoration that is being done; legislation is clear to AENV and operators; need to articulate it to stakeholders
- The approvals may require this but may not be applied in practices or are diluted with interpretation and they may not have a practical influence on outcomes
- On public land there should be no discussion or confusion – we need to restore functional ecosystems that are resilient to disturbance
- Clarifying expectations is vital to ensuring a continuing social acceptance
- We are operating in a green zone and practitioners should use the term restoration more than reclamation; restoration is a science and an art making it more challenging, reclamation is the easy way out
- They do overlap, check on definitions; don't' get too hung up on definitions when outcomes are the more important thing

Agree	*Agree but...*	*Disagree*	*Σ*	***#5. PUBLIC EXPECTATIONS*** ***The Alberta public appear to have much higher expectations for oil sands reclamation than what is being delivered in the Athabasca Boreal region. The public expects that reclamation will return areas to close to their pre-disturbance states, but the regulations don't require anything that specific.***
6	**11**	**4**	***21***	**Most agreed; disagreement due mainly to view that public does not know.**

Selected Comments – I agree/agree but (not always verbatim):

- The public wants accountability and this is very expensive for companies operating in an environment of high uncertainty -- oil prices, poor understanding of long-term reclamation success, medical threats of chemicals, government changes, First Nations claims
- The public could demand sufficiently large bonds to address the history of mining companies cutting and running
- Make mining incremental – only allow progress of mining as reclamation targets are reached
- Large companies could put 10 to 12% of profits into R&D on reclamation when oil prices are high
- The public needs to be better informed on what is possible over what time frames
- There needs to be education on the expectations as there are false expectations given to the public by industry and government
- The public doesn't realize what we're actually doing so their perceptions are missed conceptions based on inaccurate or incomplete information; while historic rules are lesser, today's rules are more strict and detailed and we need to communicate that times have changed
- Operators need to do a better job of distributing information regarding what they are doing; people would be more accepting if they knew how many efforts were going into reclamation
- We need to elevate the underlying knowledge of these discussions
- Public expectations are much higher than what can be expected of any mining operation in terms of timing
- It is important that the public realizes that the reclamation areas will look different than what existed prior to disturbance, they are on an early successional trajectory; the public also needs to recognize that even in a natural boreal forest are disturbances; this situation makes it difficult to define success parameters and measure progress
- Not only Albertans, but the world is watching... we need to get our act together
- Older reclamation using somewhat outdated methods is actually very good, reclamation establish using more current methods will perform better, perhaps much better; if the industry uses accepted world leading practice, including a commitment to continuous improvement, very good outcomes should be possible; regulations aimed at very specific outcomes, as is often the case in the US, can be fraught with difficulty and stifles creativity in situations where the industry is still learning
- Public expectations are framed by the discussions in the media
- Information before the public is what is delivered by regulators and the NGOs; if they are misinformed, then that can be corrected by proper communication

Selected Comments –disagree (not always verbatim):

- Approvals dictate the requirements reclaim to equivalent land capability -- this is being done;
- Most sectors of the public have never set foot in the boreal forest nor have they seen industry's reclamation success, and they have an agenda against the oil sands industry
- The public doesn't know what to expect and all do not agree that the current state has under delivered
- Public expectations are based largely on they what they see and hear in the media; corporations are forced to deal with economic considerations, while the general public discussions do not take into account costs; the public expectations may be different if the questions include economic impacts on the province, jobs, and economic system in general
- Current regulations DO require the return of areas to a reasonable level of pre-disturbance disturbance character

Agree	***Agree but...***	***Disagree***	***Σ***	***#6. INTENTIONS*** ***Recovery of landscapes after mining should be the foremost priority in mining planning. Before the required planning can take place, operators, government and stakeholders need to agree on what reclamation actually means.***
10	3	3	***16***	**Most agreed; disagreement due mainly to view that** reclamation **may not be highest priority for all regulators and operators.**

Selected Comments – I agree/agree but (not always verbatim):

- Planning should include more details on progressive reclamation
- Mine planning needs to be well linked to reclamation planning and have capacity to explore alternative scenarios to develop not only to understand implications to mine development implications to final landform and landscape function
- Reclamation must be balanced with resource recovery

Selected Comments –disagree (not always verbatim):

- Reclamation and closure planning needs to have financial implications to the companies before it is placed as a priority; the daily mining operations are normally "king"; mines have a hard time sticking to a weekly/monthly plan, let alone a closure plan; initial material movement and placement is critical for this closure/reclamation planning
- Not all regulators agree on this as a foremost priority, e.g. **ERCB**; mine planning has to work within often competing priorities
- After 40 years of reclamation practice in this province I think there is a reasonable level of agreement on what reclamation actually means

Agree	***Agree but...***	***Disagree***	***Σ***	***#7. REGULATION CHALLENGES*** ***An assessment of the current policies and practices governing oil sands mine reclamation reveals an alarming range of challenges, uncertainties and risks that deserve immediate attention and broader public discussion.***
9	**2**	**4**	***15***	**Most agreed; disagreement due mainly to view that the challenge is overstated, being addressed adequately or questioning need for public involvement**.

Selected Comments – I agree/agree but (not always verbatim):

- There are our many challenges for which the immediate solutions are not currently available or for which there is no immediate answer
- A coordinated discussion on what are the key challenges and agreement on how best to address them would be beneficial -- similar to what the BC forest industry did to address public concerns in the 1990s
- In the end, approvals and the conditions therein are what really force hands and make the operators do things
- Unless the public is better educated on the issues a broader public discussion will likely fail

Selected Comments –disagree (not always verbatim):

- The general public don't need to be involved in discussions prior to reclamation because this would delay any type of development indefinitely
- The challenges continue, but I do not believe they are alarming; reclamation of all open mining areas provides challenges, most of which were well-known before the first oil sands mine was developed; the specifics of chemicals and reclamation in boreal forests have been clarified by developers
- The reclamation Acts and Regulations and their implementation in Alberta is one of the most advanced sets of regulations in the world; this does not negate the fact that reclamation challenges exist, but they are being managed in a responsible manner so the risks are being addressed and mitigated

Agree	*Agree but...*	*Disagree*	*Σ*	***# 8. UNCERTAINTY – TAILINGS TECHNOLOGY*** ***Due to uncertainty related to reclamation technology at this time, Alberta cannot be confident that reclamation of fluid tailings will proceed on a timely basis, or that liabilities associated with impoundments will not be inherited by the public.***
4	**7**	**3**	***14***	**Most agreed; disagreement due mainly to view that the technology exists and/or the issue is being managed fine.**

Selected Comments – I agree/agree but (not always verbatim):

- I am not certain whether reclamation of fluid tailings will proceed on a timely basis; previous Canadian mining jurisdictions suggests that liabilities associated with impoundments will be inherited by the public, at least to some extent
- We should work harder, move forward rather than each of us guarding our turf; we should all work together
- Some technologies which are demonstrated and available may have other impacts which preclude their use
- What is missing is any contextual framework about other liabilities the public carries; sometimes that liabilities is by design or unforeseen and I'm curious why this feels like oil sands reclamation has been singled out
- The oil sands industry insisted that CT would work; it has been worked on for approximately 15 years with marginal performance so far however given sufficient effort it may be successful
- The public sees process affected water and tailings covered lakes to be a toxic liability that is not appropriate
- One approach to sign off legal responsibilities is to use a risk based approach to understand risks, determine costs of addressing all what-if scenarios, and require that the mining company establishes a trust fund so that resources are available for ongoing management or repair, as required

Selected Comments –disagree (not always verbatim):

- The technology exists; implementation of the technology in a cost effective manner needs to be refined
- This statement may have been valid a year ago, but it is not valid any longer; even though the changes in tailings management are new, what is apparent is that the operators and other interested bodies will ensure that there is a viable solution; therefore the regulators and public can be confident that reclamation will be successful
- Is the implementation timeline requirements that are not yet in place; firm, reasonable expectations from regulators will result in the elimination of these concerns, however this will take time as major systems take several years to develop
- A focus on supporting the process at the right stage (i.e. commercial technology development as opposed to base research) is the critical component needed to meet the medium and long range objectives

Agree	*Agree but...*	*Disagree*	*Σ*	***#9. TIMELINES*** ***Binding reclamation timelines are absent from EPEA approvals.***
8	**1**	**7**	***16***	**Close to an even split agree/disagree.**

Selected Comments – I agree/agree but (not always verbatim):

- An appropriate mine development plan should have dates when each area of the mine development will become available for reclamation, when it will be certified for reclamation and when that land would be returned to the province; Directive 74 helps to move the landscape towards reclamation as each DDA will have dates establish for completion, and the life expectancy establish for each pond
- Plans are all that are needed, with some tool to hold companies more responsible to the timelines; the annual reporting changes we've made will help show progress or lack thereof
- Specific timelines are difficult but progressive rehabilitation should be strongly encouraged, even insisted upon, where possible
- EPEA approvals are only one aspect of regulatory control -- this statement is naïve about the range of documents for example ERCP mind plans, C&R plans, EIAS that work in concert with EPEA approval to regulate reclamation activities

Selected Comments –disagree (not always verbatim):

- This statement presupposes that these are needed in approval; instead, the approval and its related oversight focuses on moving lands that are ready to reclaim to reclamation in a timely manner; a larger problem is that many people incorrectly believe there is a huge backlog that industry is not addressing
- Approvals have reclamation timelines
- EPA approvals are not the place to put binding reclamation timelines; more formal reference to approved cumulative disturbance and reclamation schedules could be in approval plans, but should retain capacity for flexibility as mine development rarely proceeds as planned beyond the short term horizons; this is true for mine development worldwide
- There is ample evidence to assume that natural succession will occur
- I disagree that so-called binding targets are required; there are valid operating approvals and there is methodological review and scrutiny of compliance with approvals; expectations for reclamation, for resolution of uncertainties and for progress on issue resolution are high -- both within the regulatory world, stakeholder world and the developers world

Agree	*Agree but...*	*Disagree*	*Σ*	***#10. SUCCESSIONAL MODELS*** ***Many oil sands operators rely on plant succession models to generate the establishment of climax communities, which are communities of plants that are stable and capable of perpetuating themselves. There is little evidence, however, that natural plant succession — where an assemblage of species is naturally replaced with new species and associations better suited to the prevailing site conditions — is likely to occur.***
2	4	14	*20*	**General disagreement with this assumption, some feel there is ample evidence; others present alternative views of succession. Important topic for further discussion.**

Selected Comments:

- Not enough time has been allotted to ensure a 'climax' community can develop; it can take decades; can't draw this conclusion yet
- It is operator's responsibility to help succession occur to ensure the correct species are present for the desired end land use/ecotype
- 'Relay floristics' may not be the dominant successional model in the boreal; initial floristic or tolerance models of succession are more common in boreal ecosystems; approximations of primary succession such as that found during reclamation are more likely to 'over time' have assemblages of species which are naturally replaced with new species and associations
- Little evidence that the concept of climax communities is a useful one in Alberta's NE boreal forest, pre or post disturbance
- Let's say that oil sands reclamation relies on the idea that certain soil moisture/nutrient regimes support characteristic plant communities, and that these communities will be to some extent replicated on the reclaimed landscape; over the long term (>100 years), this assumption is valid (ignoring issue of stable climate); but there are challenges to its achievement in the shorter term and little evidence of reclaimed plant communities closely resembling pre-disturbance plant communities

- It is possible that these reclaimed plant communities will evolve into "novel ecosystems", rather than resembling adjacent/pre-disturbance non-industrial communities
- Even "failed" reclamation sites demonstrate successional processes – in this case to pioneer or early states that are not considered desirable. Successional processes are evident in the boreal forest on a constant basis – the key issue is aligning successional processes with desired end land uses.

Agree	*Agree but...*	*Disagree*	*Σ*	***#11. RECLAMATION TIMELINES*** ***Reclamation timelines will have to deal with the realities of natural succession rates in a Boreal environment. Communication is needed to ensure that public expectations and underlying physical and natural realities of reclamation are aligned.***
8	**2**	**1**	***11***	**Full agreement but for one and one with concern for dependence on ingress.**

Selected Comments – I agree/agree but (not always verbatim):

- The key here is that the expectations about timelines around certification be managed -- i.e. we won't wait until succession has been completed to certify land; this in turn requires people to be confident that we are "on the path"
- Interacting with statement 10 is the concept of ingress; far too much of an expectation exists in the industry that ingress will bring new and desirable species: a few native species will ingress depending on the proximity to the native forest, however most species move at a glacial pace and meaningful results will not be visible for this generation or the next

Selected Comments –disagree (not always verbatim):

- This is not really a core issue -- natural succession rates in the boreal environment are not slow -- a severely burned forest will be mature again in 80 years and this has been going on for thousands of years; the issue is more one of the timeframe associated with an even more primary succession, one more closely resembling ecosystem recovery from glaciations; so maybe communication is needed to ensure that expectations match natural realities of reclamation; this alignment is needed not only to help guide expectations for reclamation but also to inform assessment of the true environmental impacts of extraction projects

Agree	*Agree but...*	*Disagree*	*Σ*	***#12. INSTITUTIONAL BARRIERS*** ***Institutional barriers have precluded a holistic approach to landscape design -- creating silos in reclamation, development and management. For example, there are numerous regulatory agencies with different expectations and companies often act independently.***
10	**3**	**1**	***14***	**Full agreement but for one; barriers exist in government and within companies.**

Selected Comments:

- While there has been effort to align expectations and objectives of regulatory agencies, it must be recognized that government doesn't represent the only institutional barrier; silos exist within companies and among different groups -- mining, long-range planning, operations, tailings, etc., and these groups also need to work together
- AENV and ERCP have competing objectives
- Sharing of information and clear definition of institutional roles and cooperation between industry is critical; CEMA, the RWGs etc. are some of the best examples of cooperation I have seen and should be used and built upon to ensure effective interaction between industry, government, academia and the public

Agree	*Agree but...*	*Disagree*	*Σ*	***#13. NAPHTHENIC ACIDS*** ***It is critical that the reclamation of tailings into terrestrial and aquatic landscapes at the end of an oil sands mine operation address residual levels of naphthenic acids and their rate, fate and transport in the environment.***
6	**7**	**?**	***14***	**Most agreed and there are other perhaps at least as important substances to deal with.**

Selected Comments:

- NA's aren't the only constituent of concern
- I disagree with the emphasis on NAs; they also degrade over time and there are other soluble components in the water that are of concern
- Is NA really a problem; I thought it degraded rapidly, and could be addressed by phytoremediation
- Accumulated salts may present a greater challenge to reclamation depending on landform design and groundwater management considerations
- Closure drainage and water quality plans consider this; there is a commitment to ongoing research, monitoring and management in every EIA and approval
- NAs are one of the groups of chemicals within the process affected waters that have the potential for long-term toxicity if it is not removed; water quality standards need to be established to limit the type and amount of these acids permitted in release waters, closure water bodies and streams; there should be maximum timelines established for process affected water constituents to reach acceptable water quality guidelines so that public lands are not tied up for centuries while natural degradation is used as the treatment strategy
- They are important and were addressed in the recent review of the 2007 Wetland Reclamation Guidelines

Agree	*Agree but...*	*Disagree*	*Σ*	***#14. END PIT LAKES*** ***End Pit Lakes (EPL) are complex systems in terms of hydrology, chemistry and biology, and their design requirements need to be more fully developed. Uncertainties regarding the construction, maintenance and final success of EPLs remain.***
6	**3**	**2**	***11***	**Most agreed; disagreement due mainly to view that end pit lakes are understood and acceptable elsewhere**.

Selected Comments – I agree/agree but (not always verbatim):

- Need to add "presence of tailings" as one of the uncertainties
- End pit lakes need to be defined; operators have proposed water covered tailings as lakes, pit lakes without tailings but with process affected water, and pit lakes with clean water; research on water covered tailings and pit lakes with process affected water has been proposed but not conducted to prove that they would be suitable environmental assets; what research has been conducted would indicate that they may present long-term environmental liabilities that continue to contribute toxins to the receiving waters long past the closure date
- The best approach would be to establish the acceptable process affected water quality release criteria to natural receiving waters, water covered tailings proposed as lakes, pit lakes without tailings but the process affected water, pit lakes of clean water and any water entering the environment
- End pit lakes are all important and were addressed in the recent review of the 2007 Wetland Reclamation Guidelines

Selected Comments –disagree (not always verbatim):

- The success of pit lakes should not be a huge focus; they have been established in a variety of applications around the world and the success of those lakes is not much of an issue; the unknowns are exactly what ecological outcomes of the oil sands pit lakes will be; the lakes have a variety of functions in terms of water management, water treatment, ecological interconnections and ecological outcomes

Agree	*Agree but...*	*Disagree*	*Σ*	***#15. WETLANDS*** ***Surface mining leaves no remnants of wetlands to recover, and there is currently no demonstrated success in reclaiming peat-forming wetlands.***
6	**7**	**2**	***15***	**Most agreed; disagreement by two due to view it has been done elsewhere and that other valued non-peatland wetlands can be established**.

Selected Comments – I agree/agree but (not always verbatim):

- Why the focus on peat-forming?; these cannot be proven within a reasonable timeframe, but may develop over the long-term regardless of the initial reclamation efforts; full restoration to systems within a short time period that took millennia to develop ***naturally should not be imposed***
- The statement should be clear if stated: "areas directly within the footprint of surface mines leave no remnants of wetlands" and "there is currently no demonstrated success in reclaiming peat-forming wetlands following open pit mining"
- While operators do not leave remnants of wetlands to recover, opportunistic marshes (not peatlands) often initiate on oil sands leases and are naturally colonized by some native wetland species (marsh and a few fen species)
- EPEA approvals are requiring operators to reclaim fens... were heading in the right direction so don't lose all the good work that is going on
- All are important and were addressed in the recent review of the 2007 Wetland Reclamation Guidelines

Selected Comments –disagree (not always verbatim):

- There are good examples in the east demonstrating reclaimed peatlands using the sphagnum moss transplanting method; in about 12 years, there are good trajectories and one can see the beauty of the reclaimed peatland in about 15 to 20 years
- I do not see this is a big issue; if peatlands cannot be developed on oil sands mine reclamation areas, other wetlands will be, and those wetlands have very valuable ecological outcomes; developing a reclamation and closure plan that requires development of a component that likely has a low probability for ecological resilience is not a good path forward

Agree	*Agree but...*	*Disagree*	*Σ*	***#16. RECLAMATION COSTS*** ***The current oil sands mine reclamation security program lacks transparency. Information about reclamation costs, the calculation of liability bonds and the frequency (if any) of third party validation of reclamation plans are not publicly available or readily accessible.***
14	**0**	**1**	***15***	**Full agreement but one.**

Selected Comments – I agree/agree but (not always verbatim):

- The honesty of the statement is appreciated; if these bonds are to remain silent, the public deserves to know why; last calculations made public suggested less than 10% of the reclamation costs were bonded
- It is my experience that the public is always overexposed in mining projects and is frequently left dealing with costs that outweigh any bonding program
- And, don't spend too much time discussing this until we know if the MFSP will be accepted by GOA -- no point in guessing what the new program will address or include because it's not public yet
- Similar uncertainty is reflected in accounting and securities regulators standards (and corporate interpretation of the standards) for corporate reporting on tailings liabilities; it is unclear what costs are envisioned for full reclamation and what provision companies are making for these costs
- The people of Alberta should be aware of the environmental security systems that exist for each oil sand mine; Alberta needs to determine abandonment requirements so that industry can plan steward to the requirements for abandonment; how is existing liability for contamination addressed for each mine and plant site?

Selected Comments –disagree (not always verbatim):

- The costs of reclamation are the business of the developers; and the assurance that these costs are correct and that the required liability bonds are adequate is the job of the regulators; we do not need stakeholders trickling involved -- we must learn to trust those we have empowered with certain duties

Reclamation Vision

Respondents were generally aligned with the broad vision statement – Healthy ecosystems are integrated across the oil sands region and are independent of lease boundaries (#17) and #20 – Reclamation success includes protection of human health. There were some definitional concerns around the words used in assumption #18 – Reclaimed terrestrial and aquatic ecosystems are healthy, sustainable, resemble native ecosystems and provide a multitude of values for all Albertans.

The responses to assumption #19 – Reclamation liabilities are not passed on to future generations – were mostly very straight forward and are best summed up with the following comment – "The timing factor makes it mandatory that the liability will be passed on to future generations. The question is how the benefits do also?"

Agree	*Agree but...*	*Disagree*	*Σ*	***#17. RE- RECLAMATION VISION*** ***Healthy ecosystems are integrated across the oil sands region and are independent of lease boundaries.***
6	**2**	**0**	***8***	**Full agreement.**

Selected Comments:

- This is an easy statement to make, governments will need to develop legal frameworks which reduce the risk of increased liability when the effects of reclamation efforts cross legal boundaries
- We need to define/agree on "integration"; I do not believe the post closure ecosystems need to be independent of lease boundaries, but I do think that ecological requirements and objectives should have more weight than administrative and legal constraints

Agree	*Agree but...*	*Disagree*	*Σ*	***#18. RE- RECLAMATION VISION*** ***Reclaimed terrestrial and aquatic ecosystems are healthy, sustainable, resemble native ecosystems and provide a multitude of values for all Albertans.***
4	**3**	**3**	***10***	**Most agreed; disagreement due mainly to view other end use considerations.**

Selected Comments – I agree/agree but (not always verbatim):

- Whether or not these ecosystems provide a multitude of values for all Albertans is of less importance
- This is an empty assumption as it is already apparent from the present snail tempo of reclamation that these liabilities accrued a few decades ago are still not being reclaimed and the expectation is that it will take much more time to reclaim this land

Selected Comments –disagree (not always verbatim):

- While the reclamation examples I am aware of are very good and probably sustainable, this statement seems a little over optimistic!; given current emphasis on transparency, industry will need to be careful not to oversell rehabilitation outcomes
- Do they need to resemble native ecosystems?; many areas will be unhappy if roads are reclaimed and can't be used for SUVs etc.; what other end uses make more sense?
- Does Alberta not have a separate and distinct duty to aboriginal peoples created by treaty and constitutional rights?

Agree	*Agree but...*	*Disagree*	*Σ*	***#19. RE- RECLAMATION VISION*** ***Reclamation liabilities are not passed on to future generations.***
7	**1**	**6**	***13***	**Split views – agree that it is a good principle but for the most part not feasible (now).**

Selected Comments – I agree/agree but (not always verbatim):

- This assumption of intergenerational equity reclamation is appropriate but has not been observed in practice

Selected Comments –disagree (not always verbatim):

- Based on the longevity of oil sands mines and processing plants this is not achievable; liabilities will flow to the next generation; a better statement is that reclamation will remove liabilities for future generations
- Too late; the next generation has already inherited reclamation liabilities; there are few cases of grandchildren working alongside their grandfathers in Fort McMurray
- The timing factor makes it mandatory that the liability will be passed on to future generations; the question is how the benefits do also?
- Lifecycle of a mine is a generation or more
- This should be a part of the reclamation vision and if we do not find a way to achieve visions such as these we will ultimately fail as a species; I do not believe that we will achieve it in the Alberta oil sands

Agree	*Agree but...*	*Disagree*	*Σ*	***#20. RE- RECLAMATION VISION*** ***Reclamation success includes protection of human health.***
8	**0**	**0**	***8***	**Full agreement, no supplementary comments.**

Reclamation Principles

Seven principle statements were provided. There was general agreement on the last four (#24-#27):

- #24 – The cost of reclamation will have to be borne by the value of oil extracted, and acceptable reclamation has to be completed while there is still financial capacity within the project to pay. Progressive reclamation helps to achieve this objective.
- 25 – The objective is to get land back into productive use, and sooner is better than later, but not jeopardize doing it right.
- #26 – The oil sands resource is owned by Albertans. Government plays a key regulatory role to ensure that development and reclamation are performed responsibly. In large part, what gets regulated gets done.
- #27 – The paths to different land use end-states will have different timelines and costs

While the general intention behind assumption statement #21 was generally fine, clearly the language used regarding the Natural Step principles was concerning to some and confusing to others. The same confusion can be said for assumption #23 regarding some end uses requiring that there be a developer and continuing active management.

Assumption #22 regarding removal of environmental concerns and allowing public access – while there was general agreement that the timeframe for reclamation must be driven by reclamation needs not demands for public access. Public access – "should happen – and be appropriately regulated – when the reclaimed or restored ecosystems are able to handle it without affecting ecosystem sustainability."

Agree	*Agree but...*	*Disagree*	*Σ*	***#21. RE- RECLAMATION PRINCIPLES*** ***A number of the principles of Natural Step can provide guidance: successful reclamation requires that contaminants be managed and contained, that what was originally buried, be reburied, and what is man-made also be buried, so none of these can systematically accumulate in the biosphere.***
5	**0**	**10**	***15***	**Most *comments state* DISagreement; many people are not familiar with the Natural Step. Best to remove or provide additional explanation.**

Selected Comments (not always verbatim):

- Natural Step is a relevant framework to consider in the reclamation context
- What is the Natural Step[3]?
- Anything man-made and buried needs to be guaranteed to be inert or you can have groundwater issues
- The key is that contaminants (either natural like salinity or man-made like naphthenic acids) must be left in a state that they do not compromise sustainable, functioning ecosystems developing
- Almost all of the contaminants are natural, from the deposit, not introduced into the process
- We need to take an intelligent, integrated, and informed view of our activities, their potential costs and benefits, and perhaps compare them to a "natural range of variation" (what happens in the absence of large-scale industrial activities) taking into account different non-industrial processes and multiple time scales

Agree	*Agree but...*	*Disagree*	*Σ*	***#22. RE- RECLAMATION PRINCIPLES*** ***It is desirable to remove environmental concerns and allow public access at the earliest possible date.***
4	**1**	**7**	***12***	**General DISagreement, rather general agreement that the timeframe for reclamation must be driven by reclamation needs not demands for public access.**

Selected Comments (not always verbatim):

- The time for reclamation must be driven by reclamation needs, not demands for public access; public access should be the least of our concerns
- Reclamation will be, in some ways, fragile, and will need nurturing to establish
- Take care with public access; it should happen – and be appropriately regulated – when the reclaimed or restored ecosystems are able to handle it without affecting ecosystem sustainability

[3] http://www.naturalstep.org/en/canada

Agree	*Agree but...*	*Disagree*	*Σ*	*#23. RE- RECLAMATION PRINCIPLES* ***Some end uses will require that there is a "developer" and a development proposal. Such lands may require continuing active management.***
5	**3**	**3**	***11***	**There was some confusion over what this assumption actually meant. This affected the ability to interpret the results meaningfully.**

Agree	*Agree but...*	*Disagree*	*Σ*	*#24. RE- RECLAMATION PRINCIPLES* ***The cost of reclamation will have to be borne by the value of oil extracted, and acceptable reclamation has to be completed while there is still financial capacity within the project to pay. Progressive reclamation helps to achieve this objective.***
9	**2**	**1**	***10***	**Full agreement, but one.**

Selected Comments – I agree/agree but (not always verbatim):

- Mine operators could take a tip from other large companies with 10 to 12% of profits and R&D
- For this reason it is essential the company's accounting systems have provisioning for this; shareholders will not want to be left within an un-costed liability!
- Let's turn this on its head -- the value of oil should account for the cost of reclamation, and oil extraction should not occur under economic conditions that do not allow satisfactory reclamation; the public is far less exposed if reclamation is conducted during the period in which operators are generating revenues, and that progressive reclamation is one way to achieve this

Selected Comments –disagree (not always verbatim):

- The cost of reclamation is independent of what the world is worth!

Agree	*Agree but...*	*Disagree*	*Σ*	*#25. RE- RECLAMATION PRINCIPLES* ***The objective is to get land back into productive use, and sooner is better than later, but not jeopardize doing it right.***
8	**2**	**2**	***12***	**Agreement, but for two who were concerned with meaning of "productive use."**

Selected Comments – I agree/agree but (not always verbatim):

- We should follow the example of the forest industry in the early 1990s – $$ are kept aside right at the start to take care of liabilities, as part of the "reforestation/reclamation bank account"
- The definition of productive use is important -- this must not just be focused on human use, ecological productivity is more important
- Beware of "getting it right" statement; this is a copout statement for buying time in the G0A and is a favorite rhetorical catchphrase of politicians these days, it's a way to avoid timely accountability

Selected Comments –disagree (not always verbatim):

- What is meant by productive use here? Are land uses relating to ecosystem services, conservation objectives or obligations under aboriginal treaty rights included or is it only industrial development that is envisioned?
- I don't think that productive use, by humans, is a priority for the most part; a more fulsome discussion would require full exploration of the definition of productive use

Agree	*Agree but...*	*Disagree*	*Σ*	***#26. RE- RECLAMATION PRINCIPLES*** ***The oil sands resource is owned by Albertans. Government plays a key regulatory role to ensure that development and reclamation are performed responsibly. In large part, what gets regulated gets done.***
7	**4**	**1**	***12***	**Full agreement but one.**

Selected Comments – I agree/agree but (not always verbatim):

- The government of Alberta owns the resource on behalf of the public not the other way around
- Regulation should be a minimum requirement; expectations and companies willingness to achieve them should be higher than this
- In addition, "what gets monitored and reported gets managed"
- Sometimes the regulation misses important issues that turn out to be more appropriate for the goals of reclamation, and get changed over time; the quality of the regulation matters a great deal -- results based, or prescriptive?, Adaptive or rigid standards?; If it is regulated rigidly to certain prescriptions, then the good and bad outcomes of that have to be lived with, and room for innovation and best management evolution is lost

Selected Comments –disagree (not always verbatim):

- The reality of mine reclamation is not "what gets regulated gets done" but "you get what you get"

Agree	*Agree but...*	*Disagree*	*Σ*	***#27. RE- RECLAMATION PRINCIPLES*** ***The paths to different land use end-states will have different timelines and costs.***
5	**1**	**0**	***6***	**Full agreement.**

Selected Comments (not always verbatim):

- Mine reclamation requires a specific design for many components, some components are more expensive than others to implement; it costs much less to implement key structural landform, soil and vegetation attributes the first time rather than have to go back and retrofit

Reclamation Goals

Of the six goals, there was reasonable agreement on two of them:

- #30 – Alberta is accountable to current and future generations of Albertans in all matters related to reclamation.
- #32 – Reclamation is an integral component of mine planning.

We think there was some confusion with how people interpreted assumption # 28 – Alberta has fair and effective reclamation regulations and certification procedures. We think that people were supportive of this being a goal. But, as a statement of what is currently the case, many people have concerns and feel there is room for improvement. There was a similar interpretation problem with assumption #29 – Alberta is a world leader in reclamation research and innovation. We don't think people were against aspiring to this goal for the oil sands but there certainly were questions about whether we had achieved it at this point. There certainly is considerable expertise on oil sands reclamation. We need to benchmark ourselves against the achievements of others in reclamation and draw on their experience.

There was reasonable alignment on assumption #33 – Mined land needs to be reclaimed to a natural state to get the reclamation plan approved and to meet First Nations expectations. "Natural state" needs to be defined. Other stakeholder expectations need to be included too.

The dominant response was in agreement with assumption #33 – The geographic context for reclamation is multi-level: the mining site itself, multiple adjacent mining sites (neighbours), and a larger region (the Lower Athabasca Region and potentially beyond). End land use objectives should be set based on a broader geographic context. However, a minority expressed concerns with the practical implications of this – "Why make this more complex than it needs to be. The objective is simple and should be kept so." and another who said – "If you broaden the context of reclamation to a large geographical context then it dilutes equivalent capability to 'boreal forest' and local, significant features at the site level could be lost. (i.e., peat forming wetlands, lakes, etc.)." Clearly more discussion is needed here.

Agree	***Agree but...***	***Disagree***	***Σ***	***#28. RE- RECLAMATION GOALS Alberta has fair and effective reclamation regulations and certification procedures.***
4	**1**	**9**	***14***	**General Disagreement, however there was confusion with the responses to this assumption and this affected our ability to interpret the results meaningfully.**

Selected Comments (not always verbatim):

- Only one landform has been certified as reclaimed after 40+ years of operations; the ratio of disturbed to reclaimed land also suggests we do not currently have effective reclamation regul***ation***
- If the regulations and procedures were effective the current conversation would not be required; fortunately, there is a broad desire to improve the current systems, and we have the means to effect any necessary changes
- Informed by the position of an oil sands community – government regulators too often do not operate truly as "public servants", and that certification procedures are somewhat opaque, and not truly inclusive of public interest; the community should have direct input into setting certification objectives and direct participation and influence in certification decisions
- The procedures are onerous and not effective in incenting plants to reclaim

Agree	***Agree but...***	***Disagree***	***Σ***	***#29. RE- RECLAMATION GOALS Alberta is a world leader in reclamation research and innovation.***
6	**2**	**5**	***13***	**There was confusion with the responses to this assumption and this affected our ability to interpret the results meaningfully. Good comments nonetheless.**

Selected Comments (not always verbatim):

- Agree if pertaining to oil sands specifically
- Alberta may be a leader but so far reclamation has not been delivered at a rate that keeps pace with disturbance
- By conventional measures reported R&D intensity among oil sands companies is low compared to the energy sector as a whole and even lower compared to the Canadian industrial average
- Research and innovation are not necessarily translating into rapid commercialization of new techniques and technologies
- There is a failure of those involved to realize that many other jurisdictions are doing a better job than us in Alberta -- Europe and Australia have a lot to offer

- Regulators and industry should take care not to be too smug about past achievements, given that the oil sands industry is still relatively young; true world leaders recognize that lessons can often be learned from elsewhere

Agree	*Agree but...*	*Disagree*	*Σ*	*#30. RE- RECLAMATION GOALS* ***Alberta is accountable to current and future generations of Albertans in all matters related to reclamation.***
5	**3**	**1**	***9***	**Most agreed.**

Selected Comments – I agree/agree but (not always verbatim):

- Alberta is accountable to all Canadians and indeed all citizens of the world; contaminants can be transported by air, water, and migratory species to very distant places; they can bio-accumulate to unacceptable concentrations

Agree	*Agree but...*	*Disagree*	*Σ*	*#31. RE- RECLAMATION GOALS* ***Mined land needs to be reclaimed to a natural state to get the reclamation plan approved and to meet First Nations expectations.***
3	**7**	**2**	***12***	**Most agreed; several had concerns with "natural state."**

Selected Comments – I agree/agree but (not always verbatim):

- Agree if natural state means equivalent capability
- Why are First Nations the only stakeholder expectation?
- What does natural state mean, can it be achieved through reclamation, how does it relate to treaty obligations, impact and benefit agreements between companies and aboriginal peoples, and aboriginal expectations

Selected Comments –disagree (not always verbatim):

- To a state of ecological resilience makes more sense; the concept that reclamation will make what was is unlikely to be achievable
- We have no idea if this is possible; we are moving away from saying that reclamation will be comparable to natural; this is misleading if we don't know if it's even possible yet

Agree	*Agree but...*	*Disagree*	*Σ*	*#32. RE- RECLAMATION GOALS* ***Reclamation is an integral component of mine planning.***
9	**0**	**0**	***9***	**Full agreement.**

Selected Comments (not always verbatim):

- Reclamation needs to be an integral component of mine planning prior to disturbance; this is not currently being given enough thought
- Successful reclamation is a life-of-mine process

Agree	*Agree but..*	*Disagree*	*Σ*	***#33. RE- RECLAMATION GOALS*** ***The geographic context for reclamation is multi-level: the mining site itself, multiple adjacent mining sites (neighbours), and a larger region (the Lower Athabasca Region and potentially beyond). End land use objectives should be set based on a broader geographic context.***
4	**2**	**2**	***8***	**The majority agreed, 25% disagreed.**

Selected Comments – I agree/agree but (not always verbatim):

- And land-use capabilities are local and regional opportunities made up of a spatially diverse mix of land resources; having more than one opportunity on a reclaimed mine site as compared to another would be acceptable depending on the starting point; the suitability of multiple land uses will be dependent on the predevelopment resources of soil, the amount an area of chemically challenging materials left on or near the surface that affect the soil and the landform designs that promotes sustainable and functional landforms
- Integration with neighboring mines is a responsibility of every mine, even if they are the first to develop, there are difficulties with temporal alignment

Selected Comments –disagree (not always verbatim):

- Why make this more complex than it needs to be; the objective is simple and should be kept so
- If you broaden the context of reclamation to a large geographical context then it dilutes equivalent capability to "boreal forest" and local, significant features at the site level would be lost

Additional Assumptions Suggested by the Respondents

The following additional assumption statements were suggested or implied in the feedback comments. Please note that the last 4 (7 to 10) were suggested by a single respondent.

1. Reclamation needs to protect water resources, including surface and groundwater, and to consider the movement of contaminants in water throughout the mining area.
2. Successional processes have been restoring disturbed sites in the oil sands area since glaciation. Models of successional trajectories need to be developed so that they can be mimicked on the reclamation sites.
3. Solutions to the fluid tailings problem need to be developed so that effective restoration of these areas can be achieved.
4. Need to address the balance between economic viability for Alberta and the goals of reclamation. (? Statement needs some refinement)
5. More attention to practices of road reclamation is needed, since roads can dramatically affect water flows and wetlands, and removing roads can constitute another disturbance during reclamation.
6. That we can “design” a long term landscape and know/dictate what that landscape will look like at each stage of the development. In many cases “natural” recovery of a landscape represents the most sustainable process for reclamation.
7. Reclamation is proceeding as planned and as approved by the Province of Alberta.
8. Reclamation has and will continue to return the land to a viable and ecologically productive land base that is in tune with the ecological functions of the region.

9. Landforms that are being created although altered from the original land forms are integrated into the land base design to form a functional whole.
10. Oil sands operations closure planning and reclamation planning processes are addressing the need to incorporate traditional land use into planning and reclamation.

CRITICAL QUESTIONS - FEEDBACK

Participants were invited to react to six questions:

1. What are the top four challenges in reclaiming oil sands developments to functioning boreal ecosystems and landscapes?
2. Do we have the required capability to manage and contain contaminants to create a healthy biosphere?
3. Does the current requirement to create equivalent capability, including the use of the Land Capability Classification System, achieve the expectation of a having functional boreal ecosystems and landscapes?
4. How would you recognize that a site / landscape has achieved equivalent capability?
5. What are possible and desirable end land uses for reclaimed land?
6. What are some of the key challenges in landscape design and in institutional, economic, and social and cultural acceptance for these alternative end land uses?

Feedback: What are the top four challenges in reclaiming oil sands developments to functioning boreal ecosystems and landscapes?

Ninety-four priority challenges were advanced by the participants. We have broken them down into seven (7) categories with selected comments to illustrate the perspectives on and dimensions of each challenge area. Note – some of the comments support more than one challenge area.

Strategic Goals and Desired Outcomes for the Reclamation of the Oil Sands Area

- *Defining a clear definition of reclamation goals and desired outcomes on a regional scale and site-specific scale.*
- *Lack of clear vision and support from governments and the public*
- *Reference condition that reclamation should be compared to both spatial and temporal.*
- *Timeline expectations – it is not reasonable to assume we can demonstrate fully restored and balanced ecosystems within the lifetime (i.e., individual career, governmental mandate, generation of employees) of those within regulatory or corporate body.*
- *To define and agree on expectation….*
- *Identifying what a functioning boreal ecosystem is.*

- *We have competing priorities for water (uplands vegetation vs. wetlands).*
- *Agreement on the acceptable outcomes of reclamation and the timelines associated with those outcomes.*
- *One of the perception challenges the oil sands industry faces is that the reclamation is not meeting a long list of desirable outcomes immediately.*
- *The dogma that we need to go back to the boreal forest.*
- *We don't know what initial conditions we need to set up to achieve final outcomes. We don't know what final outcomes will look like…*
- *Another challenge is the lack of knowledge as to what is expected of reclamation…*
- *The development of a process for balancing the wishes or demands of various stakeholders on outcomes is necessary to allow finalization of a plan for each development.*
- *Being able to move forward with a [clear] direction forward (hard to get agreement).*
- *The development of a process for balancing the wishes or demands of various stakeholders on outcomes is necessary to allow finalization of a plan for each development.*
- *Overcoming the number of stakeholders/agencies [need for a shared vision and and clear outcomes with broad-based buy in].*

Understanding of the Nature and Magnitude of Oil Sands Development and Implications to the Reclamation Task

- *Scale of disturbance (expensive to move that much material around).*
- *Timeline expectations – it is not reasonable to assume we can demonstrate fully restored and balanced ecosystems within the lifetime (i.e. individual career, governmental mandate, generation of employees) of those within regulatory or corporate body.*
- *Understanding the maturation process for created mining and tailings landforms.*
- *The sheer size of the areas involved.*
- *Material limitation related to oil sands region & specific sties*
- *How to manager while the mine is on-going.*
- *Increasing inventory of area to be reclaimed.*
- *Public acceptance of expansive changes to the landscape.*
- *Overcoming the number of stakeholders/agencies*

Misalignment of Legislation, Regulations, Policies, Expectations, Requirements, Enforcement

- *Lack of a consistent regulatory environment.*
- *Government departments [operating] at cross-purposes.*
- *No clear definition of what a functional boreal ecosystem and landscape actually is.*
- *No clear definition of equivalent capability.*
- *Lack of specifics in reclamation requirements.*
- *Specific criteria and indicators to evaluation and determine success.*
- *Government needs to follow through in applying/enforcing requirements (tailings).*
- *Lack of clear vision and support from governments and the public.*
- *We don't have the regulations, or the political will to demand high standards.*
- *…Regulator / stakeholder expectations.*
- *Lack of government expertise to evaluate industry directions*

Communicating with the Public, Transparency

- *Improving information to the public; current perceptions do not tell the whole story*
- *Lack of clear vision and support from governments and the public*
- *One of the perception challenges the oil sands industry faces is that the reclamation is not meeting a long list of desirable outcomes immediately. Reclamation areas will evolve through a period of several decades. If we consider that following logging a cutover area is expected to mature at 120 years, oil sands mining and reclamation is a very recent phenomenon.*
- *The Oil Sands are a world class resource that will attract attention, investment and controversy for decades and generations to come. The mines are the most, and will likely to continue to be the most visible and productive component of the oil sands. Reclamation of the mines will be a high profile topic for years.*
- *The public doesn't know how much it costs.*
- *Increasing the public and stakeholder awareness of the mine and closure planning process, adaptive processes and decision making on outcomes for specific operations...*
- *Public acceptance of expansive changes to the landscape.*

Reclamation Success – Criteria, Uncertainty, Demonstrating It

- *The greatest challenge is to define clear criteria to assess reclamation success*
- *Specific criteria and indicators to evaluation and determine success.*

- *Reference condition that reclamation should be compared to both spatial and temporal.*
- *To define and agree on expectation and to regulate and monitor on an ongoing basis.*
- *Unclear if such reclamation can be actually be achieved.*
- *That we won't know for a long time whether the work we're doing now will lead to success in the future.*
- *That we don't know if end pit lakes or even some tailings issues (particularly legacy tailings) will be addressed/will work in the end.*
- *One of the perception challenges the oil sands industry faces is that the reclamation is not meeting a long list of desirable outcomes immediately. Reclamation areas will evolve through a period of several decades. If we consider that following logging a cutover area is expected to mature at 120 years, oil sands mining and reclamation is a very recent phenomenon.*
- *Insufficient number of full scale field operations for validation and iterative learning*
- *It has never been demonstrated.*
- *Reclamation certificates are need to demonstrate the good work done.*

Knowledge Gaps, Knowledge Transfer / Sharing, Tools

General

- *Gaps in our knowledge, which affect assurance that we will reach acceptable reclamation outcomes.*
- *A lack of adequate decision support tools in the planning process. There are tools in addition to the LCCS that can inform reclamation practices. There is, however, no requirement that these tools be used, nor is there a formal process for determining which tools are best suited and then mandating that they be utilized.*
- *Lack of government expertise to evaluate industry directions.*
- *Another challenge is operational, we may have recommendations but they do not help if operators (contractors actually doing the work in the field) do not understand the purpose of these activities. Important details may be overlooked. A lot of knowledge transfer is necessary.*
- *Insufficient number of full scale field operations for validation and iterative learning.*
- *We don't have the equations that describe the relationship between initial conditions all the way to end outcome. Years of research are needed to establish this. Good pilot reclamation sites are needed to advance this work.*

- *We have to create new ecosystems, we won't be able to reproduce what was there.*
- *Incorporating regional land use planning objectives into reclamation planning*
- *Research needs to focus on issues in the field – it has to be applied.*

Landforms-Hydrology-Water-Soils

- *The design of sustainable, functional landforms and watersheds is fundamental requirement*
- *Creating an integrated landscape.,*
- *Understanding the variation in chemical constituents within the created oil sands mining and tailings landforms, as well as the interactions of those constituents between the landforms, as well as with the areas external to the mining operation.*
- *Sub surface conditions (e.g., salts and water availability)*
- *Turning lowland areas into upland areas with the materials at hand.*
- *We need a better understanding of soil moisture and nutrient regimes across the three-dimensional reclaimed landscape, and thus how plant communities are likely to establish and respond.*
- *Maintaining water table for wetlands.*
- *Hydrology (how do we make sure uplands and wetlands receive enough water in sub humid landscape).*
- *Water quality release criteria.*
- *Sub surface conditions (e.g., salts and water availability).*
- *Liability concerns surrounding release of water onto neighboring leases.*
- *That we don't understand the water dynamics of reclaimed landscapes and we have competing priorities for water (uplands vegetation vs. wetlands).*
- *The return of quality soils and diverse vegetation communities.*
- *Dams (when will the new landforms become naturally sustaining)*

Plant Ecology, Succession

- *Creating self-sustaining ecosystems.*
- *Returning landscapes to as close to pre-disturbance as possible.*
- *Understanding the natural successional trajectories for both soils and vegetation is critical to effective restoration of the sites disturbed by oil sands mining.*

- *The current Revegetation Manual sets targets for required number of characteristic species, but we are not sure how these targets will be achieved, nor how this indicator will change over time*
- *Better understanding of moisture demands of maturing plant communities, and how communities will be affected by the moisture demands of adjacent communities, e.g., how the moisture demands of a maturing upland forest will affect an evolving wetland at the toe of a slope.*
- *Species diversity.*
- *Re-introducing species that do not have long distance dispersal.*
- *The return of quality soils and diverse vegetation communities.*
- *Wildlife sensitivity (populations of species at risk will be extirpated from the region while we wait 40 years for reclamation).*

Salts, Contaminants

- *Salts (most boreal landscapes are not salty).*
- *We need a better understanding of salt dynamics (weathering, flushing, etc.) on the reclaimed landscape*
- *Sub surface conditions (e.g. salts and water availability)*
- *Contamination by salinity creates a challenge to the land capability for land use due to oil sand mining; Saline discard materials should be put in pit or be encapsulated within clean overburden to reduce environmental contamination post closure. Trading land capability of class 5 wetlands in the predisturbance situation for an equal area of saline affected class 5 lands in the closure landscape is not equivalent capability.*
- *The management of fluid fine tails and process affected waters that effect out of pit landforms, watercourses, pit lakes and groundwater has the capability to contribute contaminants to the environment long after abandonment. (Naphthenic Acids, other hydrocarbons and salts).*
- *Fluid tailings materials proposed for water capped tailings which contribute toxins and unsuitable chemistry to the lakes they are stored in, and receiving environments, for generations. All fluid tailings materials should be converted to trafficable landforms prior to closure. Terrestrial capture of contaminants could dramatically slow the release of salinity and other contaminants to the environment as compared to a water based storage option*

Wetlands

- *Maintaining water table for wetlands.*

- *Defining a clear definition of reclamation goals and desired outcomes on a regional scale and site-specific scale … is particularly important for wetlands because wetlands constitute such a large proportion of the pre-disturbance landscape, yet current reclamation plans indicate that they will be reclaimed to a much smaller proportion of the landscape.*
- *Development of techniques for the re-establishment of productive peatland ecosystems will be essential for effective restoration of oil sands mining.*
- *Reconstructing wetland features (fens, bogs, muskeg).*
- *Peatland wetland reclamation.*
- *Wetland creation.*
- *No proven post-mining fen creation techniques.*

Tailings

- *Fluids management.*
- *Managing tailings; eliminating wet tailings.*
- *Reclaiming tailings ponds*
- *The management of fluid fine tails and process affected waters that effect out of pit landforms, watercourses, pit lakes and groundwater has the capability to contribute contaminants to the environment long after abandonment. (Naphthenic Acids, other hydrocarbons and salts).*
- *Creating dry surfaces from fluid tails.*
- *That we don't know if end pit lakes or even some tailings issues (particularly legacy tailings) will be addressed/will work in the end.*
- *Fluid tailings materials proposed for water capped tailings which contribute toxins and unsuitable chemistry to the lakes they are stored in, and receiving environments, for generations. All fluid tailings materials should be converted to trafficable landforms prior to closure. Terrestrial capture of contaminants could dramatically slow the release of salinity and other contaminants to the environment as compared to a water based storage option*

Timelines

- *Reclamation takes generations to mature. The conundrum is that certification must occur before this maturation occurs.*
- *Timelines must be determined and implemented.*
- *Speeding up of reclamation.*

- *Industry needs to pick up the pace; RC's are needed to demonstrate the good work done.*

Miscellaneous

- *Determining end land use.*
- *Acceptable post-operational land use decisions.*
- *Land use: Disruptive use of reclaimed land i.e. quads, 4x4 – these scar natural lands too.*
- *Unclear if adequate provision is being made to cover the costs.*
- *Adequate liability management practices*
- *Climate change and drought conditions anticipation of future climates and vegetation selection*
- *No consideration of climate change.*

Feedback: Do we have the required capability to manage and contain contaminants to create a healthy biosphere?

There were 19 respondents to this question:

- Yes – 9 most with caveats
- No – 4 only one without a comment
- Don't Know – 6 did not know or implied they did not know for sure.

YES – The caveats included – lack of will to apply the capability; R&D of past 20 years has proven this but we need time for this to be applied; greater investment of effort is need than the present approach, needs to become integral component of closure plans; need risk assessment as part of the review process; it's expensive; and, understanding of acceptable impacts over time. Selected comments include:

- *We have the capability; we need the will to apply it.*
- *The understanding of contaminants and the management of those contaminants is fairly well understood (and processes are in place to gain understanding where it is required). Developing acceptable systems for management of contaminants as integral component of sustainable closure plans is an on-going process that continues to require efforts.*
- *Yes, but this needs to be viewed as acceptable impacts under varying timelines. For instance, zero discharge during operation has very little precedent. Cities do not operate this way. Specifics calling for minimal impact, with the potential for escalating requirements once operations in the area decline and cease.*

NO – the comments included – ability to measure naphthenic acids very recent, what fractions are causing NAs; more research needed before we can manage them; data isn't publicly available; need research on the potential of wetlands to act as wastewater treatment areas. Selected comments include:

- *Chemists have just learned how to properly measure the complex mixture of contaminants referred to as naphthenic acids (NAs). We don't even know which fractions of oil sands NA mixtures are causing toxicity, so learning how to manage these toxic fractions and contain them to create a healthy biosphere will take at least several more years of intensive research.*
- *We need much more work and research on potential of wetlands to act as waste water treatment areas for dealing with processed tailings water. Generally insufficient study and knowledge on this key issue.*

DON'T KNOW – the concerns included – no success stories; unresolved differences of opinion; each contaminant has to be considered separately

Selected comments include:

- *There are unresolved differences of opinion about the success of companies' current efforts to keep contaminants in check.*
- *This is dealt with through EPEA approvals.*

Feedback: Does the current requirement to create equivalent capability, including the use of the Land Capability Classification System, achieve the expectation of a having functional boreal ecosystems and landscapes?

There were 18 respondents to this question:

- No – 10, all but two with comments
- Yes – 6, all but one with comments or caveats
- Maybe – 1, with a comment.

NO – the comments included – knowledge and experience not at a point where we can claim this; need data over time to validate our predictions; bias against wetlands, a separate system is needed to assess wetlands; does not clearly translate into setting clear, consistent and measurable goals for achieving reclamation success; originally and agriculture tool; forestry-focused – sends a confusing message for defining desirable wetland outcomes; far from achieving this goal; 'equivalent' as a statement is useful to set very high level direction but stops short as no one knows what it means. Selected comments include:

- *No - so far, the current reclamation requirement does not appear to have produced reclamation to functional boreal ecosystems and landscapes on a large scale.*

- *We are very far from "achieving a functional boreal ecosystem". Having equivalent as a statement is useful to set some very high-level direction. However, it seems that this stops short of providing real directions since the common criticism is that no one knows what this means. Thus, at this time, equivalent capability does not achieve much. It needs to be defined – not only in words, but in terms of empirical knowledge. The LCCS does not come close to achieving the stated goal*
- *We don't know what the site will look like in 30 or 40 years. We need the data over time to validate our predictions.*
- *The LCCS was developed to assess a landforms suitability to grow trees on upland sites. The LCCS is used to assess land capability and CEMA has proven (2004/5) that the LCCS has no ability to predict the productivity of reclaimed soil. A separate system is needed to assess wetlands. If the LCCS is used to assess all sites then all upland and lowland sites, wet, dry should be assessed separately to reveal the landscape level issues of sites that are chemically contaminated.*
- *For a reclamation certificate an assessment of a landform is needed to assess: (1) Is the landform safe and stable? Are there safety risks for the public or wildlife?; (2) Will there be robust ephemeral watercourses to sustainably transmit water off the structures? Is the water collection system around the landform a ditch or a watercourse? are there erosion gullies?; (3) Is the landform appropriately integrated with the surrounding environment or other leases? Is the lease boundary with adjacent mines a trench? Is the closure landscape functional?; (4) What is the water quality; is it appropriate to release off lease?; (5) When does the groundwater quality get assessed?; (6) Is the ecosystem functioning, sustainable and appropriate?; (7) Are there restricted or noxious weeds that should be controlled?; (8) Is the site contaminated?*

YES – The caveats included – overall the tools and systems are OK, adequate; LCCS probably close to achieving the expectation; will lead to functional ecosystems give the time to do so; capabilities of wetlands need to be addressed, biased against wetlands. Selected comments include:

- *Yes - equivalent capability will lead to functional ecosystems given the time to do so*
- *Yes - the current systems (with the consideration of adaptive management) are adequate. Areas that continue to need to be addressed are the capabilities of wetlands areas as integral components of the reclamation landscape (and the function of many of these wetlands as contaminant treatment systems).*
- *Yes, but - the LCCS should not be used alone to determine equivalent capability of boreal ecosystems. The LCCS only addresses upland landscapes and so it is biased against wetlands (which have lower tree production). Wetlands comprise at least half of the pre-disturbance landscape and need their own value based classification for equivalent capability.*

- *Functioning – maybe; but what we want is health, functioning ecosystems that meet stakeholder expectations for a variety of end land uses; doing the minimum is not acceptable.*

Feedback: How would you recognize that a site / landscape has achieved equivalent capability?

There were 19 respondents to this question. The feedback ranged from a general acknowledgement of this measurement challenge to clear and detailed ideas on what equivalent capability meant and implied more deeply and this concept and intention could be enhanced and measured.

Below we have captured some specific points raised with respect to six categories: landscapes including spatial-temporal considerations, landforms, soil, vegetation, lakes and water bodies, time, and stakeholders and human use.

Landscape criteria

- *Need to include the consideration of the Natural Range of Variation which embraces the reality that pre-disturbance landscapes were not static and had frequent and severe disturbance events. Reclamation goals should be relative to this range rather than compared to static measures.*
- *At the landscape level: landscape biodiversity, sustainable ratio of upland to wetland.*
- *… Also the proportion of ecosystems on the landscape is similar to pre-disturbance conditions.*

Landforms criteria

- *Self-sustainable design – functional, non-erosive watershed, stable and safe.*
- *Form – rolling hills not benches and pyramids.*
- *Absence of slumps and soil creep.*
- *Include water quality considerations regarding near surface water run-off.*

Soil criteria

- *Supports ecosystems typical of the region.*
- *Hydrocarbon affected materials placed near the surface do not effect water quality due to run-off.*
- *… the lack of accepted adverse effects.*

Vegetation criteria

- *Plant communities with representation of ecosystem types typical of pre-disturbance that are productive, drought tolerant, fire and climate variability resilient, free of disease or weeds like the pre-disturbance situation.*
- *Native vegetation.*
- *Sustainable vegetation cover.*
- *Biodiversity at the landscape level.*

Lake and Water Bodies

- *Lakes where all fish species of the region can thrive for a lifetime.*
- *Not toxic to people.*
- *No risk of biomagnification of toxins.*
- *Suitable to support downslope and downstream vegetation communities.*

Time

- *Site will have matured for a number of years – 1-2 decades minimum.*
- *Applying the criteria and refining them as required recognizing the timelines for ecosystem development are long.*
- *Need for baseline information on capability in undisturbed areas.*
- *Compare the reclaimed land to a natural area of about the same age, composition, etc.*

Stakeholders and Human Use

- *You do not [recognize that…], local stakeholders come to that agreement.*
- *It has potential for human use.*
- *In Fort McKay we have reclamation keystone cultural species that would indicate success – the presence of beaver for example or ratroot.*
- *Not toxic to people.*
- *… buy-in by informed stakeholders including taxpayers that will cover any liability cost associated with current decisions.*

Two respondents shared specific ideas about how the intentions of equivalent capability approach could be augmented and enhanced more explicitly in terms of the concept, and criteria and measures. Their comments are long and included here verbatim to ensure that we did not misinterpreted them.

- *Equivalent capability for the oil Sands region would have the following attributes:*
    - *Provides a functional ecological resource of importance to the area: i.e., a lake that all fish species of the region and other biota can thrive in for a lifetime and not be toxic to people, no risk of biomagnification of toxins;*
    - *Landforms that are functional, safe and stable, self sustaining with a non erosive watershed design, slump or soil creep is absent, appropriate soil that supports ecosystems typical of the region, integrated with the surrounding areas. e.g., A dry trench between two leases would not be suitable. Rolling hills are more appropriate than Aztec temples of benches and pyramids;*
    - *Vegetation communities with representation of the types of ecosystems typical of the predisturbance development that are as productive, drought tolerant, fire resilient and free of disease or weeds as the predisturbance situation;*
    - *Water is an essential component of the environment. Water from closure landscapes should be suitable to support down slope and downstream vegetation communities. Consideration should be made for landform designs that will provide appropriate water quality of surface and near surface runoff. Hydrocarbon affected materials placed near surface will contribute to the water quality of runoff to the environment;*
    - *Its ok to have components of the landscape that vary within the natural range of variation, but reclamation should reflect that same ratio of predisturbance variation, not just the low end of the class. If I rent a vehicle I pay a fee for its use and I have to return it in fundamentally the same shape as when I picked it up, that's the deal Alberta expects from oil sands development.*
- *I'm not sure that that is a question that can be answered by one person on a form, but here are some contributions (note that these would need to be applied and understood across the regional reclaimed landscape, not just on at the stand or polygon level):*
    - *Range of natural variation is a critical concept, to embrace the idea that the pre-"disturbance" landscape was not only not static, but included frequent and severe disturbances. Thus, reclamation performance should be understood relative to this range, rather than compared to static measures;*
    - *I think equivalent capability, at least for forested/vegetated ecosystems, could ideally be measured by Net Primary Productivity, or carbon fixation, indexed against pre-disturbance and adjacent conditions, and understood as a trajectory from disturbance (fire, logging, and mining) through juvenile vegetation communities to mature stands to re-disturbance. If we could do this, we would measure the functional capacity of the ecosystem to supply the energy, water and nutrients necessary for development of these plant communities, but truly capture the spirit of the "capability" part of the clause – that is, the capacity to support*

similar ecosystems as those that existed in the pre-disturbance ecosystems, even though the form of these ecosystems may not be identical;

- *Further, if we want equivalent capability for organisms (wildlife, humans) that evolved in concert with the pre-disturbance, Holocene landscape, then we do need to approximate the form of these ecosystems. So, I think we need to measure presence and abundance of species characteristic of the pre-disturbance landscape on the reclaimed landscape. Again, this could be best understood as a trajectory, where initially there may be few characteristic species on a reclaimed landscape, with this number increasing as reclaimed vegetation communities mature.*

- *Actual assessment could work in one of two ways:*
  - *Assessment against ranges of natural variation for vegetation species composition metrics derived from mature, pre-disturbance communities. We would expect that initial similarity (e.g., number of characteristic species on the reclaimed landscape) would be low (i.e., the bottom end of ranges of natural variation, or even below these ranges), but would increase over time as these communities mature;*
  - *Assessment against ranges of natural variation for vegetation species composition metrics derived from an understanding of pyrogenic stand dynamics. For equivalent capability, we would expect reclaimed metrics to be within ranges of natural variation, but would expect that these ranges themselves would change with stand age.*
- *Of these two options, the second is probably the safer one, as continued indexing and assessment of adjacent pyrogenic dynamics protects against assessment versus targets that are no longer achievable due to large-scale systemic alterations such as climate change.*

Feedback: What are possible and desirable end land uses for reclaimed land?

There were 22 respondents to this question. The comments included:

- *suggested lists of customary regional uses including traditional use by Aboriginals*
- *suggested lists of non-conventional uses*
- *thoughts on who should make this evaluation and decision*
- *timeframe considerations with respect to the longevity of today's values 100 years from now*
- *the relatively small size of the land areas that actually might entertain different end land uses relative to more customary uses*

- *land use trade-off considerations including multiple uses of the same piece of land (i.e., compatible uses), which escalates the reclamation discussion into a broader land use planning (LARP) conversation*
- *the feasibility of some end land uses regarding compliance with legislation and regulation (e.g., endangers species, Aboriginal constitutional and Treaty rights), economic, equitable cost sharing, institutional alignment and technical factors*

Following is a sampling of some of the comments to illustrate the above summary points:

- *Wildlife habitat, traditional use, recreation, forestry.*
- *Whatever the public accepts. Golf course, lake, dirt bike track, tree plantation, berry farm, etc.*
- *Whatever the local stakeholders want. (Agricultural, commercial, boreal forest, etc.)*
- *End land uses have been defined many times. I believe it is most important to achieve ecological resilience, after which the diversity of human uses can be considered.*
- *… if we can create communities that have similar function and form to non-mined (adjacent or undisturbed) communities, then these communities will be capable of supporting a range of possible end land uses, some of which we probably can't conceive of at the moment.*
- *Why do we need to discuss desirable land uses if re-establishment of ecosystems should provide us with a wide variety of potential uses for the future and would give us flexibility to do so? What happens if we can't achieve those?*
- *Ideas and desires change over time. What we allow as end land uses should be things that will still be desirable in 100 years.*
- *I do not find the concept of "end land use" to be a particularly useful one, as it presumes that we have some knowledge of what humans (and other organisms?) might be doing on a landscape 100 years from now. Will the concept of commercial forestry, as defined by today's merchantability limits, be a useful one in a future world where vegetation is harvested for biomass energy production rather than pulp or sawlogs?*
- *Remember overlapping end land uses… they are not independent of each other. Wildlife, recreation, First Nations use, forestry, all can occur at the same location.*
- *Need to have that discussion with affected stakeholders, particularly First Nations to which promises have been made. It depends on the land use decisions that have been made on other lands – such as establishment of conservation areas.*
- *… there may be some value in discussion of "alternative" end land uses, such as intensive motorized recreation parks or high-management, high-yield plantation*

forestry, but don't see these as being potential significant components of the reclaimed landscape.

- *… the important element in considering "alternative" end land uses… is recognizing the trade-off of relinquishing some "equivalent capability" – e.g., a motorsports park may not have equivalent capability for any ecological values, and plantation forestry may not have equivalent capability as wildlife habitat or for traditional use – for achievement of some other values on some other landscape… The challenge here, then, is to contextualize the trade-off, and accept a reduction in reclaimed equivalent capability in order to achieve broader goals.*
- *…High maintenance end land uses are possible, such as nurseries, etc. Since the land is already disturbed, it may make sense to use this land for human uses rather than clearing new land.*

Feedback: What are some of the key challenges in landscape design and in institutional, economic, and social and cultural acceptance for these alternative end land uses?

There were 19 respondents to this question. The feedback was wide ranging but tended to matching in many cases the different aspects of the feasibility end land uses outlined in the Challenge Paper (assumption #3). Below we have captured some key challenges raised with respect to 4 categories: public and aboriginal values and expectations, communications and related stakeholder processes to ascertain values; landscape design and other technical challenges and constraints; institutional factors; and economic considerations.

Public, aboriginal, government and political values, expectations (and perceptions); processes to ascertain these and communicate them

- *In some aboriginal culture it is the site that is important, and reclaiming an area will not increase its value.*
- *Balancing values*
- *Public acceptance including First Nations.*
- *Public reluctance to accept any change from "pristine" pre-disturbance conditions*
- *Political risk of breaking promises for existing approvals.*
- *Education for acceptance.*
- *Regulatory agencies need to work together to advise the industry exactly what they want, what does success look like, what isn't acceptable?*
- *The will of Industry and Government to make it happen and communicate the results as they happen.*
- *The lack of dialogue.*

- *Has anyone asked the question of the local stakeholders about alternative end land uses and in what context?*
- *There are few effective methods of having this type of discussion in the public eye such that a well represented set of opinions is provided. Special interest groups (corporations, NGO's, and regulators) all come with agendas and hence a desire to control the message. The general public has no way to determine what forms a balanced discussion and what is "spin".*
- *Developing the understanding that acceptable or desired end land uses will not all be achievable at every site. Achievement of some uses will mean others cannot be achieved. The important decision is how are the defined uses for an area going to be selected (defined); who is going to make the final decision?*
- *Too much promised on every hectare of reclaimed land.*
- *Public paradigm that companies are looking for "cheapest way out".*
- *We must understand what we have to work with… dykes, dumps, end pits, etc. Just need to better explain mining.*
- *An unwillingness to discuss trade-offs or permanent impacts of oil sands development.*

Timeframes

- *Reclamation takes generations to mature. The conundrum is that certification must occur before this maturation occurs.*
- *Defining the exact use for an area needs to be decided early in the process as the initial mining operation may establish a landform type that narrows the range of available end land uses. This becomes very important when defining specific end lands uses for existing developments. The range of options is unlikely to be a great as what can exist for an area prior to development.*
- *Planning up front for landform considerations is hugely important.*
- *How rapidly "equivalent land capability" will be established.*

Technical

- *Semi-solid landforms.*
- *Limited nutrient supply.*
- *Physical limitation due to material types, disturbance footprint, material properties, geotechnical stability*
- *All tailings material should be progressively converted to dry landforms for reclamation because of the long term liabilities that would be create.*

- *Discard materials affected by challenging chemistry from overburden and oil sand processing are contaminants that should be captured and sequestered underground.*
- *Limited nutrient supply.*

Knowledge Gaps

- *We don't have the equations that describe the relationship between initial conditions all the way to end outcome. Years of research are needed to establish this. Good pilot reclamation sites are needed to advance this work.*
- *For all the tailings material research conducted to date there is not a reasonable level of science to indicate that water covered tailings materials will be safe for the environment because of the hydrocarbon and byproducts.*
- *Lack of knowledge as to what is expected of reclamation, although this is a big focus as CEMA currently.*

Institutional

- *Inter-lease landform coordination and overlap is an important step that industry doesn't appear to support.*
- *Closure and reclamation challenges in today's mineable oil sand development area may cost more than it did a decade ago because in the past very few attempts were made to meet all the regulatory approval clauses for a reclamation area and of the past lack of understanding about what the standards.*
- *Risk and liability between operators down to shareholder.*
- *Getting agreement on thing.*
- *Ensuring regulatory system is in place.*

COMMON THEMES IN THE FEEDBACK: A SYSTEMIC PERSPECTIVE

General Observations about the Feedback

While the Challenge Paper intended to focus on a few key aspects of the reclamation challenge for mining in the oil sands area, it ended up provoking reactions that were wide ranging and across almost the full spectrum of the "oil sands reclamation system." The nature and depth of the responses underscored the complexity, diversity and interconnectivity of the numerous reclamation issues and opportunities presented.

The feedback also indicated directly and indirectly that a systemic perspective is often missing or for those that have it, that it is not understood or shared universally among the many players working on and living in the oil sands area and among key stakeholders. A systems perspective helps to put issues into context and to see relationships and interdependencies. For example, it helps to think about how objectives at different levels of planning need to be aligned, how the mine plan affects the reclamation and closure plan, how the reclamation plan needs to consider

the outcomes for dykes, roads and different water bodies. At the end of the day, these plans need to work in an integrated manner so they are not working at cross-purposes and so that the ultimate reclamation outcomes can be achieved effectively and efficiently. A few people mentioned the need for people to better understand the "natural life cycle of mining and how the current reclamation matters relate to that." This is another expression and request for more systemic thinking in tackling the reclamation challenge.

"The Oil Sands Reclamation System"

As we reviewed and synthesized the feedback, recurring patterns and some common themes emerged. We have presented the 10 themes and the key discussion points into a very rough diagram (Figure 1). It might be thought of as one expression of the oil sands reclamation system. It attempts to be as true as possible to the key conversation points raised to avoid over-interpretation. It attempts to provide an integrated view of the Dialogue discussion on a single page. With the review of this Progress Report and the workshop on June 17th, we look forward to possibly evolving this or some similar figure further. Following is an outline of the 10 theme areas and key discussion points raised within them.

Strategic Outcomes for Reclamation (Shared Vision)

- "The reclaimed soils and landforms are capable of supporting a self-sustaining, locally common boreal forest, regardless of the end land use "
    - Establish and integrate natural features on the reclaimed landscape1"
    - "Natural functions are occurring on the reclaimed landscape1"
    - "End land use capability is equivalent to that prior to disturbance1"

Public, Aboriginal, Stakeholder and Ecosystem Values, Expectations and Attitudes

- Public and community values and expectations
- Aboriginal values and expectations
- Stakeholder values and expectations
- Social / spiritual and integrity values
- Practitioner-professional code of conduct, credibility
- Optimism
- Pessimism
- Trust

Reclamation Goals, Objectives and End Land Use Options

- Desired end land use (options)
- "Similar to pre-disturbance boreal forest ecosystem"

- Equivalent land capability – Land Capability Classification System (LCCS)
- Reclamation goals, objectives, targets
- Diversity of ecological function
- Natural range of variation (NRV)
- Uplands, wetlands, water body ratio / configuration
- Trade-offs, off-sets

Reclamation Timelines, Scheduling and Life Cycles

- Timelines – progressive reclamation
- Boreal timeframes
- The reclamation life cycle
- Realities of mine life cycle and production landbase needs
- Nature, magnitude and scale of oil sands development and reclamation
- Post-closure maintenance
- Inter-lease reclamation-related scheduling
- Alternative mind development effects on production landbase needs

Reclamation Costs, Risks and Liability

- Reclamation costs
- Cash flow for reclamation
- Security deposits
- Transparency
- Liability
- Financial uncertainty
- Investor risk
- Trust fund

Reclamation-Related Legislation Regulation Policy

- *Environmental Protection and Enhancement Act* (EPEA)
- *Alberta Land Stewardship Act* (ALSA)
- Water Act
- First Nation Treaty Rights and Obligations

- Federal Government Laws and Obligations
- Reclamation-related legislation, regulations and policy
- Guidelines, standards, definitions, etc.
- Alternative innovative mine development policy
- Poor alignment of regulations and policies
- Decision processes

Reclamation-Related Planning

- Environmental Impact Assessment (EIA)
- Reclamation plan
- Closure plan
- Mine Plan
- Approvals
- Inter-lease planning
- Regional Land-use Plan (LARP)
- Other land-use plans
- AlPac Forest Management Agreement
- Regional closure – watershed design plan
- Region – Landscape – Inter-lease – Site Coordination / Integration
- Alternative innovative mine development plans

Measurement of Reclamation

- Reclamation criteria, indicators, monitoring and reporting
- Reclamation certification (RC)
    - Uplands certification criteria and indicators
    - Wetlands certification criteria and indicators
- Landscape level criteria, indicators & certification
- Ratio upland-lowland
- Ratio of pre-disturbance natural range of variation
- Pre-Development baselines

Types of (Objects of) of Reclamation

- Uplands reclamation
- Wetlands reclamation
- Water body reclamation
- Natural succession – mother nature
- Functional landform, landscape and hydrologic design and reclamation
- Contaminant remediation
- End-pit lake content treatment
- Tailings management and reclamation
- Roads and plant site reclamation

Reclamation Information and Knowledge

- Unknowns – state of knowledge report(s) (gaps)
- State of oil sands reclamation (report)
- Open access to information and knowledge (transparency)
- Knowledge transfer / sharing & capacity building
- Communicate and inform
- Learn and educate
- Uncertainty – adaptive (experimental) management
- Research priorities
- Other relevant reclamation knowledge (best practices)
- Models and tools
- Community of practice
- Clear description and understanding of the "oils sands reclamation system"

APPENDIX 4: Workshop Workbook

GREETINGS

This is just a quick note to say many thanks for providing your time to participate in this workshop.

Many of you have already contributed by responding to the Challenge Paper that preceded this workshop. Thank you for this valuable input and your continued participation. This feedback was exceptionally helpful for informing the design of the workshop and this workbook. We have included many of these perspectives directly within some of the session materials including direct, unattributed quotes. It gives you a strong sense of what people are thinking about with respect to oil sands reclamation challenges.

You all come to this workshop with substantial reclamation technical, regulatory and process knowledge. We encourage you to put this knowledge to work openly with your colleagues so we can move forward collaboratively and as effectively as possible.

We are looking forward to a successful and productive workshop and with to express again our appreciation to you for making the time to be here to share and contribute your knowledge and experience.

PURPOSE OF THIS WORKBOOK

The purpose of this Workbook:

- To provide a guiding framework for the workshop participants.
- To continue to provide the participants with a high level sense of the feedback we received to the Challenge Paper.
- To set the scene for a workshop that is intended to be interactive, informative, innovative, practical and fun.
- To provide take away reference material for participants to use in follow-up discussions with their colleagues, including those that were unable to attend this workshop. Please feel free to share this Workbook. An electronic version is available from Chris Powter at powter@ualberta.ca.

To support the development of this Workbook and the Workshop design (Agenda):

- A Challenge Paper was prepared and distributed to over 90 practitioners across the oil sands community of practice.
- Feedback was received from 43 individuals, including responses from governments, individuals working with First Nations in the oil sands area, academia, consulting firms, oil sands companies, research/technology agencies and nongovernment organizations. The feedback was compiled into a Consolidated Feedback document,

which was distributed to all Dialogue participants, including those that did not respond to the Challenge Paper. A few copies of this document are available as a resource at this workshop. It will also be posted on OSRIN`s website as part of the Challenge Dialogue report.

- A Progress Report and a separate detailed Appendix document synthesized all of the feedback. These documents were also distributed to all Dialogue participants. Several copies of these documents are also available at each Table Group at this workshop. They will also be posted on OSRIN`s website as part of the Challenge Dialogue report.

SESSION 1: SETTING THE STAGE FOR A PRODUCTIVE WORKSHOP

Revised Key Challenge Statement for the Dialogue

The revised Key Challenge statement in the Progress Report is:

> To engage a diverse set of domain experts and stakeholders in a purposeful dialogue to create a systems view of oil sands reclamation.

Feedback on the original Key Challenge

As noted in the Progress Report, our overall sense of the feedback taken as a whole is that there is an absence of a systems view of the reclamation challenge. Nearly everyone expressed a deep understanding of parts of the original challenge, but often what was missing was putting those parts into a systems context. The Organizing Team decided that the dialogue should focus on exploring a more integrated systems view of oil sands reclamation as it examines some of the key components and their issues, gaps and uncertainties.

This systems view requires that we step back from our specific technical, regulatory or professional interests and look at the larger picture and connect all the "components" of reclamation into a system. It causes us to ask higher-level questions such as:

> Why are we reclaiming; what are we reclaiming; what are we reclaiming to; when should reclamation occur; how does it occur; what must happen before reclamation; how do we know it has been successful; when do we know it has been successful; what are the regulatory processes; what are the opportunities for stakeholder input, public input, etc?

Feedback on the Revised Key Challenge

Here is some of the feedback we received on this revised Key Challenge statement in the Progress Report. The limited responses we received would appear to support this change in emphasis.

- *The revised Key Challenge steps back to accumulate a better overall understanding of all of the key factors associated with Oil Sands mine reclamation. The original Key Challenge was focused on a few of the key issues, but perhaps not the most relevant ones.*

- *I support the proposed revised Key Challenge.*
- *This "step-back" review is an important step and should foster interesting discussions. It would be helpful to have access to a short "history" of how the province has arrived at the current views of reclamation.*
- *It is valid to step back and revise the Key Challenge to focus on the overall system. The questions put forward are key components of the overall system. It is still critical to keep the overall outcome in the Key Challenge – that is developing recommendations to Government/Industry. The key at the workshop will be to keep the focus on the overall system and not get bogged down in the details.*
- *The focus on the systems view seems like a good starting place, and will be very useful in guiding the more operational challenges in the future dialogue.*

Revised Expected Outcomes for the Dialogue

The revised Expected Outcomes in the Progress Report are:

1. Achieve alignment on the key elements, linkages and dependencies within the oil sands reclamation system and how a lack of shared understanding and alignment is hindering its effectiveness.
2. Achieve alignment on and commitment to specific follow-up initiatives to be undertaken by OSRIN and others to increase shared understanding and help increase the effectiveness of the oil sands reclamation system.

Feedback on the original Expected Outcomes

While there was general support for the original expected outcomes in the Challenge Paper some people felt they were ambitious while others pointed out that these topics have been discussed for decades. Similar to comments about the Key Challenge, a number of participants wondered about what the overall objective was underpinning this Dialogue. The Organizing Team concluded that although the original proposed outcomes in the Challenge Paper are still desirable, it is better to address the issues they touched upon by refocusing the dialogue to accomplish the revised Expected Outcomes as stated above.

Feedback on the Revised Expected Outcomes

Here is some of the feedback we received on this revised Key Challenge statement in the Progress Report.

- *The only comment I have is that a lack of shared understanding may not hinder the effectiveness of the reclamation system in achieving reclamation; it may result in many focusing on questions on the systems rather than on review of the effectiveness of the system. However, if many of those interested in oil sands reclamation do not understand the system, they reduce the capabilities of those who work on reclamation to advance the state of practice because they demand attention and*

answers on things that are already known. Energy must be focused on increasing certainties, or reducing uncertainties on specific components of reclamation programs.

- *Outcome #2 is important in both identifying and prioritizing follow-ups. One of the issues with RSDS [Regional Sustainable Development Strategy] was that the follow-up to the list of key issues was degraded by not accepting that there is a priority for addressing issues, and that not all issues can be addressed at the same time – there simply are not enough resources. The special interests of a few cannot degrade the collective prioritization decisions of the many.*
- *While alignment may be a laudable goal, simply gaining a common awareness may be sufficient for now. If each stakeholder understands the views and objectives of the others, perhaps the current adversarial system (i.e. hearings, protests, etc) can be modified to focus energies on making the system work rather than achieving individual objectives.*
- *Although I agree with the [original] four expectations listed in terms of getting everyone up to the same level of understanding/on the same page it is critical to have the fifth expected outcome as recommendations to Government/Industry. Without this final outcome this exercise risks being placed on the bookshelf like so many others. This is an opportunity to make things happen – we can't risk losing it.*
- *#1 – struggling with the second half of this outcomes 'how a lack of shared understanding …' . I would suggest that if we achieve alignment on the system it will go a long way to supporting a shared understanding. Suggest rewording to 'Achieve alignment on key elements, linkages, … reclamation system to enable a shared understanding.".*
- *Alternatively, you could break this into 2 parts (something like this); (1) Achieve alignment … reclamation system. (2) Enable shared understanding and alignment to support the reclamation system. #2 – seems like a next step or action rather than expected outcome. If kept perhaps simplify to 'Achieve alignment on and commitment to specific follow-up initiatives to support the os reclamation system'. The accountability piece can be dealt with during the process. "check."*

Expected Outcomes for This Workshop

There was no shortage of expectations and perspectives expressed for this face-to-face workshop. Four general recurring themes were evident from this feedback described as follows:

1. Common understanding of the state of our knowledge – the need for this community of practice (and interest – i.e., stakeholders) to have a common, shared understanding and exchange of what is known, what is not known, what is being researched.

2. Reclamation outcomes – the need to have clearly defined, agreed upon, high-level reclamation outcomes. Tied closely to this is the need for a deeper understanding of some foundational concepts (e.g., equivalent land capability) with their supporting explicit definitions of key terms (e.g., capability, functional, landscape, boreal, etc.).
3. Collaboration – an explicit or underlying desire to more effectively capitalize on our knowledge and expertise through better collaboration.
4. Collective action – a desire to share and build on what we know and to move forward with some collective action.

Here are some selected comments regarding workshop expectations:

- *There is good representation from all stakeholder groups (government, industry, aboriginal groups, and environmental groups) that are well-informed, that are willing to work on tough issues even if that means putting their organization's position to the side; we clearly define how the outcomes will come into effect.*
- *I would consider the workshop a success if there is a better understanding of: the oil sand development constraints; reclamation successes; the extensive amount of reclamation research that has transpired; the ongoing research work; and, the level of active involvement by the oil sands industry in regional stakeholder forums*
- *Focus of the workshop should remain a number 3 and 4; I would consider the workshop a success if – we got people to agree that alternate uses would be considered; we got some suggested alternate uses that people would find useful; we got some suggestions for people on how to measure success in reaching the alternate use (or were told that these measures need to be developed).*
- *Agreement could be reached on these definitions [definitions of equivalent capability in the pre-disturbance landscape condition] and how they impact expected outcomes*
- *I would not consider the workshop a success if the result was a transcript or discussion/workshop notes, with no clear path forward.*
- *We did not re-hash discussions of the past; and if timelines to meet agreed upon outcomes were proposed with input from the broader stakeholder community*

The proposed Expected Outcomes for this workshop are:

1. The benefits of taking a Systems Perspective to the overall oil sands reclamation challenge are better appreciated and have begun to be applied to the challenges and opportunities identified in this dialogue.
2. Challenges related to the rationale and application of the Equivalent Land Capability concept have been framed and key questions to address this challenge and to guide future work have been identified.

3. Challenges related to End Land Use Selection have been framed and key questions to address this challenge and to guide future work have been identified.
4. Challenges related to How to Respond to and Inform the Public's Expectation of Reclamation Success have been framed and key questions to address this challenge and to guide future work have been identified.
5. An Action Plan for OSRIN and its key clients has been vetted and sketched out.

Task for Participants

- At your Table Groups please introduce yourselves sharing with one another why you decided to attend this workshop and what some of your own expectations are.
- Please review the Rules for the Road (section 1.3) – can you accept these as the group's operating principles for the day?
- Please review the Expected Outcomes for this Workshop (section 1.8) — are you aligned? What adjustments do you think are necessary? What expectations would you like to remove or add?
- Please note, if time permits, discuss the revised Key Challenge and Expected Outcomes for the Dialogue overall (section 1.6 and 1.7 respectively). Comments on these over the course of the workshop would also be welcomed.
- Please jot down any of your key points on the flip chart next to your table. We will poll the Table Groups for their reactions to the Expected Outcomes.

SESSION 2: SETTING CONTEXT – NATURE AND EXTENT OF THE FEEDBACK TO THE CHALLENGE PAPER

Purpose

- To remind everyone of the nature and extent of the feedback to the Challenge Paper and how the feedback has been organized and synthesized into the Progress Report with its supporting Appendix document.
- In addition to the written feedback to the Progress Report, to provide the participants with an opportunity to provide further feedback on the Progress Report.

Selected Excerpts from the Progress Report and Progress Report Appendix

Forty-three (43) participants in the Dialogue provided feedback on the Challenge Paper. The source of feedback included a reasonable diversity of people: 12 with the Alberta government, 9 with academia, 7 with consulting firms, 6 with industry, 6 with research-technology

organizations, 2 with non-government organizations and 1 working with First Nations in the oil sands area.

In aggregate, the feedback was comprehensive, broad ranging, insightful and constructive. While the Challenge Paper intended to focus on a few key aspects of the reclamation challenge for mining in the oil sands area, it ended up provoking reactions that were wide ranging and across almost the full spectrum of the "oil sands reclamation system." The nature and depth of the responses underscored the complexity, diversity and interconnectivity of the numerous reclamation issues and opportunities presented.

At first blush it appeared like there were significant differences of opinion with the statements in the Challenge Paper. Indeed, there are some topics where some said or implied "all is well", while others said "we have no idea" or "this is a significant area of concern." But in many cases with closer examination often it became evident that these differences were more of an indication of people simply not knowing or not being able to know because they don't have access to the necessary information to judge. Most often what was brought forward in the comments was not so much counter arguments but rather new information or deeper insights on the subject. In aggregate, the comments have provided the Organizing Team, by way of this Progress Report, with an opportunity to refine and expand on many of elements in the Challenge Paper (the Key Challenge, Background, Expected Outcomes, Assumptions along with answers and perspectives in the responses to the six Critical Questions).

The feedback indicated directly and with inference that a systems perspective is often missing or for those that have it, that it is not understood or shared universally among the many players working on and living in the oil sands area and among key stakeholders. A systems perspective helps to put the many issues into context and to see better the relationships and interdependencies. For example, it helps to think about how objectives at different levels of planning need to be aligned, how the mine plan affects the reclamation and closure plan, how the reclamation plan needs to consider the outcomes for dykes, roads and different water bodies. At the end of the day, these plans need to work in an integrated manner so they are not working at cross-purposes and so that the ultimate reclamation outcomes can be achieved effectively and efficiently. A few people mentioned the need for people to better understand the "natural life cycle of mining and how the current reclamation matters relate to that." This was another expression and plea for more systemic thinking in tackling the reclamation challenge.

As we reviewed and synthesized the feedback, recurring patterns and some common themes emerged. In the Progress Report we presented the 10 themes and the key discussion points (81) the participants raised using a diagram (Figure 1). Based solely on the spectrum of the feedback received, in some respects this diagram represents one simple expression of the "oil sands reclamation system." We will be discussing system perspective further in session 3.

Task for Participants

- Keith Jones will be presenting a brief overview of the feedback and the Organizing Teams synthesis of this material.
- Please refer to the resource material listed in section 2.2 and discuss in your Table Groups for a few minutes the feedback to the Challenge Paper. Please note any key discussion points on your flip chart and prepare yourselves to bring them forward in the plenary discussion.
- We will have a brief plenary discussion of the highlights raised by Keith and the points raised in your Table Group discussions.

SESSION 3: TAKING A SYSTEMS VIEW OF OIL SANDS RECLAMATION AND UNDERSTANDING ITS IMPLICATIONS

Purpose

- To explore what we mean by the term "systems view" and the expression "oil sands reclamation system."
- To gain alignment on the meaning, importance, key benefits and potential actions for applying this concept and line of thinking to both The Challenges and Opportunities Identified in this Dialogue and to oil sands reclamation practices more broadly.

Discussion of a Systems View of Oil Sands Reclamation

This first working session of the workshop is intended to examine what we mean by the expressions "a systems view" and "oil sands reclamation system." Ideally we hope to achieve alignment on the meaning, importance, key benefits and potential actions to better use the concept in reclamation and reclamation-related practices.

The following definition of "system" captures the essence of what we mean by systems approach.

System: "a group of independent but interrelated elements comprising a unified whole." It is important to note that in many cases we are dealing with a system of (sub-) systems.

We use the term "reclamation system" to include all of the elements involved in planning, managing and conducting reclamation. This includes, but is not limited to a policy system, a regulatory system, an operational reclamation system, and others. Thus the "reclamation system" can be thought of as a system of systems.

The concept that we are focusing on here is that in almost every aspect of oil sands development, it is not possible to take an action that does not have an impact, often unintended, elsewhere in the system. Everything is connected to everything else. This is true in physical terms and in terms of regulatory and organizational components.

These connections are commonly represented in various types of diagrams that show process connections or other relationships among parts of the system. Examples of such diagrams have been included in the feedback to the dialogue (Figure 1 and Figure 2). This type of diagrammatic representation of the oil sands reclamation system can be a useful tool for understanding and describing linkages and dependencies and for testing the potential impacts of decisions, plans and actions in one element to decisions, plans and actions in other elements of the reclamation system.

We want to focus this morning on a particular aspect of taking a systems approach oil sands reclamation. We are less concerned with describing the entire system than we are in examining specific elements in the system where unexpected and unintended consequences result from decisions and actions in a local part of the system.

Because of the way the reclamation system tends to be partitioned among various organizations and sub-units of organizations, local optimization or maximization may lead to overall (system-wide) sub-optimization. This situation is far from unique to the oil sands or reclamation. In fact, it is typical of any large complicated system. The challenge we seek to address today is how we can develop strategies for overcoming these sources of ineffectiveness and of inefficiency.

Systems linkages

The following oil sands-related examples are presented to illustrate the type of system linkages that we have in mind when we talk about needing to take a systems perspective.

Selection and optimization of bitumen separation technology

In terms of the reclamation system, one of the biggest challenges lies in the process for separating bitumen from ore. The process that has been selected and the ongoing optimization of that technology are driven by technical factors such as recovery, and operating cost of the process itself. The costs of treating, remediating, and reclaiming the tailings is not a major factor in this decision. Once the capital investment decision has been made in separation technology, managing the tailings system becomes a matter of doing the best you can with what you are given.

Because the "extraction department" is different from the "reclamation department", the nature of the effluent from the separation process and the costs of remediating and reclaiming are of much less importance to the "extraction department". Incentives are generally structured to drive improvement within departments, rarely across departments. There is little to no incentive to develop an overall optimization.

Let us be clear here. We don't know that there is a technological alternative that might cost more to separate the bitumen, but would produce tailings that could be more easily and cheaply managed resulting in an overall lower cost. What we are saying is that if there were such an alternative, it is unlikely that it would be discovered because of the way we tend to think and organize ourselves.

ERCB Draft Directive for Fresh Water Use

The ERCB draft directive that limits use of fresh water in oil field operations to less than 10% of total water use was put in place to address an issue in central Alberta. The increasing use of fresh water to support coal bed methane development as well as water flooding in conventional oil fields in central Alberta was perceived to threaten agricultural viability. In response to this concern, the ERCB acted to limit the use of fresh water.

This same limitation is being applied in northeastern Alberta to limit access to water for in-situ oil sands development. The most commonly available alternative is brackish to saline groundwater. Use of saline groundwater creates a significantly larger total environmental footprint than would the use of larger amounts of fresh water.

Here are two examples.

1. Developing well fields and piping water to in-situ plants involves a significant increase in number and length of cut lines through the bush adding further to degradation of wildlife and other habitat.
2. Burning natural gas to desalinate the water significantly increases GHG emissions of the in-situ operation.

The Directive, which was designed to prevent one environmental problem, may result in even greater total environmental costs. Taking a systems view would involve answering the question "how do we minimize the total environmental footprint" rather than addressing a narrow, single objective solution.

Zero Discharge of Process Affected Water

The philosophy and resulting practice of zero discharge of process-affected water into the environment is creating the build-up of a whole series of challenges that will need to be resolved. Here are three examples:

1. One issue is a continually increasing concentration of chemicals in process-affected water, which both degrades its effectiveness in separation of bitumen and will ultimately increase treatment costs.
2. Some mines have built up such large stocks of water in their water management systems that simply managing the volume has become a problem.
3. One possible use for excess process-affected water is as feed-water for in-situ operations. This would minimize the requirement for treatment, which would be a benefit to both the mining and in-situ operations. Unfortunately, process-affected water is considered fresh water from the perspective of the ERCB draft directive on fresh water usage. As a result, this attractive opportunity is currently not available.

Conflicts in Objectives

In many instances we seek to address conflicting objectives by making a decision that precludes alternatives. The following examples illustrate the types of trade-offs. A more regional focus on

the entire mining area may enable responding to multiple objectives in ways that are not feasible within the context of a single mine site.

1. The push for dry tailings technology that produces more upland, productive forest leads to increased salinity in both process recycle water and in water that will eventually need to be released to the environment.
2. The focus on upland forest, and the related use of the Land Capability Classification System, gives the appearance of a reduced importance and value of wetlands and water bodies.
3. Concern about reclamation vegetation inhibiting the ability to effectively monitor tailings dam slopes leads to recommendations to not plant trees anymore, which is diametrically opposed to the goal of progressive reclamation.

Task for Participants

- Step 1: In your Table Groups identify and describe at least three examples from your own experience of cases where decisions or actions directed at solving a "local" problem or capturing an opportunity created unexpected problems or costs elsewhere in the oil sands reclamation system.
    - Describe what was intended and what the unanticipated consequence was. To the extent possible, identify what linkages would have been necessary to foresee the consequence and how they might have been avoided. Please capture your main discussion points on your flip chart.
- Step 2: In a very practical implementable way, consider at your Table Groups how we might increase the application of our understanding of the oil sands reclamation system in our day-to-day work so that we are better able to recognize unobvious systems linkages that may result in unintended consequences and in turn limit our ability to improve the effectiveness and efficiency of our reclamation efforts.
    - Please identify at least three concrete actions that might be taken to address this systems-related deficiency. Please capture the actions on your flip chart and prepare yourself to share them in plenary discussion.

SESSION 4: EQUIVALENT LAND CAPABILITY —THE CONCEPT AND ITS APPLICATION

Purpose

- To frame the Equivalent Land Capability discussion by exploring and characterizing the various dimensions of this aspect of the oil sands reclamation challenge.

- To identify a set of key questions related to this challenge that can serve as the basis to guide future work by OSRIN and others.

Discussion of the Feedback from the Challenge Paper Regarding Land Use Selection

Note: the following material is taken from section 3.3.2 of the Progress Report Appendix document (page 8).

Equivalent land capability was a major element of discussion for many participants. It is evident from the range of views that there is significant variability in how people interpret the definition of equivalent land capability in the *Conservation and Reclamation Regulation* and how it is applied to oil sands mines or boreal forest areas. Since this is the foundation of Alberta's regulatory approach to reclamation there is a critical need for a focused dialogue on what this means for oil sands mines in a boreal forest setting. Here is some feedback to illustrate this.

- Equivalent land capability is a poorly understood term which is so vague as to mean many different things to different people
- Determining reclamation success in equivalent land capability in the oil sands is a major challenge the operators are currently being faced with.
- Maybe this challenge should include developing a working framework for "equivalent capability".
- Any discussion of "challenges and timelines" in reclaiming to equivalent capability must start with an exploration of how to truly define equivalent capability in such a way that its achievement can be assessed and documented. I think that this is also an appropriate part of the discussion.

Land Capability Classification for Forest Ecosystems in the Oil Sands (CEMA)

Note: the following material is taken verbatim from CEMA – http://www.cemaonline.ca/index.php/cema-recommendations/land-capability

The goal of reclamation in Alberta is to achieve land capability equivalent to that which existed prior to disturbance. The Land Capability Classification System for Forest Ecosystems manual (LCCS) is a working document intended to facilitate evaluation of land capabilities for forest ecosystems on natural and reclaimed lands in the Athabasca oil sands region, as required by Alberta's *Environmental Protection and Enhancement Act* (EPEA) approvals, and by current Alberta Environment terms of reference for Environmental Impact Assessments.

The LCCS is based on an integration of numeric values assigned to soil and landscape characteristics that are known to be fundamental to ecosystem productivity. Parameters considered include soil moisture regime, soil nutrient regime and soil physical and chemical properties that are potentially limiting to plant growth.

The first edition of the LCCS was developed in 1996 by the Tailings Sand Reclamation Practices Working Group, and was revised in 1998 based on results from field testing. The Soil and

Vegetation Subgroup (SVSG) of the Reclamation Working Group (RWG) of the Cumulative Environmental Management Association (CEMA) is currently responsible for the continued refinement of the LCCS, and has developed this 3rd (2006) Edition.

Regulation and Approval Requirements

Conservation and Reclamation Regulation

1(e) "equivalent land capability" means that the ability of the land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but that the individual land uses will not necessarily be identical;

1(j) "land" means terrestrial, semi-aquatic and aquatic landscapes when the term is used in the definitions of "land capability" and "equivalent land capability";

1(k) "land capability" means the ability of land to support a given land use, based on an evaluation of the physical, chemical and biological characteristics of the land, including topography, drainage, hydrology, soils and vegetation;

Objective

The objective of conservation and reclamation of specified land is to return the specified land to an equivalent land capability.

Suncor Approval (example of capability requirements)

6.1.11 The Mine Reclamation Plan referred to in subsection 6.1.10 shall provide the detailed operational plan for development and reclamation for a specified period of operation. The plan shall:

(d) detail the procedures that will be used to ensure reclamation to an equivalent land capability;

6.1.24 The approval holder shall return disturbed land at a minimum post-disturbance area of land capability class illustrated in TABLE 6.1-A, or as otherwise authorized in writing by the Director.

TABLE 6.1-A: LAND CAPABILITY CLASS

LAND CAPABILITY CLASS	PRE-DISTURBANCE AREA (HECTARES)*
1	**0**
2	2,564
3	1,808
4	4,451
5	10,535
Total	19,358

*as amended from time to time

Task for Participants

- At your Table Groups please review and discuss the Equivalent Land Capability material provided in sections 4.2 and 4.3 above. Discuss and write down on your flip chart what you consider are the main components of this aspect of the oil sands reclamation challenge when you break it down. This will help us to frame this topic.
- Once you have set some dimensions to the Equivalent Land Capability challenge, both the concept and its application, consider what questions need to be answered in relation to the different aspects of the challenge.

SESSION 5: LAND USE SELECTION

Purpose

- To frame the Land Use Selection discussion by exploring and characterizing the various dimensions of this aspect of the oil sands reclamation challenge.
- To identify a key set of questions related to the challenge that can serve as the basis to guide future work by OSRIN and others.
- To revisit and assess the *Oil Sands Mining End Land Use Committee Report and Recommendations* (July, 1998) to determine the extent to which the context for and assumptions underlying this report remain relevant to today's reclamation challenges.

Discussion of the Feedback from the Challenge Paper Regarding Land Use Selection

Note: the following material is taken from section 3.3.1 of the Progress Report Appendix document (page 4).

Among a number of similar reactions the following three comments illustrated the importance that some Dialogue participants placed on this topic.

- *I am thrilled that the notion of alternate land uses is being explored by OSRIN. This is a topic much overdue and hopefully no imaginative alternate land use ideas will be discounted.*
- *Would like to see the overall objectives discussed (i.e., under what conditions could alternative closure objectives be considered?)*
- *Creating alternative end land uses will be a lot easier than reclaiming to equivalent capability (or something that looks natural). Do you want to explore the feasibility or have a dialogue with stakeholders to determine if this is acceptable and what it may look like?*
- *It was apparent from the feedback that there were different views on whether or not alternative land uses were an option under the legislation, or, if they were an option, whether they should be allowed.*

- *The Environmental Protection and Enhancement Act requires that the land should be reclaimed to a condition similar to pre-disturbed conditions. Why are we deviating from the legislation?*
- *What is the impetus for the creation of closure landscapes with novel land use capability, would it be cheaper to create a novel use than an equivalent to pre-disturbance forested landscape that the oil sand mines originally proposed and were approved for?*
- *Are there stakeholders who wish for potential novel closure land uses that would be more lucrative than the forest matrix and traditional land uses can provide? Is it relevant if the land is not capable of supporting such activity?*

There seems to be general alignment around the view that the overall reclamation goal is to return to a self-sustaining productive boreal forest ecosystem. Understandably therefore some people wondered why options would be considered. These are important questions to answer, because they set the boundaries within which mine reclamation planning, and related public dialogue on suitability of reclamation plans, are carried out. Without answers to these questions companies will continue to propose the same (self-sustaining productive boreal forest ecosystem) reclamation goals rather than risk undue delay, while the general concepts of alternative land uses are debated. As a result regional stakeholders may lose the potential opportunities that alternatives could bring.

Some people asked "Alternative to what?" Some people asked if this meant allowing different uses in a reconstructed boreal forest ecosystem (e.g., forestry, hunting, fishing, berry picking, hiking, camping, quadding, etc.) or if it meant creating something different than a boreal forest ecosystem with a specific use in mind (e.g., a bison ranch, an ATV park, a golf course, a campsite, an industrial park). In a similar vein, some people asked if this was about allowing temporary uses with the idea that the land would then be returned to a productive boreal forest ecosystem (i.e., the reclaimed area has the capability of a boreal forest ecosystem) or if these were permanent changes (i.e., the capability has been restricted to one or more specific uses).

Some people pointed out that selecting appropriate land uses is a public, values-driven process. Once the decision is made on appropriate land use the mining and reclamation specialists can then get engaged to deliver the reclamation plan.

If alternative land uses are to be considered we need to explore the following line of questioning:

1. What uses should be considered (and what uses should not be considered)? Are there examples in Alberta of alternative land uses being allowed and being certified?
2. Are there any specific constraints that should guide the selection and approval of alternative land uses? For example: (a) Where in the region are alternatives most/least appropriate? (b) Which landform types are most/least suitable for alternative uses? (c) Will the Lower Athabasca Regional Plan say anything about land uses? (d) What existing policy documents describe land use outcomes and decision processes?

3. What criteria should be used to determine if an alternative use is viable and useful (i.e., meets the test of equivalent land capability)? For example: (a) Who does the option benefit? (b) Is there a viable proponent for the option who has the capacity to continue management of the site
4. What is the process for approving the alternative use (current practice and recommended practice)?
5. What regulatory land management requirements need to change if an alternate land use is approved?
6. What criteria are available, or need to be developed, to certify alternative land use areas?

Interestingly, in all of the feedback only one person mentioned the recommendations of the Oil Sands Mining End Land Use Committee (see excerpts from this report below). In this workshop session we would like to review these recommendations in relation to the above questions.

Ultimately this type of discussion might lead to the formulation of different policy options that would guide industry on what land use options could be considered for oil sands mine reclamation and the preferred process for considering and approving such options.

Excerpts from Oil Sands Mining End Land Use Committee Report And Recommendations (July, 1998)

The following material is a verbatim excerpt from this report.

In June 1996, the Director of The Land Reclamation Division, Environmental Regulatory Service, Alberta Environmental Protection, recommended that a committee be established with membership from the Oil Sands Mining Industry; Alberta Environmental Protection; Alberta Energy and Utilities Board; and representative of the interests that may be directly affected by oil sands mining. The committee would make recommendations to the Government of Alberta and the Oil Sands Mining Industry to assist decision-making during the regulatory review and approval process for reclamation and end land use planning. The Committee focused on minimizing impacts on other uses and industry (e.g., forestry) while at the same time respecting oil sands mining as an important regional activity. An important product of the committee was a framework that would help the industry operators and government regulators make decisions using a common understanding of legal, social and economic factors affecting reclamation and end land use.

Committee members were recruited and began meeting in February 1997, with unidentified completion date of December 20, 1997. A terms of reference was finalized that supported completion of the task within the defined schedule.

Committee Recommendations

The End Land Use Committee prepared recommendations focusing on four areas in the reclamation process:

Baseline Information/Data for End Land-Use Decision-Making – Pre-Disturbance Land Capability: This includes recommendations on baseline data collection for new oil sands development, existing oil sands operations and verification of baseline vegetation data for existing oil sands development.

Reclamation Plan Coordination: Recommendations deal with the need for regional coordination of end land-use decisions through a group consisting of regulatory agencies, Oil Sands Industry and key stakeholders in the Regional Municipality of Wood Buffalo, requirements for coordination between government and industry and coordination of plans and reclamation activities among industry operators.

Land Use Category an Allocation: The committee provided recommendations for major land-use categories: Natural and Conservation Areas, Human Development, and Forestry as well as guidelines for implementation and allocation.

Priority of Establishing End Land Uses: Recognizing that development of land uses on reclaimed land will happen over long periods of time, the committee provided recommendations for setting end land-use priorities.

Use of the Committee Recommendations: The committee recommendations have been provided to government regulatory agencies and oil sand mining companies as a framework for:

- Recommendation and end land use planning by companies
- Provincial Government regulatory review and decision-making
- Preparing a strategy for ongoing monitoring and review of the committee's recommendations on oil sands mining end land use.

Tasks for Participants

- At your Table Groups please review and discuss the land use material provided in sections 5.3 and 5.4 above. Consider and write down on your flip chart what you consider are the main components of this aspect of the oil sands reclamation challenge when you break it down.
- Once you have set some dimensions to the Land Use Selection challenge consider what questions need to be answered in relation to the different aspects of the challenge.
- As you are doing the above tasks please take a look at the Oil Sands Mining End Land Use Committee Report and Recommendations and consider to what extent the context and underlying assumptions for this report remain relevant today. Do you feel this report and its recommendations are helpful for the land use discussions we are having now? What would we need to do to update this report? What group and what process would be most appropriate to accomplish this?

SESSION 6: RESPONSE TO AND INFORMING PUBLIC EXPECTATIONS OF RECLAMATION SUCCESS

Purpose

- To explore how Alberta can shape the public debate on what constitutes reclamation success in the oil sands area so that policymakers and practitioners can be held accountable for the right things. More specifically to:
    - frame the challenge by exploring and characterizing the various components of this challenge.
    - identify a key set of questions around the challenge that can then serve as a basis to guide future work by OSRIN and others.

Brief Thoughts on the Public Debate on Reclamation Success

At the present time, Alberta's brand with respect to the handling oil sands development is tarnished. In its deliberations, the Premier's Council on Economic Strategy is hearing from Canadians living abroad as well as from highly placed individuals in foreign businesses and governments that negative perceptions of Alberta's stewardship of this resource is damaging Canada's credibility.

The public has a number of negative perceptions regarding reclamation. Among them are:

1. The pace of reclamation is too slow
2. Too little reclaimed land has been certified
3. The amount of reclamation security being held is inadequate to ensure that reclamation occurs
4. Tailings ponds are a growing and permanent feature of the landscape.

Some of these concerns are appropriate and legitimate; others are not.

Alberta is accountable to its citizens, to Canadians, and to the world for discharging our stewardship obligations to develop the oil sands resource in an environmentally and socially responsible ways. What then are the measures of reclamation success that the Alberta oil sands sector should be held accountable for?

In addressing this question, Vancouver-based corporate public relations consultant and environmentalist, James Hoggan, articulates three laws for corporations and governments that are dealing with environmental issues: Law 1 – Do the right thing; Law 2 – Be seen to do the right thing; and, Law 3 – Don't confuse Law 1 with Law 2.

Judged against these three laws, Alberta is not doing a very good job. Although we are doing some of the right things and doing them very well, both government and industry are doing a

poor job of communicating to the public so that we are seen to be doing the right things. In other areas, where we are simply not doing enough of the right things, people think we are mistaking law 1 for law 2, and are relying on “PR spin."

The most effective way that we can shape the public debate is to communicate in a consistent way the message that we recognize there are problems and challenges in reclaiming oil sands mining areas, and that we are dealing with them. We need to communicate what expectations are reasonable for people to have with respect to the mining life cycle and therefore the pace of reclamation. We need to communicate where we have the necessary knowledge and practices to achieve reclamation success. We also need to communicate honestly and openly where we really don’t know how to be successful and what we are doing to address these knowledge gaps.

Brief Thoughts on Measures of Reclamation Success

Oil sands mining and reclamation is a large, complicated, and long-term process. Work related to reclamation is quite different at different stages in the life cycle of a mine. Presumably the measures that should be used to track reclamation success should be different at different stages in the life cycle. Unlike plains coal mining, where progressive reclamation is a continuous process that follows the mining process across the landscape, the rhythm of oil sands mining is quite different.

Progressive reclamation is a nice sounding “motherhood” concept. In reality, mines will always have significant areas that cannot be reclaimed until towards the end of the operating life of a mine. This reality needs to be accepted, and if there are significant concerns about the capability or drive of the organization to spend the large amount of required money on reclamation at the end when the operation is not making money, then the amount of reclamation security collected during the peak money making years of the operation needs to be adjusted upwards. Simply saying that more reclamation needs to be done sooner will not make it happen without significant changes to the fundamentals of oil sands mining and extraction operations.

This quote, which was excerpted from the feedback to the Progress Report, provides a starting place to consider what measures of reclamation success we might propose.

The principle that success in each stage should be measured in different terms in our view is very important in managing communication with the public. A measure such as number of hectares with a reclamation certificate, which might be highly meaningful in the later stages of a project, has no relevance in the early stages of a mine life cycle. Similarly, the percentage of disturbed area from which topsoil or LFH has been recovered and “hot placed” onto a prepared, reclaimed surface (which might be a splendid measure early on in a project) does not provide much guidance for assessing performance in the later stages of a project.

Task for Participants

- Step 1: In your Table Groups please discuss the stages in the life cycle of an oil sands mine in relation to the process of reclamation. For each stage in this process

identify at least one measure that might be used to establish that reclamation work is proceeding appropriately and is on track.

- Step 2: Next, please identify a significant challenge or barrier to achieving a high level of performance in the measure that you identified for that stage of mine life cycle model. For each challenge or barrier, identify what is currently being done, or could be done to resolve the challenge or remove the barrier.
- Step 3: Next, please suggest a communications format/medium that would be suitable to tell people what the issue is and what we are doing about it.
- Step 4: Finally, please develop a specific communications approach for one of the priority or key challenges or issues related to reclamation success. What do we need to do to "do the right thing" (Law 1), or are we already doing it? How do we structure communications so that we are "seen to be doing the right thing? (Law 2)."

SESSION 7: MOVING FORWARD: ACTION PLAN, NEXT STEPS AND EVALUATION OF OUR COLLECTIVE PERFORMANCE

Purpose

- To assemble and verify the actions that were identified primarily from the discussions in session 3 (Systems Perspective), 4 (Equivalent Land Capability), 5 (Land Use Selection), and 6 (Public Expectations).
- To review our accomplishments for the workshop overall.
- To confirm the immediate post-workshop next steps in the Challenge Dialogue process.
- To re-visit the Expected Outcomes set out at the beginning of the workshop in order to measure our collective performance.
- To close-off the workshop and thank the participants for their valued input over the course of the Dialogue and at this Workshop.

Tasks for Participants

Action Planning

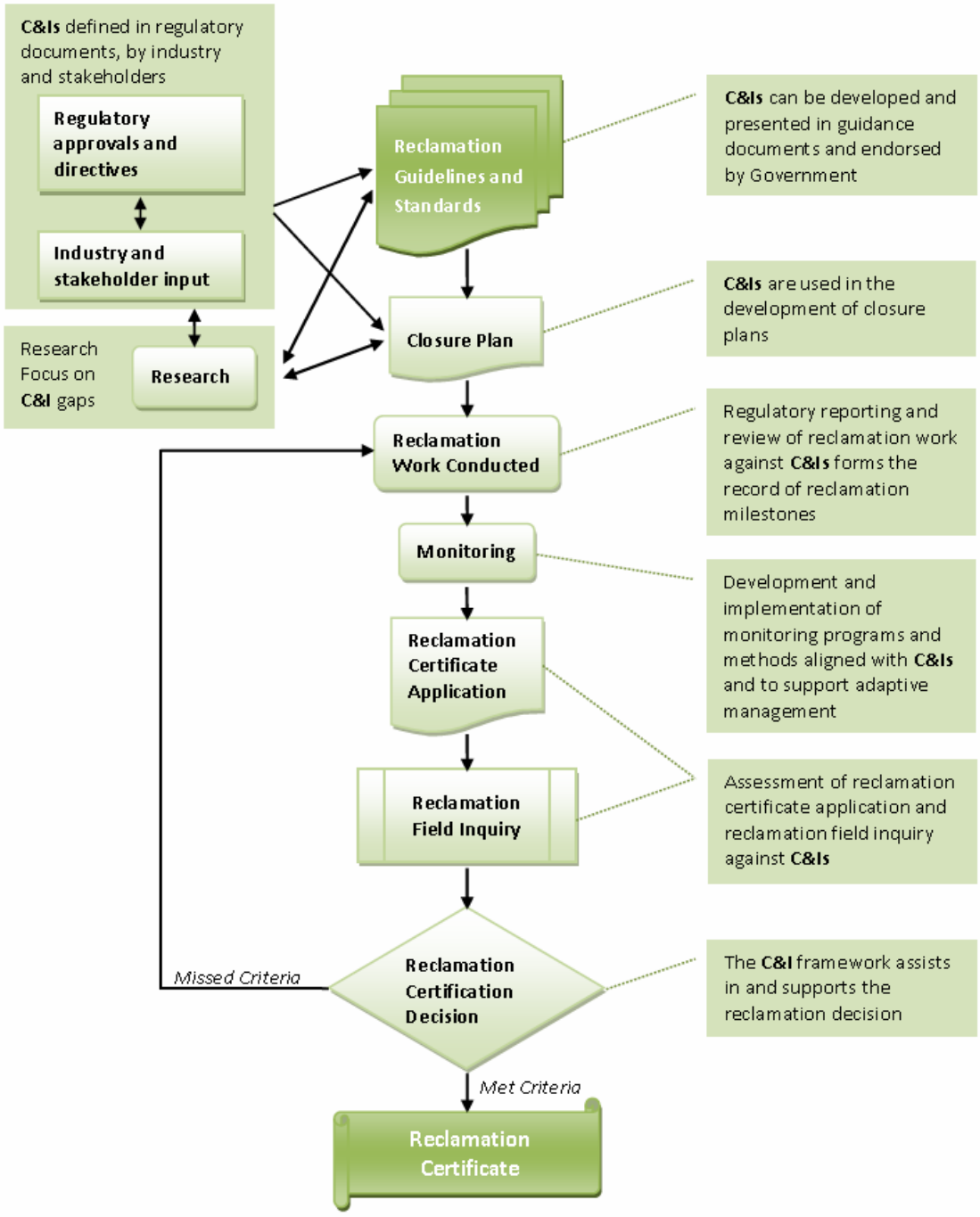
- In your Table Groups please take a few moments to organize the action-options or action-recommendations that you or other participants noted in the preceding sessions and generally over the course of the day.
- In plenary, we will poll the group and create a master list of action-options or action-recommendations. Clearly, some of these actions will be the responsibility of

OSRIN. Some however might be achieved more appropriately through collaboration. Some actions may not involve OSRIN but would be better undertaken by other groups. For some of these actions OSRIN might provide facilitation role if that is useful. Please indicate some of these considerations, as appropriate, during the review of your action list.

Performance Evaluation

- Please return to the Expected Outcomes set at the beginning of the Workshop as a basis to evaluate our collective performance. Using the separate workshop evaluation form and the rating system below please evaluate our collective performance for each of the expected outcomes. Please feel free to use the form to add any other comments you'd like to make.
    - 4 Stars **** expected outcomes exceeded
    - 3 Stars *** expected outcomes met
    - 2 Stars** expected outcomes partially met
    - 1 Star * expected outcomes not met but some useful conversation occurred

APPENDIX 2: FIGURE: CRITERIA AND INDICATORS IN THE RECLAMATION CERTIFICATION PROCESS



APPENDIX 3: OSRIN / CAMBRIDGE STRATEGIES SURVEY OF ALBERTAN'S VALUE REGARDING OIL SANDS DEVELOPMENT

Overview

In partnership with Cambridge Strategies, OSRIN has conducted a survey to determine the value based drivers of oil sands development that are most important to Albertans. The results of the survey will provide insights into ways that both the government of Alberta and the industry can better serve the needs and wants of Albertans.

The survey was conducted on line during the period May 6 - 11, 2010. The survey consisted of conjoint trade-off options among various value-driven perceptions related to oil sands development. In addition, respondents were asked to respond to a series of attitudinal questions related to oil sands development. The total sample size was 1032 randomly selected Alberta adults. With a sample of this size, the aggregate results are considered accurate to within +/-3.0 percentage points nineteen times out of twenty, to what they would have been had the entire adult population of Alberta been included in the survey.

Preliminary analysis of the survey results allows the following observations. Reclamation type (objective of reclamation) and habitat preservation were very important to respondents.

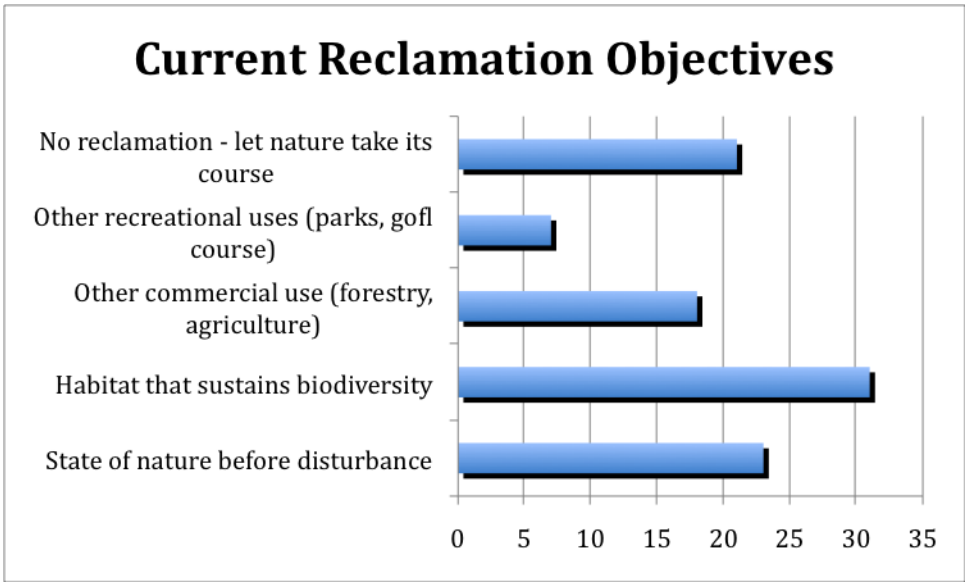
Type (Objective) of Reclamation

Preference

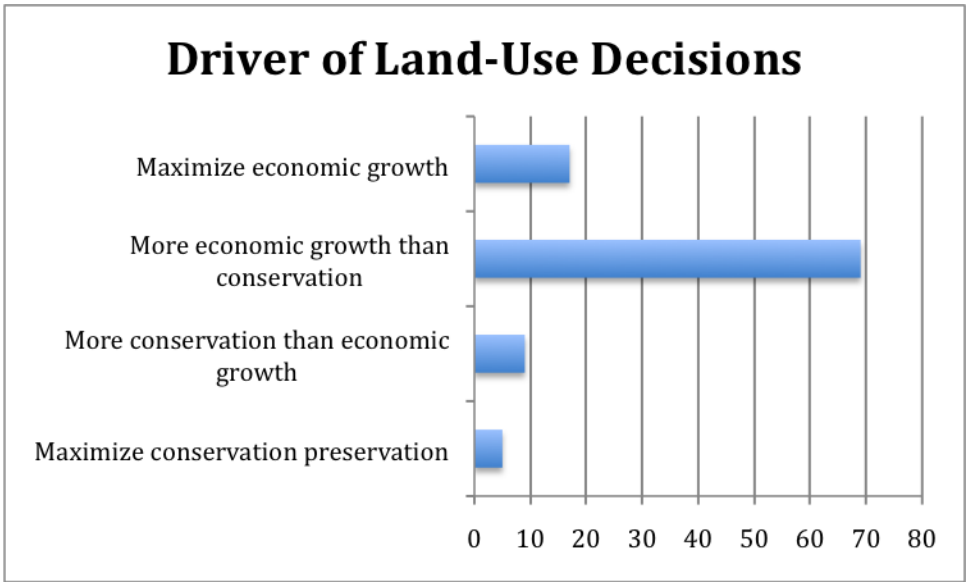
With respect to type of reclamation, the highest preference was for "reclaim to habitat that sustains biodiversity", followed closely by "reclaim to "state of nature" prior to disturbance" and "reclaim to other commercial use, including agriculture and forestry". It is not clear that the differences among these three reclamation objectives are statistically significant. There is a lesser, but significant preference for "reclaim for recreational use, such as golf course, parks and lakes".

Perception

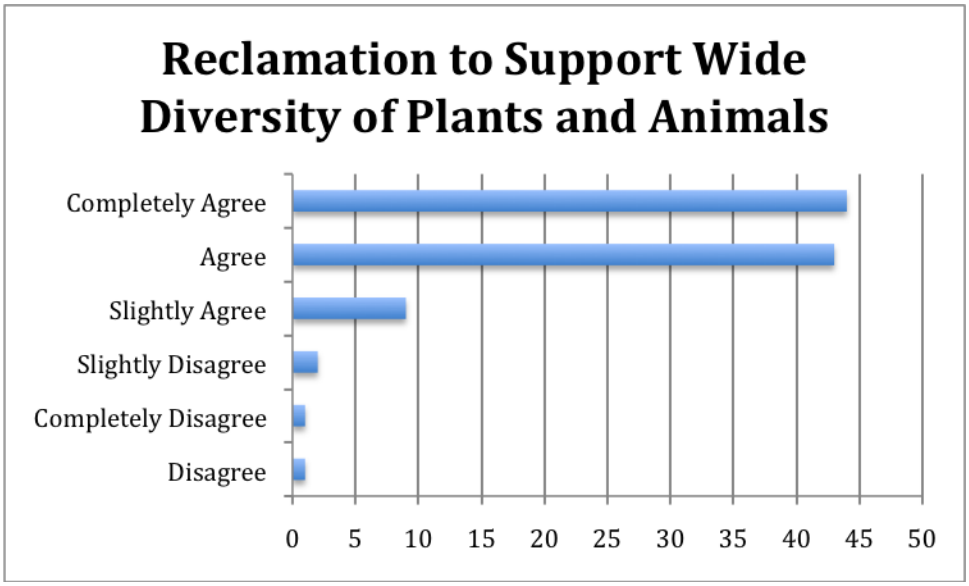
Over half (54%) of respondents believe that the current objective of reclamation is either "to habitat to support biodiversity" or "to the state of nature prior to disturbance". Only 18% believe that the objective of reclamation is for other commercial uses such as agriculture or forestry. Interestingly, 1 in 5 Albertans believe that there is currently no reclamation taking place.



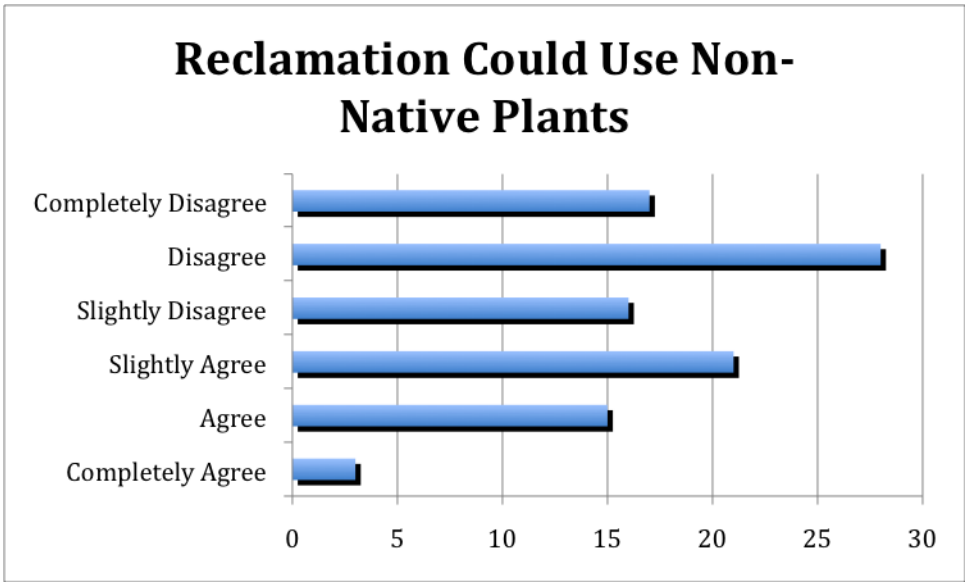
The majority of respondents indicated that they believe consideration of economic growth currently drives the priority for land use in the oil sands.



Two questions were asked regarding revegetation. Respondents expressed an overwhelming preference for revegetation that supports biodiversity. More than 87% supported the idea that "reclamation must support and sustain a wide diversity of plants and animals".



The majority of respondents (61%) expressed some level of concern about the use of plants that do not naturally occur in the oil sands mining area. If we remove the 39% that didn't feel strongly on this issue, respondents who expressed disagreement with use of non-native plants out numbered those who agreed by nearly 3:1.



APPENDIX 5: Workshop Summary Report

EXECUTIVE SUMMARY

This Workshop Synopsis provides a high level summary of what was discussed and discovered at a Reclamation Challenge Dialogue workshop including key results and proposed next step action-recommendations. Stemming from this Challenge Dialogue, and subsequent activities, OSRIN intends to develop some specialized knowledge products focused on a few of the key discussion topics that emerged. The Key Challenge for the Dialogue evolved to become: To engage a diverse set of domain experts and stakeholders in a purposeful dialogue to create a systems view of oil sands reclamation with a particular focus on key components: (1) challenges related to the rationale and application of the equivalent land capability concept; (2) challenges related to end land use selection; and (3) challenges related to how to respond to and inform the public's expectation of reclamation success. The June workshop was designed to focus on the reclamation system perspective and these three challenge areas.

The Reclamation System Perspective

There was considerable interest in exploring the meaning and implications of taking more of a systems approach to reclamation of the oil sands area. Some felt it would help address the increasing need to align site-level plans and actions with landscape-level planning objectives such as those in the Lower Athabasca Regional Plan (LARP). Expanding on this, others saw the need to more explicitly link EIAs to mine plans, mine plans to closure plans, and closure plans to regional plans. A systems approach means that the significant efforts being made with reclamation needs to be better coordinated so that one organizational unit's objectives are not creating untended consequences for the others. Fourteen examples of unintended consequences due to not taking a systems approach were described. This means that when we examine how to best increase the efficiency and effectiveness of current reclamation plans and practices, we must take the whole system into account. Ultimately everything is connected to everything – "the detailed elements are important and need to be worked on, but we need to focus also on the 'system' and how these elements have to work together."

Equivalent Land Capability

Equivalent land capability (ELC) is the cornerstone around which much of current reclamation practice is built. It is critical that regulators, planners and practitioners thoroughly understand what it means and what it implies. There continues to be considerable variance in the interpretation of the concept and its application. Phrases like "Equivalent Land Capability looks like …" rather than "Equivalent Land Capability is …" might be more in keeping with the idea that ELC is a concept rather than something that is measureable. Even though ELC doesn't mean "the same as before" many people believe it should. Growing expectations that are shifting "reclamation" to "restoration" may also affect the concept and the practice. We need to manage expectations by speaking of trajectories, expected end points and key measurement and

certification points in time. Regarding spatial scales, it is easier to define and measure ELC on a smaller scale than at the landscape level or higher.

ELC contains value judgments which change with time. The Land Capability Classification System (LCCS) assigns capability based on one value – e.g., upland forest is "good" – but this previous value has changed because wetlands are now also "good", but are Class 5 "bad" using the LCSS. We should be referencing ranges of acceptable conditions that are based on current values. The LCCS clouds the ELC challenge because the classification system and the ELC concept are not the same thing; LCCS is but one part of a larger set of ELC assessment tools.

There is a need for a tool to compare reference areas to reclaimed areas that is consistent and can be easily applied. However, ELC cannot be indexed in "one" number or be measured universally. Many factors and requirements determine how ELC is measured such as approval conditions, vegetation performance expectations, land use, etc. But ELC should be about confirming that the basic components of a functioning and useful ecosystem are in place. Further, there is a need to understand how contamination and remediation fit into ELC. It is important to note that Alberta's regulatory approach focuses on capability not productivity.

Land Use Selection

The 1998 report Oil Sands Mining End Land Use Committee Report and Recommendations was still seen as a useful explanation of the processes to identify and propose alternative land uses, but few people are aware of its existence. The reclamation community needs to know that these Land Use Selection challenges have been addressed already but also recognize that they need to be re-evaluated in context of the Lower Athabasca Regional Plan and other present day circumstances. No one in industry has tried to use the process outlined in this report to propose an alternative land use which may have led people to assume that these alternatives are not really an option.

One of the key questions raised was whether there are more productive uses than boreal forest that might be appropriate particularly in consideration of changing values and uses of land over time — e.g., greater recreational demands. It was also recognized that areas that are receiving high land use pressure in NE Alberta could be moved to a simpler, quicker decision system.

Alternative uses likely will require different reclamation practice. Reclamation standards will need to be based on end land use however there is still the question of which approach is "best." Do we reclaim the site for the specific end use, or reclaim the site so it can support the full range of uses and then superimpose the selected use?

Response to and Informing Public Expectations of Reclamation Success

The challenge here is less about targeted "measures" of success or performance as an intellectual pursuit and more about directly engaging a broad range of stakeholders at an emotional level. Further, there should be less focus on public relations initiatives and more focus on improving reclamation performance.

Some important ideas for addressing this challenge were brought forward including:

1. Learning from experiences in the BC forest sector over the last two decades.
2. In a competition for hearts and minds, you can't compete with facts and knowledge.
3. Visualization tools offer one of the most effective approaches to communicating alternatives and your intentions.
4. Authentic stakeholder engagement at a very deep level is critical.
5. Developing a Sustainable Oil Sands Code of Practice that establishes the underlying principles for "sustainable oil sands development operations".
6. Practicing open, transparent, confident leadership based on the strength of what we know, what we don't know, what we are doing that is right and what we are doing to fill gaps.

Action-Recommendations

Over the course of the workshop the participants were asked to identify action-recommendations. The OSRIN team reviewed and then organized them into five areas as follows. They serve now as action-recommendations concluding this Challenge Dialogue overall.

Action-Recommendation 1: Strike a small, informal "oil sands reclamation system" subgroup (ideally including at least some people that attended the workshop) to explore options for designing, developing and implementing a systems- and outcome-based approach (constructs, tools, etc.) to oil sands reclamation that would span all or most elements of the reclamation system (e.g., Figures 1 to 3) and that span reclamation objectives from individual mines to multiple operators (landscapes) and to the region (LARP). OSRIN could facilitate this process and help create some straw dog options, some concrete examples and other supporting discussion materials to help seed the conversation.

Action-Recommendation 2: Linked to Action-Recommendation 1 – analyze the pros and cons of moving towards an outcome-based regulatory approach to reclamation of the oil sands area.

Action-Recommendation 3: Develop a "capability manual" to better define what Equivalent Land Capability means and relate that to certification criteria.

Action-Recommendation 4: Conduct a dialogue and workshop focused solely on Equivalent Land Capability in the fall to flesh out ideas for developing policy, practice and communication options.

Action-Recommendation 5: Advertise the Oil Sands Mining End Land Use Committee Report and Recommendations and explain its purpose.

Action-Recommendation 6: Evaluate the need to update the Oil Sands Mining End Land Use Committee Report and Recommendations once the Lower Athabasca Regional Plan is released.

Action-Recommendation 7: There was uncertainty around the need for, or appetite for, alternative uses. There may be some value in exploring this further – if there is no appetite then

this is not an issue; if however there is an appetite then an identification of acceptable uses and the locations/landforms they could be applied to, would be helpful.

Action-Recommendation 8: If the Oil Sands Information Portal shows that cross-lease coordination is ineffective, explore real and perceived institutional impediments to better effectiveness.

Action-Recommendation 9: Engage executives from forest companies to learn both what failed and how the industry is learning to perform in new, much more sustainable ways.

Action Recommendations 10: Explore the feasibility of developing dynamic visualization tools along the line of the McGregor Model Forest scenario tool. Although the pending Alberta Environment Oil Sands Information Portal would be helpful, it may not be sufficient to provide the kind of visualization of future conditions that is needed.

Action Recommendations 11: Explore developing a code of practice for Sustainable Oil Sands Development.

PURPOSE OF THIS WORKSHOP SYNOPSIS

The purpose of this Synopsis is to provide:

- To provide a high level summary of what was discussed and discovered at the workshop including the key results and a set of proposed next step actions.
- To set the stage for the development of some specialized knowledge products focused on some of the main discussion topics that emerged from the pre-dialogue and that were pursued at the workshop.
- To serve as a reference document that can be used to share information with colleagues to further inform conversations on this important and somewhat unique Alberta challenge. Please feel free to share this Workbook.

This document is part of an incremental series of Challenge Dialogue documents. The preceding documents are listed in order below.

- A Challenge Paper was prepared and distributed to over 90 practitioners across the oil sands community of practice.
- Feedback was received from 43 individuals, including responses from governments, individuals working with First Nations in the oil sands area, academia, consulting firms, oil sands companies, research/technology agencies and nongovernment organizations. The feedback was compiled into a Consolidated Feedback document, which was distributed to all Dialogue participants, including those that did not respond to the Challenge Paper.
- A Progress Report and a separate detailed Appendix document synthesized all of the feedback. These documents were also distributed to all Dialogue participants.

- A Workshop Workbook which mirrored and informed the workshop design. The one-day workshop design included seven sessions with four key sessions being focused on (1) Taking a Systems View of Oil Sands Reclamation and Understanding its Implications; (2) Equivalent Land Capability (the concept and its application); (3) Land Use Selection; and (4) Response to and Informing Public Expectations of Reclamation Success.

Note: This Synopsis document is designed to be used in conjunction with the Workshop Workbook and the Progress Report. As such, it will refer to but not replicate most of that already synthesized previous material.

REVISED KEY CHALLENGE AND EXPECTED OUTCOMES FOR THE DIALOGUE AND THE WORKSHOP (SESSION 1)

As with many Challenge Dialogues the Key Challenge statement and the Expected Outcomes evolve with each step in the process. In this dialogue it was no different. in sections 1.1 and 1.2 respectively we have provide the latest revision of these two items. The Expected outcomes used for the one-day workshop are listed in section 2.3. These outcomes were used to evaluate the success or performance of the workshop. The results of this evaluation are provided in section 7.

Revised Key Challenge for the Dialogue

Building on the revised key challenge statement in the Progress Report and feedback on it and reflecting on the workshop discussion we have adjusted the statement slightly as:

> To engage a diverse set of domain experts and stakeholders in a purposeful dialogue to create a systems view of oil sands reclamation with a particular focus on key components:
>
> - Challenges related to the rationale and application of the equivalent land capability concept
> - Challenges related to end land use selection
> - Challenges related to how to respond to and inform the public's expectation of reclamation success

Revised Expected Outcomes for the Dialogue

As a reminder, the revised Expected Outcomes for the Dialogue in the Progress Report are:

1. Achieve alignment on the key elements, linkages and dependencies within the oil sands reclamation system and how a lack of shared understanding and alignment is hindering its effectiveness.

   The key elements OSRIN has chosen to focus on are: the equivalent land capability concept and its application; end land use selection and response to and informing the public's expectation of reclamation success.

2. Achieve alignment on and commitment to specific follow-up initiatives to be undertaken by OSRIN and others to increase shared understanding and help increase the effectiveness of the oil sands reclamation system.

Expected Outcomes for the Workshop

The Expected Outcomes for this workshop were:

1. The benefits of taking a Systems Perspective to the overall oil sands reclamation challenge are better appreciated and have begun to be applied to the challenges and opportunities identified in this dialogue.
2. Challenges related to the rationale and application of the Equivalent Land Capability concept have been framed and key questions to address this challenge and to guide future work have been identified.
3. Challenges related to End Land Use Selection have been framed and key questions to address this challenge and to guide future work have been identified.
4. Challenges related to How to Respond to and Inform the Public's Expectation of Reclamation Success have been framed and key questions to address this challenge and to guide future work have been identified.
5. Preliminary outlining of Action-Recommendations as input to a post-workshop Action Plan.

Note: Expected Outcomes 1 to 3 remained as originally proposed. Expected Outcome 5 was toned down from the original "An action plan for OSRIN and its key clients has been vetted and sketch-out."

Most of the discussion stressed that the results of this dialogue needs to inform and influence appropriate implementation channels across all stakeholder types – government, industry, academia, the consulting sector and non-government organizations. OSRIN noted that while the results of the dialogue were aimed at helping to inform and guide its own program, the very nature of OSRIN's role is to collaborate widely across the various communities of practice. While it intends to act on the results, in many cases these actions will need to involve OSRIN's clients and partners. Tied to this there were a few questions regarding who ultimately "owned" the products stemming from this dialogue.

Participants asked questions about OSRIN – OSRIN's new website provides information on the rationale for its creation along with its vision, mission, focus areas, financial support and budget and governance – http://www.osrin.ualberta.ca/AboutOSRIN.aspx

REFLECTIONS ON THE NATURE AND EXTENT OF THE FEEDBACK TO THE CHALLENGE PAPER (SESSION 2)

The purpose of this session in the workshop was to remind everyone of the nature and extent of the feedback to the Challenge Paper and its synthesis reported in the Progress Report. The

results of these pre-workshop tasks were summarized at the workshop mainly by referencing the emerging themes and discussion points portrayed in Figure 1; repeated here for convenience to the reader.

The discussion was centered largely around three topics summarized below.

Discussion of the Nature and Extent of the Pre-Workshop Feedback

Virtually everyone felt that the pre-workshop feedback was "excellent, extensive and comprehensive." Figure 1 – the "sand grain" diagram proved to be a useful way to summarize both the breadth and subject detail from the dialogue to this point. For many the nature and extent of the response appeared to be not overly surprising. People felt that, in addition to the "systems" discussion, the three highlighted topics for the workshop – equivalent land capability, end land use and public expectations – were the ones where opinions were more divergent and therefore warranted the most attention.

One group pointed out that reclamation is a technical process aimed at achieving land capability whereas the end land use is about making a decision.

One group discussed why there was such diversity and divergence in the pre-workshop feedback. They concluded it was a reflection of several factors including:

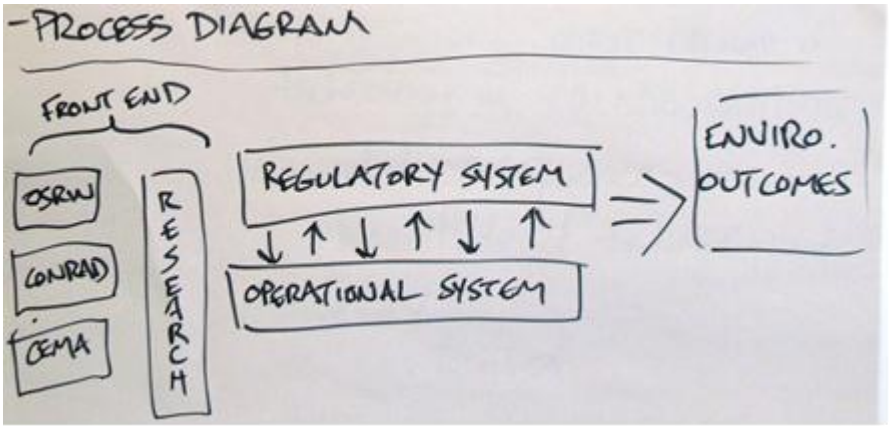
- the inadequacy of communication between organizations – i.e., organizational / institutional barriers
- the reclamation challenge being decomposed into many areas of specialization and the domain of specialists and therefore less people are tasked with ensuring and communicating that the sum of the parts equals the whole, achieving the ultimate goals – i.e., specialization boundaries
- a polarization of values as a result of different and competing views whereby each camp is absolutely sure they are right and that they need to be represented
- different views of reclamation have different powers behind them which creates different perspectives on whether efforts are "successful", appropriately focused or timely.

Discussion of the Reclamation System

Most of the discussion focused on the nature of reclamation system. While the views varied on what this actually was, what it meant and how it could be conveyed, most agreed that it was important that it be understood better. In fact comments on "the system" were the most dominant in this session. It sparked a lot of interest despite its ambiguity – The detailed elements are important and need to be worked on, but we need to focus also on the 'system' and how these elements have to work together. Systems mean different things to different people and this variance often reflects your role in reclamation and who you represent (government, industry, NGOs, academia, etc.).

Several expressions of systems thinking and activities were shared:

- The need for site level planning and activities to be aligned with landscape level planning objectives – for example outcomes in the Lower Athabasca Regional Plan (LARP)
- The need to see more explicitly how EIAs relate to mine plans and objectives, how mine plans relate to closure plans and objectives and the iteration between these, how closure plans relate to regional plans and objectives and how all of these different plans and objectives affect cost and the goal of reclamation certification
- The need for a more strategic and coordinated approach among all parties involved in reclamation; that they be driven by a common set of desired environmental outcomes, are aligned with and supported by regulations and operations and are informed by applied research knowledge from organizations like OSRIN, CONRAD and CEMA (among others)



- Increasing recognition that every mine development action is also a reclamation action; in fact there is a shift toward more interactions between mine and reclamation planners whereby miners are considering reclamation outcomes much more in the development of their mining plans
- New methods for dealing with tailings are affecting how mines are developed and reclamation strategies
- Timeframes need to be an integral aspect of the system; for reclamation they are better understood when considered in context with the broader reclamation and oil sands development system

As part of these conversations there was some discussion about what was the best way to convey the oil sands reclamation system. One group suggested that the sand grains in Figure 1 be turned into cog wheels to illustrate their interconnectedness (see inset in Figure 1). There was also the suggestion that Figure 1 be portrayed as a process map similar to Figure 2. There was also the suggestion that feedback loops be incorporated so the system is seen to an adaptive, learning and continuous improvement-oriented system. Lastly there is a need to convey that this is a regional

multi-operator scheme, not a single mine site. When polled, none of the participants were aware of other existing system diagrams apart from some that may show the regulatory process.

TAKING A SYSTEMS VIEW OF OIL SANDS RECLAMATION AND UNDERSTANDING ITS IMPLICATIONS (SESSION 3)

What was evident in the feedback to the Challenge Paper is that first, the reclamation of the oil sands is very complex and is seldom recognized as reclamation system per se. Different people – planners, practitioners, experts, policy-makers, regulators, etc. – engage with the reclamation system at different places. In so doing, they observe different things and focus on different things. The feedback confirmed the complexity of the system and that people were relating to different parts of it and therefore had significantly different priorities and issues with their part of the system.

A second observation noted in the Progress Report was that the feedback indicated directly and through inference that a system perspective is often either missing or, for those that have a systems view, that a common systems view is not understood or shared universally among the reclamation planners and practitioners.

On the heels of the system discussions in session 2, this session was designed to examine further what we mean by the phrase "taking a system view" and the "oil sands reclamation system. More specifically we were interested in affirming how important it is, what some of the benefits are to systems thinking in reclamation and what potential actions we might take to apply systems concepts in reclamation and reclamation-affected policy, plans and practices.

Context for the Systems Discussion Regarding Oil Sands Reclamation

For the discussion, the following definition of "system" captures the essence of what we mean by taking a systems approach.

System: "a group of independent but interrelated elements comprising a unified whole." It is important to note that in many cases we are dealing with a system of (sub-) systems.

Further, the term "reclamation system" is intended to include all of the elements involved in planning, managing, conducting and measuring / monitoring reclamation. This includes, but is not limited to a policy system, a regulatory system, an operational reclamation system, and others. Thus the "reclamation system" can be thought of as a system of systems.

The conceptual focus for this conversation is that that in almost every aspect of oil sands development, it is not possible to take an action that does not have an impact, often unintended, elsewhere in the system. Everything is connected to everything else. This is true in physical terms and in terms of regulatory and organizational aspects. Figure 3, presented at the workshop, shows another form of illustration portraying the reclamation system as a series of four layers. There may even be a fifth layer which would be for "society's values and expectations". Many people working in the system go back and forth between at least two of the layers depending on what level you operate at in an organization.

A systems perspective helps to put the many issues into context and to see better the relationships and interdependencies. For example, it helps to think about how objectives at different levels of planning need to be aligned, how the mine plan affects the reclamation and closure plan, how the reclamation plan needs to consider the outcomes for dykes, roads and different water bodies. At the end of the day, these plans need to work in an integrated manner so they are not working at cross-purposes and so that the ultimate reclamation outcomes can be achieved effectively and efficiently. A few people mentioned the need for people to better understand the "natural life cycle of mining and how the current reclamation matters relate to that." This is another expression and plea for more systemic thinking in tackling the reclamation challenge.

As shown in Figures 1 to 3, these connections are commonly represented using various types of diagrams that show relationships among the different elements of the system or process connections. These types of diagrammatic representation can be a useful tool for understanding and describing linkages and dependencies and for testing the potential impacts of decisions, plans and actions in one element to decisions, plans and actions in other elements of the reclamation system.

While we referenced the different systems representations at the workshop, it was deemed to not be practical to try and flesh-out and describe the entire reclamation system. Rather, the focus was on examining specific elements in the system where unexpected and unintended consequences result from decisions and actions in a local part of the system. The reclamation system tends to be partitioned among various organizations and sub-units of organizations. Local optimization or maximization may lead to overall (system-wide) sub-optimization. This situation is typical of any large complicated system and not unique to the oil sands develop or reclamation. What is important to ask here is — how we can develop strategies for overcoming these sources of ineffectiveness and of inefficiency?

In the Workshop Workbook four examples were provided to illustrate systems linkages and unexpected or unintended consequences:

- Selection and optimization of bitumen separation technology
- ERCB draft directive for fresh water use
- Zero discharge of process affected water
- Conflicting management objectives

Systems Linkages and Unexpected or Unintended Consequences of Not Taking a Systems Approach

Poor communication between mining operations and reclamation limits coordination and cooperation

Mining operations drive everything. Events that happen in the mining operations happen very quickly and don't get communicated to the company reclamation teams in time for them to react

and adjust their plans and activities. This is a communications issue and does not reflect well on the company. Mining operations need to communicate better internally and include the reclamation unit to understand reclamation needs. A more coordinated and cooperative approach needs to be achieved within the company and it needs to be properly communicated externally to the regulators and the public.

ERCB Directive 074 regarding tailings took a more collaborative approach so that there was a reasonable understanding of what was intended and needed to occur. The results of these discussions were then appropriately communicated outside.

Reclamation liability misconceptions, fear of failure and disincentives hinder more timely reclamation certification

There are issues and concerns among companies and the government with the transfer of liability to the Crown at the time of reclamation certification. There are also disincentives for industry and the regulators to apply reclamation certification and achieve more timely reclamation. Some of these issues are misconceptions regarding liability and reclamation failure. For example one misconception is that once a reclamation certificate is issued the land is automatically withdrawn from the company's disposition.

While there is a considerable amount of reclamation going on, the concern with certification is failure to get the certification approved. This result reflects poorly on both the company and government. Clearer criteria for measuring conditions of success as part of the certification process are needed. This would provide more certainty that a certificate application would be approved. Disincentives act as barriers and also need to be removed.

Conflicting regulatory and policy requirements

Government promotes trying to achieve timely reclamation but also says not to plant trees on tailings dams (for geotechnical safety reasons). Tailings dam faces are often one of the first surfaces available for reclamation.

Changing reclamation objectives and outcome-based performance means yesterday's reclamation doesn't meet today's certification criteria

Early reclamation objectives were focused on erosion protection and minimization and "visible" forest reclamation. Therefore fast growing often non-native species were the preferred choice (e.g., grass / legume mixes, hybrid poplar and Siberian Larch). These approaches of the past have caused companies to hesitate with their application for certification because these sites no longer meet today's standards. Complying with previous requirements that are different today has led to problems with where companies are today.

In addition there has been a concomitant shift away from a prescriptive approach toward more of an outcome-based performance approach. With prescriptive approaches it was easier to check-off the requirements.

The reality is that oil sands mines last a very long time and so, as standards, expectations and policies change during that time, it is important to have documented proof about which standard

applies to which piece of land. A good example is the reclaimed and certified Gateway Hill site. This area had several areas with different soil replacement expectations because they were built at different times. This is equally true for revegetation requirements and accepted practices.

There is another aspect to requirements that need to be considered. It is important to be clear about whether the requirements are properly established through government policy, that is that you can point to a particular document) or are established by way of an ongoing practice which has become de facto "policy". An example of a de facto policy might be the use of a cover crop (currently barley) to be planted for soil stabilization – it isn't an approval requirement but is "common practice" and regulators might ask why a company is not using it if it has chosen a different approach.

Consolidated tailings (CT) presented more challenges for reclamation (and water quality, extraction and mine closure)

The consolidated tailings (CT) approach, which was developed to eliminate fine tailings accumulation, has presented more challenges for reclamation, water quality, extraction and mine closure, at least initially. These new methods have changed the way that operations have had to manage and maintain those systems including while they are in development.

Change in overburden depth requirements for saline-sodic lack scientific rationale

There is a long standing practice in the oils sands of covering saline-sodic materials with an 80-20 cm cover mix. This has now changed to 1.5 m. This change has added a significant cost, created a materials balance challenge, caused industry to have to change more rational reclamation strategies for higher and lower quality sites and reduced flexibility. No scientific rationale for this change has been offered other than the precautionary principle.

This is more about science driving a prescription instead of an outcome. This is also a scale issue – there needs to be a way to measure reclamation outcomes at a larger geographic / landscape scale, not just at the lease and individual site level.

LCCS' forestry bias causes wetlands to be undervalued and under considered

The LCCS is very forestry biased under the assumption that forests are good and wetlands are dispensable (Class 5); a forestry outcome as opposed to a reclamation outcome more broadly. An unintended outcome of this is that only marginal consideration is given to wetlands and how they fit into the reclamation and landscape system.

Oil sands promotion and government incentives for development

The government's promotion of the oil sands and provision of incentives for development has created an unintended consequence in the last couple of years – increased negative political, social and public attention to the oil sands development particularly with respect to the effects during the rapid expand period and its stressors on Alberta's social infrastructure support.

Rigid application of rules reduces situation-specific flexibility jeopardizing reclamation outcomes

Local circumstances sometimes warrant some flexibility in applying regulatory rules. The rigid application of the rules can in some cases be an impediment the realization of desired reclamation outcomes.

In another case in a quarry, bird boxes were installed as nesting sites for birds to improve biodiversity. While this was alright in the original approval it turns out it was classified as a further disturbance to the site which raised issues with non-compliance.

Access control and management need to be a part of reclamation planning

The oil sands development can create a number of roads across the lease and over water bodies. While there is considerable discussion about managing expectations for these access roads, are we really clear about these intentions in our reclamation planning? There is a need to consider access control and management in the long term as an integral element of reclamation planning and the reclamation system.

Accounting rules for the disclosure of liabilities may affect a company's 'reclamation attitude'

Accounting rules currently do not require an operator to fully disclose liabilities associated with their entire operations. If full public disclosure was required it would encourage company's to more explicitly address how reclamation liabilities are going to be dealt with.

Reclaiming uplands affects the wetland system hydrology

There is a need to think about planned site activities at a much broader scale potentially up to the region; for example, at the landscape level what you reclaim in an upland system may affect the wetland system in terms of its hydrology. You can't simply isolate a system and conduct activities and expect that you are OK because you were able grow an upland forest. The wetland system interests may wonder why there is no water flowing into their wetland.

General observations about the Oil Sands "Reclamation System"

Following is a description of some of the main discussion points regarding the reclamation system thinking.

The Regional Reclamation System

The reclamation system challenges need to get sorted out regionally, across leases and at the individual mine level, all in an integrated landscape manner with alignment "up" and "down" in scale.

Because there are so many mines across the region there is a need to take more explicit systems approach considers how mining and reclamation activities could be better integrated across the mining leases, across the landscape. In short, there is a need for some form of "regional reclamation system." This is where the focus needs to be, less so at an individual mine-

reclamation system level. We are referring here to coordinating the reclamation efforts of multiple operators over, say, 250,000 ha.

Right now you have individual mine operations and individual mine closure plans. They do not link to one another. There are also distinct boundaries between adjacent leases and that can create a disconnect between what you might desire on a regional basis especially when you are dealing with water moving from one lease to another toward the Athabasca River.

There should be a greater focus on "why" instead of "how" so that reclamation strategies are focused more on outcomes and less on prescriptions. This "why to how" shift in thinking would also cause planners and practitioners to have to think about regional reclamation plan objectives and the linkages back to individual mine level operations. This is where the Lower Athabasca Regional Plan (LARP) should come into play. But we are not sure at this time exactly how it is going to influence these reclamation planning and operations processes from a regional and local mine lease level. This uncertainty creates concern because some regional expectations may not be feasible on the ground locally. Then what? This overriding regional perspective needs to be incorporated more clearly in Figures 1 and 2.

The reason for unintended consequences, prescriptive vs. outcome-based reclamation

What is the trigger point for unintended consequences? Perhaps it's the result of a prescriptive-based regulation. By acting on prescriptive approach the practitioner addresses a series of rules. It's a cookbook approach to reclamation regulation. And, when you do not have a clear technical understanding of the consequences of the regulatory system you can often end up triggering various unintended consequences.

Who benefits from this prescriptive approach? The prescriptive approach benefits the regulators and industry because it creates a series of checkboxes and it is easy for everyone to demonstrate that they are doing their job – the regulator overseeing the industry operator and the company operator who is just applying the rules. The difficulty comes when things go wrong. When that happens the problem comes back to the regulator since the operator says – we followed your prescriptions, it's your problem now.

A better approach to prescribing how you do it would be to describe what outcome or result you want to achieve. A results- or outcome-based approach leaves it up to industry to figure out the best way to accomplish the desired result. There are of course some trade-offs.

The results-based approach puts a lot of faith by government in the industry; faith that industry will in fact carry through with its reclamation intentions and the results to be achieved. There are interesting considerations with risk in this scenario. Who is willing to assume the risk? When do we know success has been achieved? We need to ask – What are the unintended consequences of one approach versus the other?

A systems approach needs to look at the different incentives, disincentives and operating models that underlie what drives successful reclamation. The results-based approach vs. the prescriptive approach is a core principle that should be explored. We need to determine where on the "prescriptive … results-based continuum" government policy and authorizations should sit.

Liability challenges with cross-lease reclamation

There are liability concerns with cross-lease reclamation just as there are with aspects of oil sands development. While these concerns cannot be discounted, it will be important for all stakeholders – the companies, communities, governments, Aboriginals, NGOs, etc. – to keep the higher level objectives clearly in mind over and above legal complexities. Legal needs should serve the shared needs and aspiration of the stakeholders not the other way around. Liability considerations and legal support do need to be brought into consideration at the outset as an integral part of the creative process in sorting out options and implementing solutions.

The lawyers are there to advise the corporations and the governments about what the risks are. It is an executive decision at a very high level however that that says – We now understand the risks and here's how we are going to work around them explicitly. We are not going to let these risks stand in the way of our accomplishing a larger objective. We have significant cross-lease and regional issues like these that have not been dealt with properly by all parties for well over twenty years.

One idea that did surface in the dialogue is that of creating a "reclamation company" for the whole region that would buy the liability along with the materials and the requirement to reclaim. This would pass the liability to a regional entity designed to solve the problem for the individual leases in a regional context. This may or may not be simple to do but there are ways if there is the will.

EQUIVALENT LAND CAPABILITY — THE CONCEPT AND ITS APPLICATION (SESSION 4)

The reason it was important to talk about Equivalent Land capability (ELC) is because it is the cornerstone around which much of our reclamation practice is built. It is absolutely critical that we understand when we are speaking with each other that we are using the same language and that we at least have the same general concept in mind. Otherwise we will all have different ideas about what it means.

Stimulated by this dialogue, OSRIN is considering having a workshop on ELC sometime in the fall. This session was used to help frame this future workshop discussion. To seed the conversation the following questions were posed for the participants' consideration.

- What is the legal context for ELC? When we look at the responses we received to the Challenge Paper there is a wide range of opinion on this. Further…
- How did ELC get to be a legal requirement?
- What do each of the words in the phrase mean individually, and when you put them all together?
- Is capability a concept or is it a measurable thing? And, if it is measurable…
- How does it get to be measurable – i.e., what is the process for putting in place that measure?

- Does ELC relate to land use selection? And…
- Does the land use option you select have an impact on ELC?
- What is the scale that we are talking about – landform, mine site, region – that we should be thinking about when we are talking about ELC?
- What do we use ELC for; what should we be using it for?
- What is the relationship between approval conditions and ELC?
- What is the relationship between certification criteria and ELC?
- Does this concept work; does it work in the oil sands?

The following summary of the discussions has been divided into six common themes.

Understanding the Concept of Equivalent Land Capability

There is a need for a common understanding of what Equivalent Land Capability is and isn't; something that we can all live with as a concept so our discussions can then move forward and focus on the objective and its measurement(s) rather than the words (it seems as if the words themselves are part of the problem). Even amongst the knowledgeable experts in the room there were lively discussions around the interpretation. Perhaps there is a need to use phrases like "Equivalent Land Capability looks like …" rather than "Equivalent Land Capability is …" which would be more in keeping with the idea that Equivalent Land Capability is a concept rather than a measureable thing.

There was a concern around how the term "equivalent" can be applied to an area where conditions have substantially changed (e.g., a change from wetlands to uplands). There was also concern around what we mean by "but the uses may be different"; how different can they be and still be Equivalent Land Capability?

It was noted that while the concept may be somewhat flawed (see issues below) it is probably "honest" in attempting to describe what reclamation should aim to achieve in principle. It was also noted, very importantly, that it may not be achievable in the mid-term.

One group asked if we should define equivalent land capability through a consultative process with stakeholders. It was unclear if this was a reference to the general concept or the need to determine equivalence for each reclaimed land unit.

Expectations of Capability

There was a feeling that expectations may be shifting from "reclamation" to "restoration". Even though Equivalent Land Capability doesn't mean "the same as before" many people believe it should. What would a shift to "restoration" mean to Equivalent Land Capability – in concept and in practice?

When describing capability we need to acknowledge that "stuff happens" and temper our expectations by being realistic about the occurrence and impacts of performance-influencing

factors including water deficiencies, time and ecological succession (e.g., over time some wetlands may disappear or appear depending on water movement).

The concept of Equivalent Land Resilience – the ability to handle natural disturbance like off-site areas (analogs) – was raised as a way to help clarify the performance expectations for reclaimed landscapes.

In summary, we need to manage expectations by speaking of trajectories, expected end points and key measurement/certification points. This could take the form of a series of statements like:

- We are planning to create X
- We will start with Y
- We expect it will take Z years to move from Y to X, with the following expected changes over time; we acknowledge that the site will face a range of natural disturbances such as drought, erosion and fire over that timeframe and expect it will react the same way natural sites do
- We intend to measure success at time W at which point we will be comfortable that the site is moving along the expected trajectory from Y to X

Use vs. Capability

It is difficult to talk about capability without talking about use (capability for what), but, we also have to be clear that we can only plan, and act on a plan, for capability not use especially when it comes to uses we have little control over – for example, we can create wildlife habitat but can't guaranteed that wildlife will appear. There was a feeling that capability is now defined as use.

There may be a need for one or more assessment tools to help define what uses a particular reclamation practice/result can provide.

Equivalent Land Capability is Values-Based

Equivalent Land Capability speaks to value judgments, some from a long time ago, by a variety of people and it is therefore hard to select the 'right' answer. Furthermore, people's values change over time so therefore the expectations may change over time. The Land Capability Classification System is an example of the potential problems created by assigning capability based on one value (upland forest is "good" if not "best") and is especially a good example of what happens when values change over time but the chosen measurement tool doesn't keep up. Today, wetlands are now also "good" but still show up as Class 5 "bad" using LCSS. So rather than reclaim to a set of strictly defined conditions, we should be referencing ranges of acceptable conditions that are based on (current) values.

One of the clearest descriptions of the values-basis for reclamation outcomes is the desires of First Nations who, in addition to wanting "something similar" in terms of their ability to hunt, fish, trap and harvest, also speak about the desire for a spiritual connection to land. This

perspective was also noted in the dialogue prior to the workshop. All of these require some form of yardstick to guide reclamation planning but also to more explicitly measure success against.

The concept of Ecological Utility ("natural conditions") vs. Realized Utility (some calculated economic or social value) (see diagram below – not drawn to scale) was raised as a means of helping to separate two "pools" of uses. This may be a valuable tool in framing the dialogue around the values decisions required. One could even attempt to describe the "pre-industrial" utilities as a potential baseline. Interestingly, this is a request commonly heard from First Nations in Environmental Impact Assessment reviews. Assuming one could agree on how to calculate each of the "utility" pools, one could compare pre-mining condition with a variety of potential post-reclamation conditions and use the results as the tool to talk about values-based trade-offs.

Pre-Industrial	Pre-Mine	Mining	Reclamation Option 1	Reclamation Option 2	Reclamation Option 3	Reclamation Option 4
Ecological	Ecological	Ecological	Ecological	Ecological	Ecological	Ecological
		Realized				
						Realized
					Realized	
				Realized		
	Realized					
Realized			Realized			

Measuring Equivalent Land Capability

General

There is a need for a tool to compare reference areas to reclaimed areas that is consistent and easily applied. Currently Equivalent Land Capability cannot be indexed in "one" number or universally measured; unfortunately to many people the Land Capability Classification System is perceived to do just that. Many other factors and requirements (e.g., approval conditions, vegetation performance expectations, land use, etc.) will determine how Equivalent Land Capability is measured and/or assessed.

Equivalent Land Capability should be about confirming that the basic components of a functioning and useful ecosystem are in place:

- Vegetation
- Landscape
- Cultural

- Land use
- Value of land

It was noted that capability should not only be about biotic measurements (interestingly the Land Capability Classification System assesses soils and landscape and no biotic components).

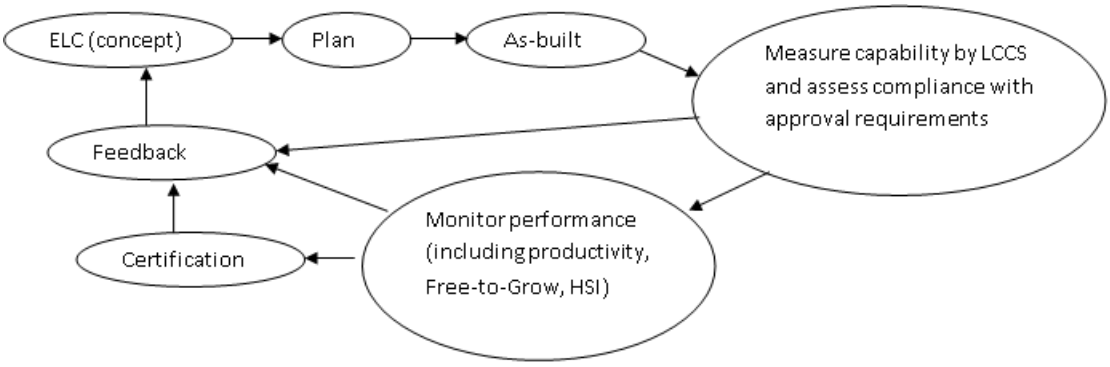
There was a suggestion to use the Valued Ecosystem Component analogy from the Environmental Impact Assessment world to approach Equivalent Land Capability – identify one or more Valued Ecosystem Components and then measure against those.

There is a need to understand how contamination and remediation fit into the determination of Equivalent Land Capability.

Finally, there was a reminder that Alberta's regulatory approach focuses on capability not productivity, and therefore the characteristics of capability should not be confused with the performance of the reclaimed lands – paraphrasing the example above, we can create the capability for wildlife (i.e., the habitat) but don't need to see them there using it to issue a reclamation certificate.

Land Capability Classification System

The current Land Capability Classification System clouds the Equivalent Land Capability issue as people see it as the same as Equivalent Land Capability. The Land Capability Classification System is one piece of a larger puzzle – in the diagram below we start with a concept, give it flesh in the form of a plan, build it, test it against initial measures of capability and regulatory requirements (e.g., soil type and depth, species type and density), monitor it for proof of concept (capability not productivity as noted above) and then sign-off. The measurement, monitoring and certification steps provide critical feedback to future concepts and plans.



The System doesn't do a good job of predicting forest productivity BUT it is the only tool now available!

Scale

What is the spatial scale of Equivalent Land Capability; is it the landform, the landscape, the mine, the region…? It was noted that it is easier to define and measure on a smaller scale –

much harder for the landscape level or higher. This challenge is not unique to Equivalent Land Capability and examples from other resource domains might provide ideas for dealing with this conceptually and in policy and practice.

Time

Time is an important factor in determining Equivalent Land Capability – when to measure, when to certify compliance, how to explain changes in Equivalent Land Capability over time, what to do about changing values and their impact on "equivalence". This ties back to the earlier points raised around Expectations of Capability.

LAND USE SELECTION (SESSION 5)

Existing Report

The Oil Sands Mining End Land Use Committee Report and Recommendations document (the Report) was seen as a useful explanation of the processes to identify and propose alternative land uses but it was felt that few people were aware of its existence. There was seen to be a definite need to "advertise" the report so people know the issue has already been addressed, and that it should be evaluated in context of the Lower Athabasca Regional Plan, when issued.

There were different views on whether or not the report needed to be updated based on the current policy environment:

- Recommendations in report won't be much different
- Is the global attitude on oil sands something that would change the recommendations?
- Priorities would change today to reflect potential opportunities for more human-valued land use
- The Regional Advisory Committee report will likely complement the Report; some priorities will change and recommendations will be more flexible

It was suggested that the report should be reviewed to identify good parts that have not been acted on and see why, and to see if any pieces need tweaking or can be updated with more recent examples. The group noted that the word "natural" in the land use category Natural and Conservation Areas may not be the best term given the current context for "natural areas".

The group noted that no one in industry has tried to use the process to propose an alternative land use. For this reason most people assume that alternatives are not really an option.

Decision System

A number of observations were raised around the framework for making land use decisions described in the Report and as actually practiced. One of the key questions was around the role of stakeholders – should stakeholders have more of a say in what the End Land Use is and what

equivalent land capability is? In any case, we need clear expectations of outcomes described for the selected land use.

It was noted that upfront decision on end land use can create very specific reclamation goals and targets, and therefore land use, particularly an alternative land use, should be determined before reclamation begins.

People asked when the value decision around use would get made and by whom. They also noted that the decision should be in the form of an agreement between the parties (provincial government, local government, industry) not one forced by government policy, approval or practice.

Alternatives

A considerable amount of time was dedicated to discussions on alternative uses. It is clear from the Report that the option of alternative uses is available. One of the key questions was whether there are more productive uses than boreal forest that might be appropriate. It was noted that use of the land has changed / evolved over time therefore so should end land use.

In terms of use options, the group noted that as the area/community grows there is an increased need for recreational areas which could be built on reclaimed land instead of disturbing natural areas. This would be consistent with regional management initiatives to minimize impacts on a landscape scale. It was suggested that areas that are receiving high pressure in NE Alberta could be moved to a simpler, quicker decision system.

Impacts on Reclamation

The group noted that alternative uses may/will require different reclamation practice, though not necessarily less reclamation as there will be a need to "harden the land" to withstand intensive recreation so sand or consolidated tailings don't get exposed.

Reclamation standards are likely going to be based on end land use (e.g., forest different than bison ranch different than campground). But there is still the issue of which approach is "best" – reclaim the site for the specific end use, or reclaim the site so it can support the full range of uses and then superimpose the selected use.

Although not directly related to the issue of alternative uses there was considerable discussion on the apparent lack of regional coordination of reclamation plans and actions:

- Continuity of land forms and watershed across lease boundaries
- Industry not comparing / coordinating plans with neighbors
- Drainage plans between leases not coordinated or considered in some cases
- Require regulatory direction on watershed implementation and design

There was some discussion of the Oil Sands Information Portal being developed by Alberta Environment, which would include GIS-based information that would go some way to showing whether or not coordination related to these issues is in place and effective or not.

RESPONSE TO AND INFORMING PUBLIC EXPECTATIONS OF RECLAMATION SUCCESS (SESSION 6)

Framing the Questions

Two questions were proposed to the group for general discussion in plenary.

1. What are appropriate measures of success with respect to reclamation at each stage of an oil sands mining project?
2. How might Alberta gain control of the conversation to ensure that oil sands development is being held accountable to appropriate performance expectations?

Important ideas that emerged

Much of the discussion called into question the underlying premise of the questions. The general view emerged that the challenge was less about intellectually targeted "measures" of success or performance and more about directly engaging a broad range of stakeholders at an emotional level. There was also general alignment on the need for less focus on public relations initiatives and more focus on improving reclamation performance.

The key ideas

1. Learn from the experience of the BC forest industry.
2. In a competition for hearts and minds, you can't compete with facts and knowledge.
3. Visualization tools offer one of the most effective approaches to communicating.
4. Authentic stakeholder engagement at a very deep level is critical.
5. Develop a Sustainable Oil Sands Code of Practice that establishes the underlying principles for "sustainable oil sands development operations"
6. Practice open, transparent, confident leadership based on the strength of what we know, what we don't know, what we are doing that is right and what we are doing to fill gaps.

Learn from the experience of the BC forest industry.

Several participants noted the similarities between the challenges currently faced by the Alberta oil sands and the BC forest industry, especially the on the coast. Forestry companies attempted to respond to external ENGO pressure by engaging in PR campaigns, more and better facts to improve understanding, and education of the public. These efforts failed almost totally. The key changes that have begun to deal with the negative campaigns include: (1) establishment of Sustainable Forest Management codes of practice that enable 3rd party certification on the basis

of objective criteria for both the forest products and the woodlands, (2) committed engagement of a broad range of stakeholders including end customers to increase understanding of issues, and to co-create solutions, and (3) involvement of stakeholders more extensively in sustainable forest management planning and in establishing land use discussions and decisions.

In a competition for hearts and minds, you can't compete with facts and knowledge

Discussion here focused on the limited value of relying on data, facts, and reason in responding to stakeholder concerns that are emotionally driven. Several participants identified the need for having improved (visual) evidence to support reclamation performance claims and regulation, and to enable increasing knowledge of Albertans.

Visualization tools offer one of the most effective approaches to communicating

Several participants expressed the opinion that visualization tools are very powerful in communicating with stakeholders.

The suggestion was made to capture and present all the mine development scenarios that are included in EIA submissions into a single comprehensive vision of regional development and reclamation. By making this collective portfolio and time sequence of maps publicly available, it was suggested that confidence in the ultimate post- mining landscape vision would be more easily accepted by the public. While this could be done for each mine development, it probably would be more beneficial for broader multi-operator landscapes, if not the overall oil sands region. Again, experience from the forest sector should be drawn upon.

The Alberta Oil Sands Information Portal, which is being developed by Alberta Environment, was discussed at length. This site will provide access to environmental data and interpretation regarding the state of oil sands development. It will allow viewing spatially the sequence of mining plans over the oil sand region. It will provide a picture of a projected future state as mining and reclamation proceed. The intention is to have initial views that are designed to communicate with the general public. Deeper inquiry to obtain more technical data and knowledge will also be supported.

A scenario modeling and visualization methodology developed by the McGregor Model Forest Association has proven to be an extremely powerful tool for engaging stakeholders in conversations about sustainable forest management planning alternatives. The methodology does not present data per se, rather it focuses on how the landscape would look and feel as it evolves under a number of development scenarios. The scenarios are however driven by real data and real performance indicator protocols. Experience with this form of visualization tool indicates it has been highly effective for deepening stakeholder understanding of alternatives, incorporating further input and gaining alignment on final sustainable forest management plans.

Stakeholder engagement at a very deep level is critical

The core idea that emerged was derived from the BC forestry experience. Involving a broad range of stakeholders in the process of planning and carrying out the development has been

found to create significant buy in to the development. Seek to understand and bring critics "into the tent". The point was made that it has proved useful to bring even harsh critics in to view what is going on and share efforts at improvement. Seek to understand their motivations and objectives. Learn from critics how to improve performance. Build friends and allies by developing and sharing a clear understanding of the net benefits of the development with all stakeholder groups who benefit.

Develop a Sustainable Oil Sands Code of Practice that establishes the underlying principles for "sustainable oil sands development operations"

The development of externally verifiable codes and standards for sustainable operation has proved a powerful mechanism for improving performance and communicating that improved performance in a number of industries. The Sustainable Forest Management codes of practice were discussed in the workshop. These involve objective, market-driven criteria and indicator frameworks, and intensive stakeholder engagement. They tend to be results-based rather than process-based, but both are important.

Two other industries that have successfully developed similar frameworks resulting in substantial improvement in practices and in public acceptance include the global metal mining industry and the chemical industry with its Responsible Care program.

Practice open, transparent, confident leadership based on the strength of what we know, what we don't know, what we are doing that is right and what we are doing to fill gaps

The suggestion was made that we need to change our attitude toward development to a more open, transparent, and proud positioning. We know much more about how to successfully reclaim oil sands mines than is commonly appreciated. This knowledge needs to be more widely shared and recognized. We need to be very up front about what we don't know and how we are moving to fill these knowledge gaps. We need people in positions of authority to step up and forcibly about what we are on top of and what we are working on. We need to stop being defensive.

Inherent in this attitudinal positioning is the need to be genuine about what we are saying. We need to be doing the right thing and then say that we are doing the right thing. If we have regulations that are strong and are being enforced, then we should confidently say so. If we have a financial security program in place that ensures that reclamation will be funded if the company fails, then we should confidentially say so.

ACTION-RECOMMENDATIONS

Over the course of the workshop the participants were asked to identify action-recommendations. The OSRIN team reviewed and then organized them into five areas:

Designing a Regional Reclamation System – Taking a Systems Approach to Oil Sands Reclamation

Action-Recommendation 1: Strike a small, informal "oil sands reclamation system" subgroup (ideally including at least some that attended the workshop) to explore options for designing, developing and implementing a systems- and outcome-based approach (constructs, tools, etc.) to oil sands reclamation that would span all or most elements of the reclamation system (e.g., Figures 1to 3) and that span reclamation objectives from individual mines to multiple operators (landscapes) and to the region (LARP). OSRIN could facilitate this process and help create some straw dog options, some concrete examples and other supporting discussion materials to help seed the conversation.

Suggested actions and comments from the workshop participants related to this theme.

- Need to move to an 'outcomes' approach at a higher scale to avoid unanticipated consequences (i.e., Regional Reclamation System)
    - Address the scale disparity between outcomes and site level actions
- Develop methods and models to link outcomes at a larger scale to site level actions; and measure impacts of site level actions on broader outcomes
- Develop a Regional Reclamation System:
    - Define the system; linkages; objectives; outcomes / measures;
    - Develop a process diagram map
    - Include roles/responsibilities – CEMA, CONRAD, OSRIN, etc.
- Develop a vision document
- Develop a path forward
- Reframe the system diagrams to include time indicators and policy areas that affect planning
- Design and develop a process and legal framework for sharing liability in a way that enables creative solutions to achieving regional outcomes
- Develop institutional system to manage legal liability
- Improve communications between operations and closure planning
- Enhance inter-lease watershed planning and design
- Clarify accounting requirements to fully disclose abandonment and reclamation liabilities – how should this be handled to not negatively affect balance sheet issues
- Develop incentives for companies to apply for Reclamation Certificates
- Increase transparency in the Reclamation Certification Process

Action-Recommendation 2: Linked to Action-Recommendation 1 – analyze the pros and cons of moving towards an outcome-based regulatory approach to the reclamation of the oil sands area.

Suggested actions and comments from the workshop participants related to this theme.

- Work on the governance/risk sharing/and incentives under an outcome-based versus prescriptive approach
- Shift from prescription-based regulatory management to results-based regulation and understand (and agree to) the inherent risks
- Understand the basis for a prescriptive approach to regulation.

Equivalent Land Capability

Action-Recommendation 3: Develop a "capability manual" to better define what Equivalent Land Capability means and relate that to certification criteria.

Action-Recommendation 4: Conduct a dialogue and workshop focused solely on Equivalent Land Capability in the fall to flesh out ideas for developing policy, practice and communication options.

Suggested actions and comments from the workshop participants related to the ELC theme.

- Create new tools to evaluate ELC
- Develop an LCCS-like wetland capability assessment system, or at a minimum, develop a breakdown of LCCS Class 5 to separate wetlands from upland forests to clarify "value" of the Class 5 designation

Land Use Selection

Action-Recommendation 5: Advertise the Oil Sands Mining End Land Use Committee Report and Recommendations and explain its purpose.

Action-Recommendation 6: Evaluate the need to update the Oil Sands Mining End Land Use Committee Report and Recommendations once the Lower Athabasca Regional Plan is released.

Action-Recommendation 7: There was uncertainty around the need for, or appetite for, alternative uses. There may be some value in exploring this further – if there is no appetite then this is not an issue; if however there is an appetite then an identification of acceptable uses and the locations/landforms they could be applied to, would be helpful.

Suggested actions and comments from the workshop participants related to the Land Use Selection theme.

- Review, reconfirm and "re-issue" Land Use Recommendations document
- Include reclamation areas in regional land use discussions and frameworks for different land uses, offsets, or specified areas – i.e., don't disturb new land, put camp on reclaimed land

- Determine what role stakeholders should have in end land use decisions
- Develop a list of options for end land uses – indicate how they are created/measured and where they can be suitable and identify where information is required to support consideration of options

Response to and Informing Public Expectations of Reclamation Success

Action-Recommendation 8: If the Oil Sands Information Portal shows that cross-lease coordination is ineffective, explore real and perceived institutional impediments to better effectiveness.

Action-Recommendation 9: Engage executives from forest companies to learn both what failed and how the industry is learning to perform in new, much more sustainable ways.

Action Recommendations 10: Explore the feasibility of developing dynamic visualization tools along the line of the McGregor Model Forest scenario tool. Although the pending Alberta Environment Oil Sands Information Portal would be helpful, it may not be sufficient to provide the kind of visualization of future conditions that is needed.

Action Recommendations 11: Explore developing a code of practice for Sustainable Oil Sands Development.

Miscellaneous suggestions from the workshop participants

- Conduct an inventory of past work
- Unearth lost documents and make them accessible and available to the public and stakeholders
- Compile 10 key historical documents that are still relevant – validate them, refresh them where needed
- Determine, assess and report on what progress has been made on addressing key knowledge gaps
- Foster and share innovative practices and reclamation learnings to support adaptability and drive toward excellence
- Conduct a workshop to work on innovative solutions for key issues and opportunities
- Consider including in situ oil sands operations as well as oil sands mines

EVALUATION OF WORKSHOP PERFORMANCE (SESSION 7)

The workshop participants were reminded that the five Expected Outcomes that were reviewed and revised in session 1 would be the basis for the workshop evaluation. These outcomes are listed in second column below. An evaluation form was provided to each participant and 21 responses were handed-in. The results are summarized in the table below.

Expected Outcomes 1, 2 and 3 received a median rating of 3 – i.e., these outcomes were met. Expected Outcome 4 and 5 received a median rating of 2 – i.e., the outcomes were partially met. The participants offered a number of comments specific to each Expected Outcome and with respect to the workshop in general.

For each Expected Outcome please provide a rating of our performance using the following scale:

- 4 Stars **** expected outcome exceeded
- 3 Stars *** expected outcome met
- 2 Stars ** expected outcome partially met
- 1 Star * expected outcome not met but some useful conversation occurred

Expected Outcome #	Outcome Description	Rating	Comment
1	The benefits of taking a ***Systems Perspective*** to the overall oil sands reclamation challenge are better appreciated and have begun to be applied to the challenges and opportunities identified in this dialogue.	Range 2-4 Ave: 2.9 Median: 3	• Good! Critical approach, thanks for opening [this topic]. • Good discussion and insight on scale issues and benefits/drawbacks. • I think the systems perspective was absolutely better appreciated; it was difficult to determine if it will be applied. • High level of agreement on systems approach on a regional scale. • I appreciate the move towards a systems perspective. Valuable, but not particularly new. It does provide a basis for new insights. • Cross regulatory agency cooperation is needed. • Still don't have a really good understanding of what the system would look like. I'm very much looking forward to the summary and next steps. • Good stuff, need to flesh out process diagram and narrative story to explain in plain language. • Great enthusiasm but the groups had difficulty getting around the concept. The stage could have been better set. • I struggled with this perspective. I don't appreciate how it differs from other approaches. • Systems perspective still needs considerable work. • [This session was] more organized and focused than the previous.
2	Challenges related	Range 1-4	• Key questions developed for future workshop.

Expected Outcome #	Outcome Description	Rating	Comment
	to the rationale and application of the ***Equivalent Land Capability*** concept have been framed and key questions to address this challenge and to guide future work have been identified.	Ave: 2.7 Median: 3	Identified various perceptions of the concept. • Good discussion that could lead to some useful material to be developed on this topic. • Very good discussion but I'm not sure we really settled [on] a position. I was very encouraged by the questions that Chris Powter posed to start the session. • Really brought out the diversity of views. • Concerns were very well verbalized. • Much more discussion needed. Some key issues have been flagged. • Difficult conversation in that the same one has been happening over 10 years and progress is questionable. • More questions than answers resulted, but good discussion. • Need to explore in greater detail at a later date. • Not well framed yet. "Problem" is overstated. Perhaps [we] need to educate what ELC provides, not what it doesn't achieve. • ELC is a poor term; need to move to a set of objectives and outcomes with measures. • Still much confusion, limits ability to achieve desired outcome. • Good discussion -- still a subjective measure. Need additional discussion and framing. • Most time was spent on this session!
3	Challenges related to ***End Land Use Selection*** have been framed and key questions to address this challenge and to guide future work have been identified.	Range 1-4 Ave: 2.6 Median: 3	• I think excellent questions were formed to determine appropriate ways forward. • Feel a bit better about this one. Seems the path forward on this one is to update the C&R IL. • Very good. • Good conversation that prompted greater understanding. • Complex issue, just getting to talk about it was great. • The problems have been recognized in some alternatives discussed. • Would have been good to have better stakeholder (First Nations) representation. • This needs follow-up but hopefully is captured in

Expected Outcome #	Outcome Description	Rating	Comment
			action items. • Unclear where this should go. LARP hopefully will add clarity. Too bad previous efforts (RSDS) didn't go anywhere. • Not yet clearly set objectives for regional.
4	Challenges related to ***How to Respond to and Inform the Public's Expectation of Reclamation Success*** have been framed and key questions to address this challenge and to guide future work have been identified.	Range 1-4 Ave: 2.3 Median: 2	• Great plenary discussion. • Good discussion. Looking forward to seeing compilation of discussion. • Some on the ground experience on this was unexpected. I'm glad it was discussed and shared. • Touched on a few of the major issues and has some great discussion based on the BC logging experience. Waiting to see the summary. • Useful discussion but no clear/firm expectation/outcome. • Obviously this discussion needs much further effort to scope out and develop direction. • Diversity of opinions and approaches -- again needs additional dialogue and planning. • Ran out of time I think. • Running out of time, people tired. • Excellent discussion however no clear distinction on how to begin this process or what process is appropriate • Starting point for discussions found potentially with forest industry. • Industries have to be more sincere in what they communicate. • The problem has been discussed -- options discussed. • Need to identify who are the champions of getting the message out. It is not OSRIN. • Should include media/psychologists in different ways. Starting own backyard. Sure we missed really good ideas. • Too big of a topic. • I like the recognition that more needs to be said publicly.
5	***Preliminary sketching-out of action ideas /***	Range 1-3 Ave: 2.2	• Good start. • Should now be able to identify and address major

Expected Outcome #	Outcome Description	Rating	Comment
	recommendations as input to develop an Action Plan post-workshop. Original: An Action Plan for OSRIN and its key clients has been vetted and sketched out.	Median: 2	issues. • Maybe not a plan but oodles of ideas. • Don't feel we got to this at all. I will reserve comment for after I review the summary document. • Not enough time to bring meaning to the list. • We'll have to wait until information has been compiled to know for sure. • Action items listed by groups need more work/thought in order to form an action plan. • Use the above information to get there. This was the most challenging topic. • The problems are diverse; agreement on what to do discussed; but agreement is not evident. • I'm not sure. • Works for OSRIN committee going forward. • I think [soak?] time will benefit OSRIN and a plan will come later. • Still work needed.

Other comments you'd like to make about the workshop

- Overall dialogue so far has been very useful from perspective of recognizing a wide range of options/expectations/understanding.
- I appreciate being invited to this session. I'm sure that my participation will help in some small way. But of more value is the insights I gained, and will be able to take to incorporate in my future work. Thank you.
- Thank you! I think this organization will be purposeful and effective once it collaborates with the current organizations working in the industry as they have a slightly different mandate any different strategic direction.
- Great workshop -- lots of work getting this ready -- I appreciate the efforts made.
- Varying levels of familiarity with the history/issues hampered some of the discussions (i.e., ELC has a vision statement versus description). The facilitation method was only partially effective.
- I felt I had a great table for discussion. That really helps me enjoy the day. Good facilitation! Chris and Stephen were great resource people. The suite of attendees was darn impressive! A veritable who's who... a cross-section of academic, government, consulting, industry -- well done. The fruit salad late in the day was great. The venue/room was excellent. The workbook was FABULOUS idea! Agenda too ambitious.
- Overall I feel this session was useful. I hope that the summary will provide OSRIN with the direction they want and to enable development of an action plan. Very much looking forward to seeing the summary report for the session. We must ensure that the action plan is initiated and follow through to completion so that this piece of work doesn't sit on a shelf and disappear.
- The topics have been discussed at length in different forums, for some stakeholders. Seeding the conversation with a little history and then the current state might have kicked things into high gear

Expected Outcome #	Outcome Description	Rating	Comment
easier. • Key players that have a significant voice in reclamation in the oil sands were not in attendance -- First Nations, RMWB, Pembina. This absence of these groups could/may affect the success of this initiative!! • Was a great forum to openly place issues on the table. I was encouraged on the degree of alignment on issues and the enthusiasm to directly deal with issues with a focus to approach solutions in a timely manner. Glad I attended. • I expect the results and outcomes to be communicated to the participants. Perhaps an OSRIN newsletter to keep all stakeholders in the loop. • Regarding session 6 -- measure and report on performance; do not report on activity. • Lower expectations for reclamation certification. • Participants are not ready to make concrete offers of action. • I enjoyed the atmosphere -- everyone had a chance to give their opinion; could've been longer. • Overall a good well-run workshop. Some of the objectives were only partially met. I see this as a process that is part of a large industry/government challenge. • Excellent discussion in the beginning of a much-needed dialogue! Thank you. Additional expected outcomes offered: • What we know, what we think we know, what we don't know perspective could have been better utilized. • Need for landscape approach to reclamation. • I would involve other specialists if oil sands image needs to be changed -- media/sociologist -- could help			