CERTIFICATION OF MINERAL SOIL PADS IN THE BOREAL REGION – A PATH FORWARD

WORKING SESSION SUMMARY

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1.0 BACKGROUND AND PURPOSE OF PROJECT

In 2018, the Petroleum Technology Alliance Canada (PTAC) put out a request for proposals entitled *Reclamation Practices on Upland and Peatland Well Sites*. The project was established in response to challenges experienced by practitioners, regulators and industry related to reclamation certification of legacy sites. The specific sites in question are those that were constructed using imported mineral soil pads in peatlands, and upland sites that that have had natural vegetation encroachment. These sites generally present one or more reclamation deficiencies according to the applicable wellsite criteria and cannot receive a reclamation certificate without additional scrutiny and justification under current regulatory criteria and policies. The **goal of the overall project** is to provide recommendations for an acceptable policy framework/decision support tool(s) to assist industry and regulators in making decisions around appropriate management and certification of these sites that ensures that functioning ecosystems are developed and that there is a process that outlines eligibility for reclamation certification. To date the project has been conducted in two stages. This report describes the work in Stage 2 related to sites that were constructed using imported mineral soil pads in peatlands (a separate Stage 2 report has been prepared dealing with upland sites).

When dealing with peatland sites, the question arises of whether to remove mineral soil pads in peatlands. There has been inconsistency in how decisions about these sites are being made (i.e., different levels of reclamation effort have been applied) and in how reclamation criteria are interpreted and applied in terms of defining what are acceptable conditions for certification. Historically, industry and regulators have agreed that in certain site-specific circumstances, sites with mineral pads in peatlands can be certified without the removal of the pad or with partial removal of the pad. There has been a recognition that sites can be deemed to be on a trajectory towards developing a sustainable plant community from an ecological perspective, and to not be causing off-site impacts, without further disturbance/reclamation. A consistent and standard method to define and address these circumstances has been difficult to discern within the current regulatory and policy framework.

Stage 1 of the project identified that there is limited guidance on how decisions are being made to accept or reject requests for a change in land use and that there are *misperceptions* associated with why requests are being made (from the government/regulator perspective) and how the requests are being evaluated (from the industry/practitioners perspective) (Tokay et al. 2019). It was determined that these perceptions must be addressed before meaningful change can occur. Stage 1 also identified the key factors to consider when assessing the ecological implications of a change in land use request (hydrology, cumulative effects and regional considerations, upland function, status of the borrow pit, site location, and land use considerations) and a number of knowledge gaps which should be addressed to confirm the effectiveness of a decision support tool and policy framework. However, consultation with Alberta Environment and Parks (AEP) and Alberta Energy Regulator (AER) regarding the findings from Stage 1 was recommended before developing a policy framework and research project to address the knowledge gaps to ensure resources are allocated appropriately.

The *Certification of Mineral Soil Pads in the Boreal Region – A Path Forward* working session was held in December 2019 for the purpose of facilitating a productive discussion involving industry (Oil and Gas and Environmental Consultants) and government (AEP and AER) related to change in land use requests. The objective was to inform a path forward for a policy framework that provided clarity on the *process* to request a change in land use and the *criteria* for evaluating the requests. The agenda for the meeting is provided in Appendix A.

A total of 30 people representing AEP, AER, oil and gas industry, environmental consulting companies and the project team participated in an open, productive discussion. An overview of the key findings from Stage 1 of the project was presented to the group (Appendix B) to provide context for the discussion. A summary of the key findings from Stage 1 is provided in Section 1.1.

1.1 KEY FINDINGS FROM STAGE 1 RELATED TO CHANGE IN LAND USE DECISIONS

Leaving mineral soil features (well pad or access road) in place in peatland settings has not been well studied or assessed therefore challenges arise in the management of mineral soil pads with natural vegetation encroachment when the site is not causing any adverse impacts off site and the vegetation on site meets the forested land criteria (with or without a variance to criteria) (Alberta Environment and Sustainable Resource Development, 2013b). There have been instances where leaving pads in place has been accepted when (1) pads are not causing significant impact off-site and (2) pads are forested or on a trajectory to becoming a forest. However, the process for requesting and approving a land use change has not been formalized in Alberta creating challenges for both industry and government for managing these requests. Consultation with industry and government found there is a lack of clarity on the *process* to obtain approvals and the *criteria* for evaluating the requests. Both AEP and AER are involved in each decision resulting in variable responses and timelines for approval:

- AEP (effectively the "landowner") approves a change in land use request
- AER certifies the site if a change in land use approved and if the site meets Forested Criteria (with or without a variance)

In addition, the implementation of the wetland policy in Alberta has impacted the perception on leaving pads in place in peatlands, and it is unclear how that influences approval of change in land use requests. There is also a lack of information available related to the long-term impacts associated with pads remaining in place, creating uncertainty for future implications and therefore the conservative approach has been to default to pad removal. However, there is precedence from other industries and jurisdictions that can be used for guidance in making land use change decisions:

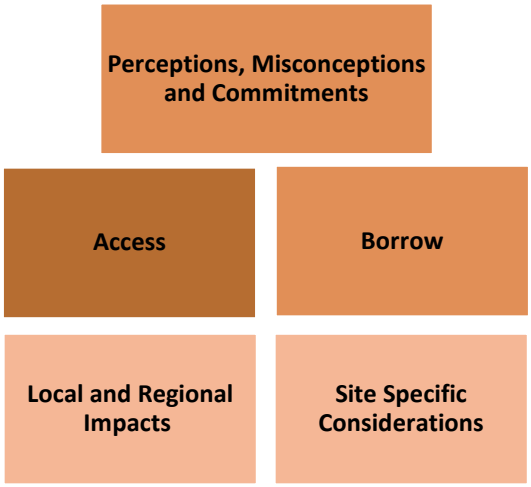
- Public Land Management Policy No. 7 regarding borrow activities (Alberta Environment and Parks, 2018)
    - Change in land use should reflect an ecological community found in the natural sub-region of the site.
- Peat Operations (Alberta Environment and Parks, 2016)
    - Preferred outcome is to return land to pre-disturbance condition; alternate land uses are an option.
    - "Site characteristics, historical practices and/or subsequent land uses" result in requests for change in land use.
    - Should reflect an ecological community found within the natural subregion of the site.
- Aggregate operations (Alberta Sustainable Resource Development, 2010)
    - End land uses are site specific and depend on pre-disturbance conditions which depend on regional limitations (soil type, climate, landforms within region), surrounding land uses, and costs.

During consultation in Stage 1, when asked the question *what site/local/regional characteristics and/or conditions would lead you to apply for/approve leaving a mineral soil pad in place* there was a range of responses. Some respondents were in support of and some were opposed to leaving a pad in place. A summary of the feedback recieved is provided in Table 1.

Table 1. Supporting and opposing views for what characteristics and/or conditions should be considered when applying for or approving, a change in land use.

Supporting	Opposed
• Need to consider landscape scale for considerations even at a site scale • Change in land use needs to be justified by more than "vegetation establishment on a mineral soil pad" • Other considerations – regional implications, borrow material, borrow pit, surrounding landscape, etc. • Consider the structure and composition of established vegetation • Justification is ecologically based • Need evidence that removing pad is "doing more harm" than leaving it in place • Demonstrated that there are no adverse impacts (vegetation, hydrology, pooling water, erosion, slumping, etc.) • Would "partial" reclamation (pad removal) be a viable option? • Borrow unavailable to receive fill material (already a functioning wetland and/or revegetated)	• In general, leaving a pad in place creates a negative impact on the environment • Pads do not produce the same type of forest that reclaimed upland forests produce • Need to ensure "forests" are not considered ecologically more valuable than "wetlands" • Wetland policy considerations required (to change land use – requires offsets) • Vegetation is likely to be impeded in the long term • Cost is not an appropriate justification for leaving a pad in place • Extremely time consuming to review requests, particularly when not ecologically based • Do not want to encourage/condone poor practices • Industry should be doing what they agreed to in the disposition • Company "historical practices" factored into decision

Based on Stage 1 it was determined that the key factors influencing a decision to leave a pad in place could be grouped as follows:



Decision support tools and clear guidance can be developed to addressaccess, borrow, local and regional impacts, and site specfic considerations, however it was determined that there was also a need to address the non-technical aspects to enable meaningful change. Some of the perceptions and misconceptions identified through comments such as those listed below need to be addressed to ensure agreement on the path forward for management of these sites.

- “In general, leaving a pad in place creates a negative impact on the environment”
- “’Forest’s end land use is being considered ecologically more valuable than ‘wetlands’”
- “Primary driver for leaving pad in place is ‘cost’”
- “Government not willing to consider applications for a change in land use regardless of rationale”
- “Industry should be doing what they agreed to in the disposition”

1.1.1 *Access and Borrow Considerations*

Key factors to consider with respect to the access to the site included:

- Is access to the site restricted (i.e., revegetated)?
- If access road is revegetated – would it meet the appropriate criteria?
- Is access to the site limited (i.e., extremely remote, only available via winter access)?
- Is there an opportunity to coordinate activities with others completing reclamation in the area?
- Need for consideration of “net environmental benefit” associated with reclamation efforts (i.e., does the impact of additional reclamation outweigh the potential benefits).

It was clear that the cost of reclamation due to restricted access would not be an appropriate justification by itself for leaving a pad in place, but is a factor to be considered.

Key factors to consider with respect to the borrow included:

- Is the borrow pit available to receive the pad materials?
  - If yes – what is its status?
  - If no – what are the alternative options?
- “Many borrows that were constructed 20 to 30 years ago have developed functional wetlands and are providing a similar ecosystem service at a regional scale as the 1 ha disturbance of the wellsite”.
- “Landscape” borrows often have already revegetated naturally and blend well with the natural subregion.

1.1.2 *Local and Regional Impacts*

There has been very little research done to date on implications of leaving a mineral soil pad in place within a peatland, however it is well known that hydrology at the local and regional scale is the most important factor influencing the development and persistence of a functioning peatland. Therefore key considerations for evaluating impacts associated with a mineral soil pad within a peatland include those that are influenced by, or may influence, the hydrology such as the type of wetland (bog vs. fen), direction of water flow, type of feature (pad vs. road), and size of feature. It is essential to consider whether there are hydrological issues as a result of the pad and/or access road in terms of:

- Inhibition of off-site surface and subsurface water flow
- Water chemistry
- Erosion and sedimentation
- Effects to vegetation in surrounding peatland

It is also important to consider if impacts are identified whether or not they can be alleviated with "minimal effort" and/or "partial reclamation" such as culvert installation or partial removal of an access road to restore water flow.

Other factors that were important considerations at the local and regional scale included:

- Regional cumulative effects
  - Regionally, if the pad is reclaimed to upland, will the change in ratio of upland vs. peatland adversely impact water quality, hydrology, or biodiversity?
  - There is a need for establishing a cumulative effect threshold based on scientific and geographical approaches to allow a proportion of wetland in a given area to be "lost" without significant degradation of function of the region. This is a major knowledge gap.
  - Number of other mineral soil pads or roads left in place in the local and regional area.
  - Size of the local or regional area over which cumulative effects are determined.
  - Scale and impact of other human impacts in the local or regional area.
  - Sensitivity of the ecosystem, or receptors within that ecosystem (e.g., caribou in peatlands), to cumulative effects.
- Implications of Alberta's Wetland Policy (Alberta Environment and Sustainable Resource Development, 2013a)
  - Whether the site is in an area with an abundance of wetlands and low historical loss.
- Whether the end land use would be compatible with the natural subregion
  - Proximity of the site to other upland areas.
  - If the surrounding area is a mosaic of upland forests, bogs and fens, or a transitional area between upland and peatland, an upland forest on a pad or road left in place was considered more appropriate by many outreach respondents than if the surrounding area is a large, uninterrupted fen or bog.
- Implications for removal in terms of returning functional peatland
  - Do benefits outweigh ecological costs associated with removal?
  - Potential for successful peatland reclamation.
    - By peatland type
    - Proximity to upland landforms
    - Effects of peat compression and peat re-bound

1.1.3 *Site Specific Considerations*

It is important to determine if the site is on an acceptable trajectory towards either an upland forest or peatland. Based on the literature review and consultation the key factors for consideration when evaluating a mineral pad within a peatland include:

- If the site is revegetated would it pass a Detailed Site Assessment (DSA) with or without a variance using the Forested Criteria (Alberta Environment and Sustainable Resource Development, 2013b).
  - Does it have the appropriate species assemblage, plant health, tree growth, structural layers, etc.
- Are there any other limitations to the long-term sustainability of an upland ecosystem (e.g., rooting restrictions, topsoil/nutrient availability, soil chemistry, etc.)?
- Are there any other deficiencies that require further reclamation?
  - Topsoil, subsidence, contour, soil chemistry, coarse woody debris (CWD), etc.

- Does the site need to be recontoured to blend in with the landscape within the natural sub-region?
- Are there third-party impacts?

1.1.4 *Summary and Path Forward*

An informed decision regarding whether to apply for or grant a change in land use requires an understanding of the following:

- Does the site meet Equivalent Land Capability and provide necessary ecosystem functions?
- Are the risks of adverse effects to off-site areas acceptable?
- Are the risks of cumulative effects acceptable?
- Does an upland (i.e., pad in place) fit into the regional landscape context?
- What are the costs and benefits of leaving the pad in place vs. removal?

It was determined that a decision framwork, built in consultation with industry, pratitioners and government (AEP and AER) that uses a holistic, ecological approach to evaluate "change in land use" requests and incorporates the elements from all four of the key considerations (Access; Borrow; Local and Regional Impacts; and, Site Specific Considerations) would be the most effective approach to address the perceptions and misconceptions and enable a path forward for certification of padded sites within peatlands, where appropriate.

1.2 COMMENTS ON THE APPROACH

After reviewing the results of Stage 1, and before reviewing the four proposed decision support tools, the participants were asked if they had any comments on the approach. The following were discussed:

What does "legacy" mean?

- No clear definition re: timelines though we did refer to the most recent criteria release dates
- Legacy definition – are old sites with poor trees vs. the surrounding landscape the same as old sites with good trees? More than just age.
- Table 1 in the Forested Criteria has relevant dates that should be looked at to define legacy.
  - Although this is targeted at legacy sites it should also be helpful in planning for new sites.
- A lot of the criteria have to do with non-legacy sites therefore maybe use tools for new pads with planning that enhances forested sites.
- Maybe throw out whole "legacy" / time concept and use tools to design from Day 1.

- Believe there should be more emphasis placed on ecological function than on past commitments / agreements in disposition applications
  - Question becomes – now that we are seeing trees on site that weren't expected, what can we do?
  - Not about saving $$, its about getting closure and showing the public we can be trusted to reclaim sites.

- Topsoil is available but not being used – this is an ecological issue.
  - Old bad sites should be fixed.
- We can get a bit tree-centric in our thinking

- Need to balance vegetation (trees) with other environmental characteristics to get the best overall result.
- Some species like aspen can sucker back quickly if disturbed so in those cases maybe it is OK to do full reclamation.

- Regional basis for decisions – how to select the three remaining sites of 10 in hand that should not be allowed to keep a pad?
- Industry being asked for more Area-based Closure-like approach to field closure, therefore are looking field-wide for planning and decisions.
- Have to start looking at more regional effects, therefore will drive industry to coordinate and discuss.

- Need to consider both dugout and landscape borrows.
- Need to consider mineral soil quality in the decision to keep pad / road in place.
- The decision support tools, and their components are the key issues being raised in the field.

- As we go through the boxes are there others and some assumptions that are inherent in the tools?
- Go forward process – need to look at learnings from existing certified sites.
- Good to see inclusion of environmental net benefit, cost-benefit concepts being considered.
- Also need to keep equivalent land capability requirement in mind.

- Definitely on the right track with the proposed approach. Similar approach used when revising the Forested Criteria.
- It will make decisions much more defensible if there is a clear process and criteria being followed.
- Needs to be a living document to help alleviate anxiety of change.

Take Away: No major objections to the approach.

2.0 FEEDBACK ON PRELIMINARY DECISION SUPPORT TOOLS

Preliminary decision support tools for the four key considerations identified were developed for discussion and presented at the working session. The four decision support tools are provided in Appendix C, along with a brief description of a potential mechanism to aggregate the results of the four tools into an overall decision. Explanation boxes were overlaid on various points of the decision support tools to enable more effective discussion through a better understanding of the intention associated with the steps. Words that are highlighted red in the charts need to be defined if used in the next version of tools – definitions should be tied to an individual decision tool if the term is used differently in another tool.

During the working session participants attached sticky notes to various parts of each preliminary decision support tool (a decision box, a decision path, or the tree as a whole). In the sections below, the places where the sticky notes were attached are shown on each decision support tool by a red letter. General feedback and comments made on each each of the decision support tools are provided below.

2.1 GENERAL FEEDBACK

The following points regarding use of the tools were raised:

- Need to develop a Process Decision Support Tool.
    - In the tool – put wetland policy question further down the line. Wetland policy only applicable for post-2016. Public lands only for pre-2016. Can remove "influences of wetland policy" for any sites predating 2016.
- Important to remember this will not necessarily apply to all sites.
    - There will always be exceptions that don't fit within these boundaries.
    - Need some explanation above each decision tree for situations where the tree does not apply.
- At each decision point, list the factors to consider when deciding which path to follow.
- Site visits with AEP would really help make all the decisions (i.e., if there were dedicated resources to enable these decisions as a higher priority)
- Suggestions regarding how to combine the results of the four tools into a single decision
    - Leave weightings/justification to the practitioner/operator otherwise may result in the loss of common-sense approach.
    - Try to remove subjectivity as much as possible.
    - If 3 of the 4 tools recommend one option then go with the dominant recommendation (i.e., does not have to be unanimous).
    - Leverage examples to guide the weightings. Start with anything that is doable or not possible.
    - Borrow – less important because wetland will be lower quality?
    - Regional – very important (maybe top priority) but hard to quantify.

The following wildlife points were raised:

- Need to incorporate caribou (and/or it could be incorporated into regional support tool).
- Is it in a caribou or other wildlife zone – may need to discuss with fisheries and wildlife officer. The best ecological play could be driven by wildlife use.

- Is evidence of wildlife use relevant to the decision? For example, wildlife will be using wetland (or landscape) borrows.

If testing of the final draft version of the tools is desired the project team could farm the testing out to other practitioners to "run" sites through the flowcharts, rather than do it all themselves.

2.2 ACCESS DECISION TREE

The preliminary Access Decision tree, with the places where participants noted comments, is shown in Figure 1.

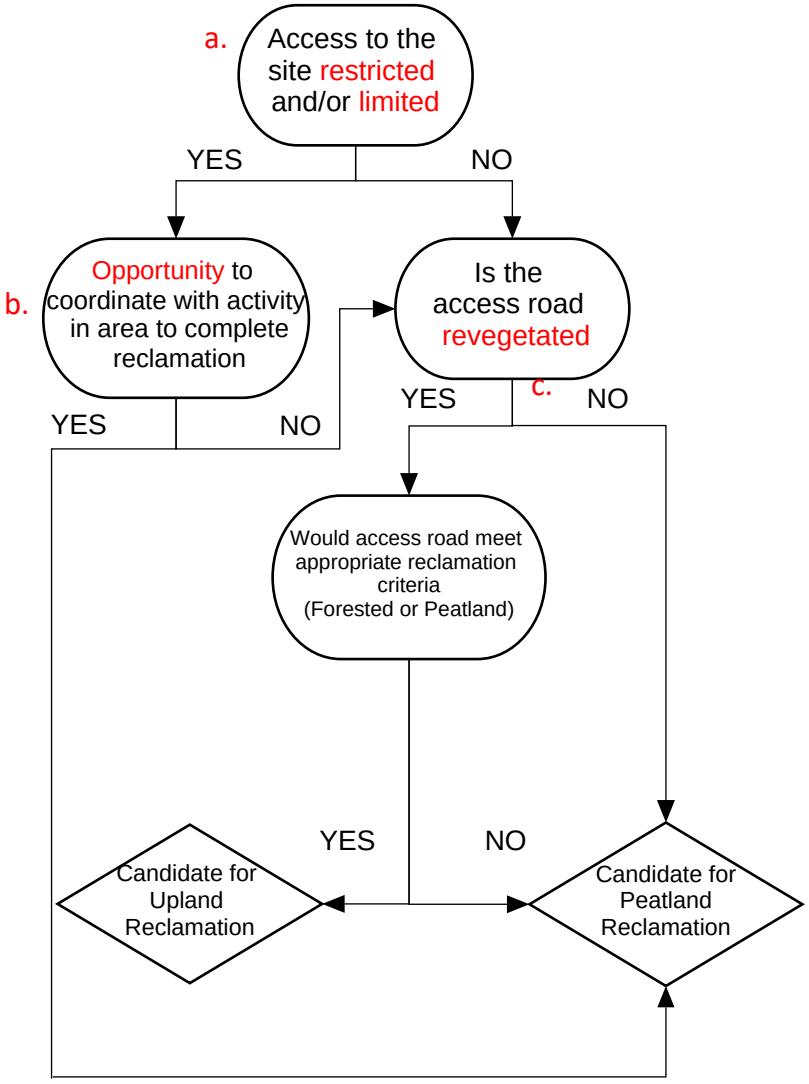


Figure 1. Preliminary Access Decision Support Tool.

a. Access to the site restricted and/or limited

- There was confusion about terminology (i.e., restricted or limited definitions).
  - Need to be able to legitimately define limited and put context around it.
  - Consider removing one of them and/or separating out and define for remoteness, etc.
- What if no access road or if Licence of Occupation is staying in place.

- This is a top priority if access into the site is non-existent (i.e., in terms of weightings and "process" decision support).
- Did this reflect a winter road, or creek crossing, etc.
- Consideration is required for whether or not the road is padded. Where does that fit within the tool?
- Need to look at the cost/benefit analysis
  - Could be substantially better reclamation if disturbed.
  - Consideration for what is required for access (e.g., creek crossing, what proportion of the road is crossing a wetland, etc.).
- Magnitude of the impact on the environment (i.e., the length of the road).
- How much of the road was revegetated, the type of vegetation, how much and what type.

b. Opportunity to coordinate with activity in the area to complete reclamation

- Need to be more descriptive about what an "opportunity" is.
  - Enable sharing between companies to incentivize regional planning.

c. Is the access road revegetated

- Clarify what is meant by yes/no.
- Need to add – if not – "can it be fixed with minimal activity. The statement "is the road successfully reclaimed" would clarify.

d. Would access road meet appropriate reclamation criteria (Forested or Peatland)

- Consider rewording diamonds; options for rewording include
  - "Candidate for upland end land use" and "candidate for peatland end land use."
  - "Forested Criteria" or "Peatland Criteria".
  - "pad"/ "wellsite" etc. candidate.

e. consider third party impacts – regional and local considerations

2.3 BORROW DECISION SUPPORT TOOL

The preliminary Borrow Decision Support Tool, with the places where participants noted comments, is shown in Figure 2.

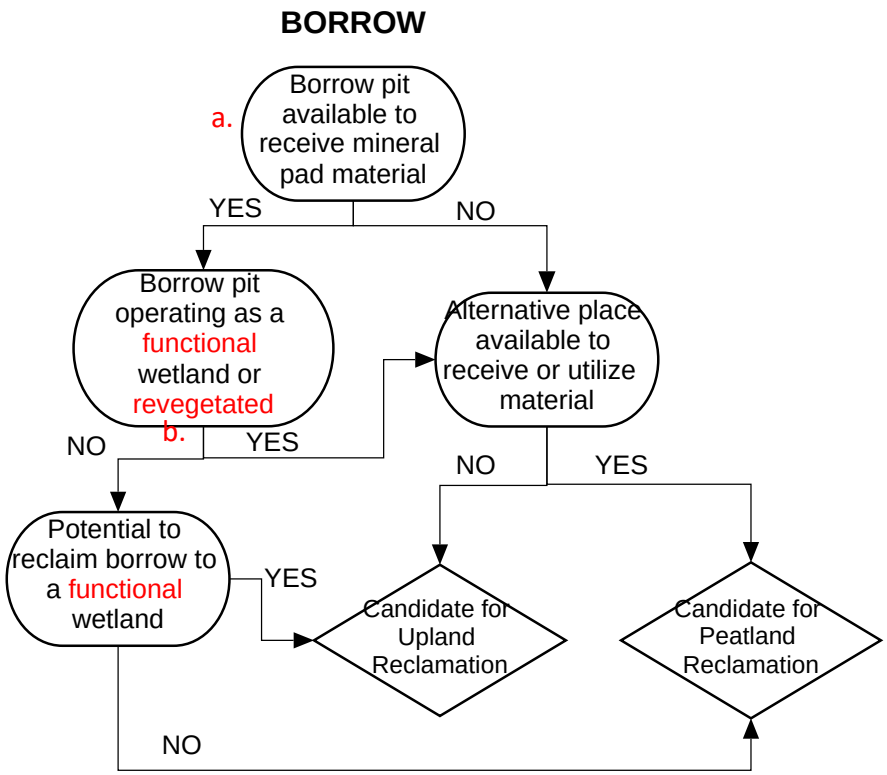


Figure 2. Preliminary Borrow Decision Support Tool.

a. Borrow pit available to receive mineral pad material

- May not be aware of where borrow pit is.
- Dispositions for borrow and wellsite may not be linked (need more information from AER/AEP).
- Need to add an element to tool for partial material removal.
- Need to define "functional"
  - Consider using Alberta Transportation's Borrow excavation guides (Alberta Transportation, 2013a; 2013b; 2013c)
  - Review COSIA's *In-Situ Oil Sands Shared Practices for Working in and Around Wetlands* document (Osko et al., 2018)
  - Review COSIA's Guide for In Situ Reclamation in the Oil Sands Region of Alberta: Reclaiming Aggregate and Borrow Excavations Associated with EPEA Approvals to Water Bodies (CPP Environmental, 2017)
  - Need to define what type the targeted wetland should be (marsh, pond, bog, fen, etc.).
- If wetland is not "functional" – then what? Need to ensure "what is not acceptable" is also considered.
- Consider separating "Landscape vs. wetland" borrow
- Need to define "revegetated".

b. Borrow pit operating as a functional wetland or revegetated

- Much more information to define "functional" required in a table
- If not functional – then what?
- Does the borrow require reclamation? Need to understand borrow reclamation requirements.
- How to share the information about activities and location of pits.

- Policy impediments to moving pad material around (e.g., restrictions on soil movement from site to site).
- Is the material suitable to be put into a “borrow” (are you just moving a problem from one place to the next?).

2.4 LOCAL AND REGIONAL IMPACTS

The preliminary Local and Regional Impacts Decision Support Tool, with the places where participants noted comments, is shown in Figure 3.

LOCAL AND REGIONAL IMPACTS

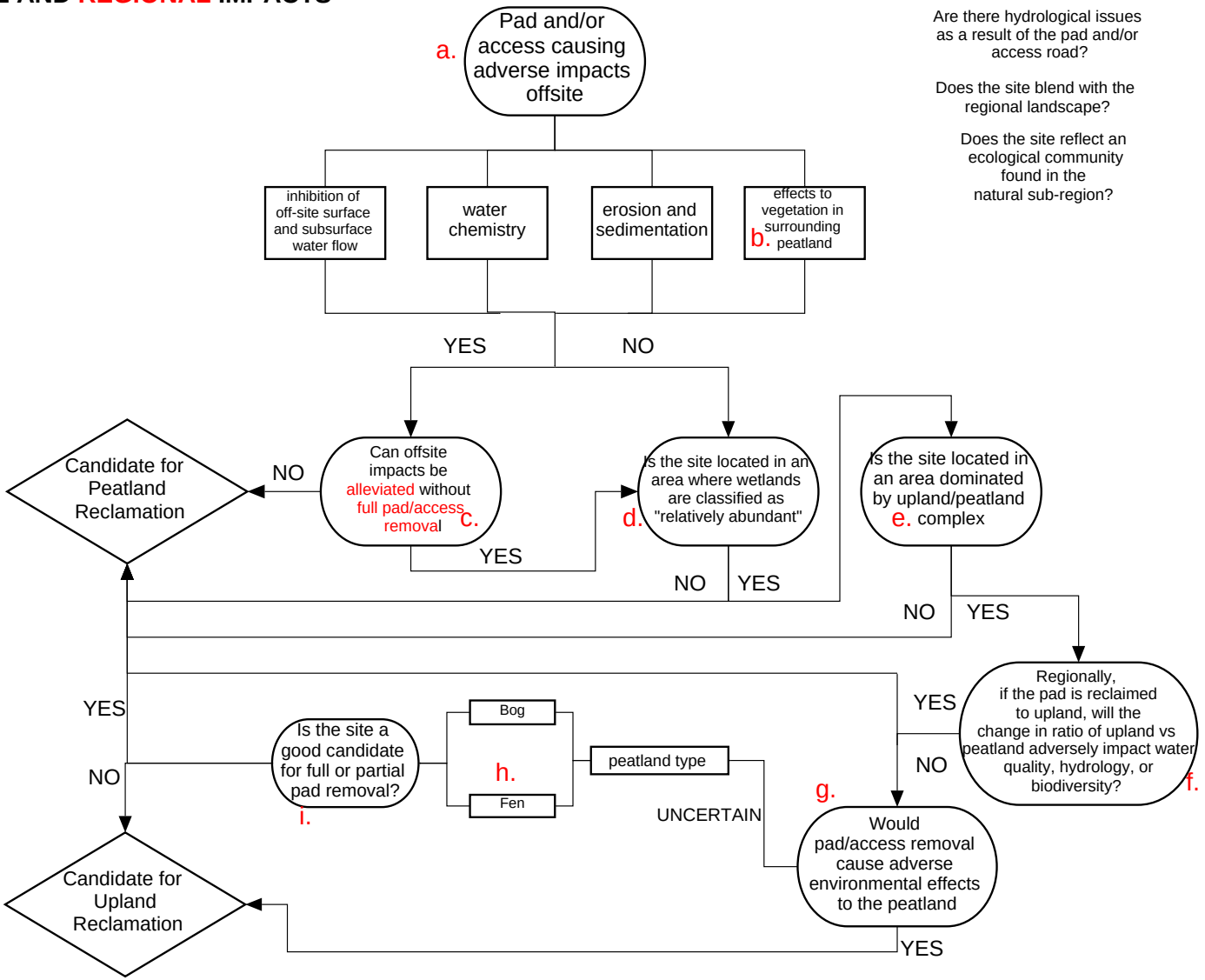


Figure 3. Preliminary Local and Regional Impacts Decision Support Tool.

General Feedback

- How to prioritize regional considerations on a site-by-site basis
  - Reality – "first come first serve".
- Is this being considered on a watershed scale?
- Need to define "regional".
- Need to consider instances where contamination may be present (e.g., management limits in the Green Area).
- Need to be clear when activities, such as pad removal, require approval under the Wetland Policy and/or *Water Act* if it is impacting a wetland.
- Does "payment" (i.e., offsets) cover sites that are having adverse effects?

a. Pad and/or access causing adverse impacts off site

- Need to clarify if a "no" to any one of the boxes points to a "no" (i.e., if you are causing effects in 1 out of 3 boxes, what does that mean – is it a no?)
- What are easy to measure components?
- Require a table for additional information – should we prioritize some impacts and the magnitude of impacts?

b. Effects to vegetation in surrounding peatland

- Require more clarity on "effects" (i.e., adverse or is it just a change).
- Vegetation is an indicator of the other four boxes (consider moving above) (i.e., are there indicators of effects such as vegetation impacts).
- Require a table for additional information – should we prioritize some impacts and the magnitude of impacts?

c. Can off-site impacts be alleviated without full pad/access removal

- Can we really know if mitigation would be successful?
  - Provide ideas for what could be done to "mitigate" impacts.
- Need to ensure the root cause of the impacts has been addressed.
  - Consider re-wording.
  - May require additional boxes. Consider separating full pad removal vs. partial pad removal.
- Need to reference existing literature.
- May need to add a timeline element into this.

d. Is the site located in an area where wetlands are classified as "relatively abundant"

- Remove box (reference to Wetland Policy definition and implications in descriptive text / user manual).
- Determine if there are other ways to incorporate Wetland Policy (i.e., in the initial "process" and/or "screening" tool that we need to develop).

e. Is the site located in an area dominated by upland/peatland complex

- Blend with site “upland/peatland complex”. Reword to clarify “regional context”.
- Difficult to quantify regional impact.
  - Requires air photo/satellite image interpretation.
  - If using terminology from existing criteria, add footnote to criteria reference.
- Is this even a change in land use? If it is close to transition/blends in with surrounding landscape?
- Need to clarify that >50% upland is needed for a change in land use.

f. Regionally, if the pad is reclaimed to upland, will the change in ratio of upland vs. peatland adversely impact water quality, hydrology, or biodiversity?

- Provide considerations for the type of data that could be used (air photo interpretation).
- Is this outside the scope of an individual application? Should this be before blend with local subregion?
- This may be outside the scope of this project.
- Use the phrase “cumulative effects”.
- Consider colour coding to help provide context to intent.

g. Would pad / access removal cause adverse environmental effects to the peatland

- This is trying to address *Net Environmental Benefit*
- How to quantify??
  - Is it about peatland pad removal?
  - Operational considerations.
- This may be more of a site-specific consideration than a regional consideration, unless looking at pads within the entire region.

h. Bog or fen

- Is this necessary here? It may just be causing confusion.
  - The intent was to emphasizes that there are different considerations for the type of peatland being influenced, but without reference to a table or some other supporting information, it is unclear what to do at this decision point.
  - Will ultimately have different flow paths for these choices.
- If we leave this division in, we need to include mineral wetland as well.

i. Is the site a good candidate for full or partial pad removal

- Remove “peatland type” and incorporate into a “considerations” table that supports the decision point.
- Box should be reworded “is the site a candidate for a partial or full pad removal”.

2.5 SITE SPECIFIC CONSIDERATIONS

The preliminary Site Specific Considerations Decision Support Tool, with the places where participants noted comments, is shown in Figure 4.

SITE SPECIFIC CONSIDERATIONS

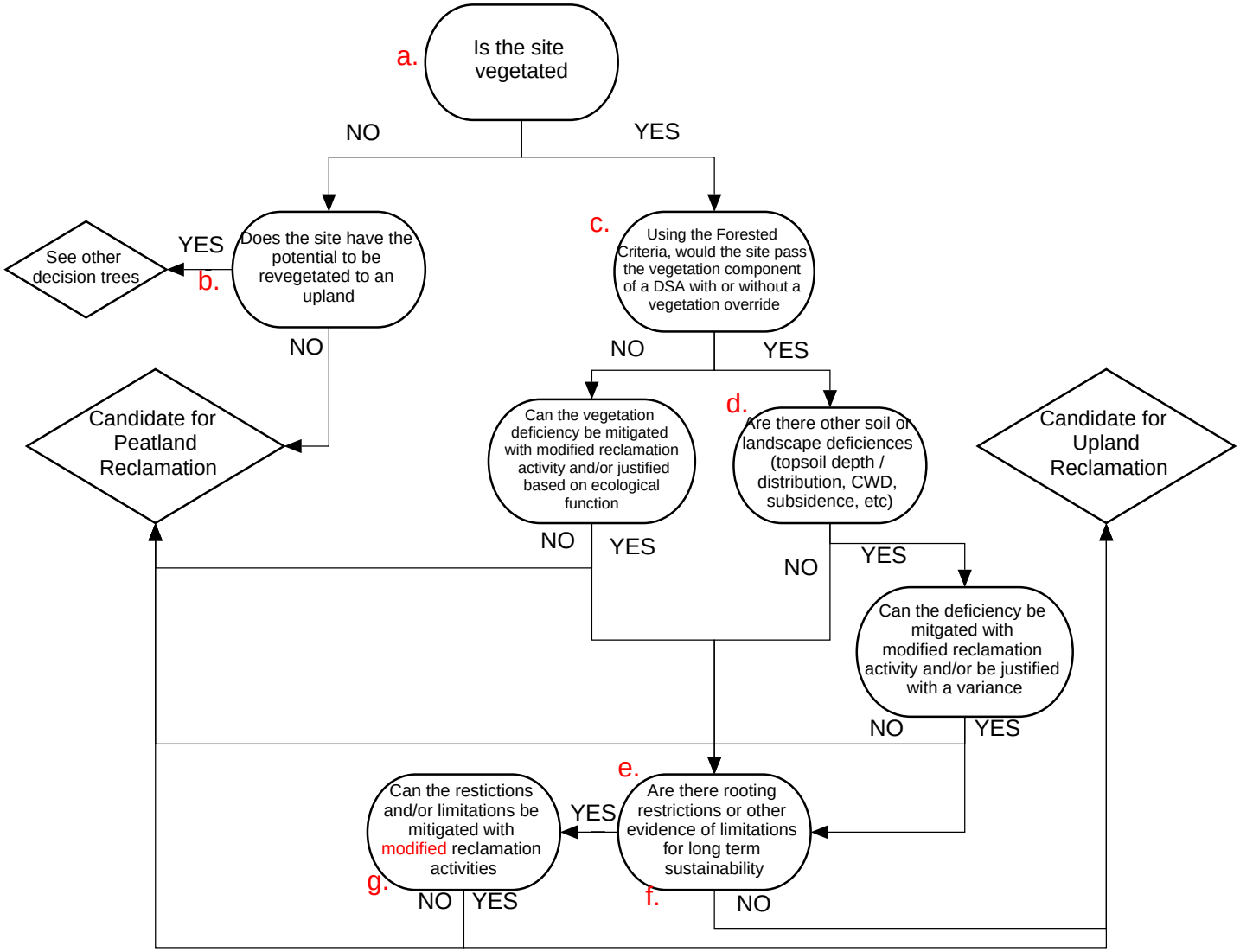


Figure 4. Preliminary Site Specific Considerations Decision Support Tool.

General Feedback

- Need to consider how to incorporate "third party" impacts and net environmental benefit into site specific considerations.
- Need to develop "process" for pads vs access.
- What if the site is already a peatland site (or on a trajectory to becoming one, in full or in part) even though it is padded (e.g., sphagnum growing, pad as sunk into the peatland over time, or a sandy pad that is now very wet). This especially happens in fens.
- Need a mechanism to incorporate the following into the site-specific considerations:
  - Pad depth.
  - Corduroy.
  - Saline pad removal.
  - Case for fen/bog formation.
- Need to consider when/how to incorporate "pad removal" into site specific considerations.

a. Is the site vegetated

- Is this site "forested" rather than "vegetated".
- Need a better definition of "vegetated".
- Forested is highly valued – need to incorporate tree health and emphasize the importance of vegetation.
  - Quantifiable comparisons may help to ensure some consistency.
- Forested vs. grass dominated is a big difference.
  - Nothing growing is the same as grassy pads in terms of desirability.

b. Does the site have the potential to be revegetated to an upland

- What would prevent a site from being reclaimed to an upland?
  - Rooting restriction from compaction or corduroy, etc.?
- May be able to delete if we merge all of the Decision Support Tools into one large Tool.

c. Using the Forested Criteria, would the site pass the vegetation component of a DSA with or without a vegetation override

- This box is confusing. Consider changing the wording and then provide clarity and examples for consideration in a table.
  - Topsoil depth is not relevant if topsoil is not being imported.
- Box could read: Is the site functioning as a forested ecosystem?

d. Are there other soil or landscape deficiencies (topsoil depth / distribution, CWD, subsidence, etc.)

- Remove "other".
- Remove examples (topsoil depth/distribution, CWD, subsidence, etc.) and add to a table for consideration.
- Won't be topsoil if it's a pad, thus only focus on landscape issues here.

e. Are there rooting restrictions or other evidence of limitations for long term sustainability

- Clarify "rooting restrictions".

- Is there interest in overall sustainability evaluation (i.e., greenhouse gas evaluation of the reclamation plans; natural recovery vs. intrusive work; associated disturbance, etc.).
    - Cost/benefit from an ecological perspective.
- Consider removing this box as it is repetitive with other points in the decision tree.
    - Explain (legacy).

f. Can the restrictions and/or limitations be mitigated with modified reclamation activities

- Do we need the word "modified" in this box?
- Could full reclamation be done to an upland (i.e., why default to a peatland)?
- Factors for consideration
    - Depth of geotextile.
    - Adjustments to surface hydrology.

3.0 SUMMARY AND NEXT STEPS

3.1 SUMMARY

There was general consensus that this approach is on the right track with appropriate modifications to address the discussions in the working session. Decisions will be much more defensible if there is a clear process and criteria being followed by practitioners and regulators. This needs to be a living document that is updated as more field experience is gained, and new research findings arise to help alleviate anxiety of change.

Workshop participants provided several suggestions for revisions to the four decision support tools; however, some common themes were seen:

- Definitions and/or descriptions and examples are required for key terms used in the decision support tools (see list below).
- Tables or other forms of supporting text are required to assist in making the choices at each of the decision boxes.
- Reference to relevant documents to aid in decision-making is recommended.
- A Process Decision Support Tool is required to guide use of the four separate decision support tools. A key purpose of the Process Decision Support Tool will be to provide a method of aggregating the results from the four tools into a single decision.

List of required definitions:

- Full pad removal
- Functional wetland
- Limited access
- Local impact
- Modified reclamation
- Opportunity to coordinate reclamation work
- Partial pad removal
- Regional impact
- Restricted access
- Revegetated
- Rooting restrictions

3.2 NEXT STEPS

Based on the feedback received at the working session, the following steps are required:

1. Revise the four decision support tools to reflect the feedback and circulate to the project Technical Advisory Committee.
2. Develop a Process Decision Support Tool and circulate to the project Technical Advisory Committee.
3. Use the revised tools to evaluate several example sites to see how the tools perform (evaluation will be based on available information and, where necessary, analysis of imagery and other readily available public information). This can be done by the Project team and/or the tools could be circulated to a select group of consultants who could evaluate the tools based on sites they have worked on.

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APPENDIX A – Meeting Agenda

Certification of Mineral Soil Pads in the Boreal Region – A Path Forward

MEETING AGENDA

Location: InnoTech Alberta, 250 Karl Clark Road, Edmonton
Date: December 11, 2019 (1:00 to 4:30 pm)
Participation Options: In Person; Skype for Business

The **purpose of the meeting** is to facilitate a productive discussion related to change in land use requests.
The **objective** is to inform a path forward for a policy framework that provides clarity on the ***process*** to request a change in land use and the ***criteria*** for evaluating the requests.

Time	Topic	Facilitator
12:30 – 1:10	Arrival, Light Refreshments	Bonnie
1:10 – 1:20	Welcome, Safety Moment and Introductions	Bonnie and Chris
1:20 – 1:50	Purpose of the Overall PTAC Pads-in-Place Project and Summary of Results to Date	Bonnie
1:50 – 2:00	Roles of AEP and AER in the Project	Susan and Nadia
2:00 – 2:15	Discuss Key Considerations for Evaluating Ecological Implications of Mineral Soil Pads in Peatlands	All
2:15 – 2:30	Present Preliminary Decision Support Tools for Considering a Change in Land Use	Bonnie
2:30 – 2:45	Break	All
2:50 – 3:15	Table Discussions – Preliminary Decision Support Tools 1, 2 and 3	All
3:15 – 3:40		All
3:40 – 4:05		All
4:10 – 4:30	Summary and Next Steps	Chris and Bonnie

Evaluation of Reclamation Practices on Forested Upland and Peatland Wellsites

A Path Forward Working Session

December 11, 2019

InnoTech ALBERTA VERTEX Enviro O&A Services NAIT

1

What's the Problem?

- Certification of legacy upland and peatland wellsites
  - Forested sites that have had natural vegetation establishment
  - Mineral soil pads in peatlands
- Recognized that sites can be on a trajectory towards a sustainable plant community and not require further disturbance/reclamation to enhance ecological outcomes
- A consistent and standard method to define and address these circumstances is required

2

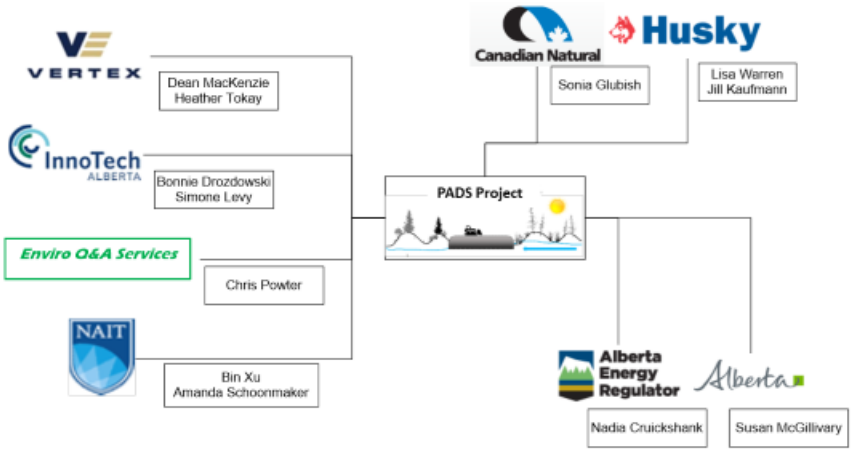
Objective

- Document basis for current industry practices and regulatory decision for legacy sites
- Provide recommendations for an acceptable policy framework/decision support tool(s) to enable decisions regarding certification of legacy sites

The goal is to ensure that legacy sites that have developed functioning ecosystems can proceed through the reclamation certification process with an appropriate level of activity.

3

Project Team



4

Research Approach

3 stage project from 2018 to 2020

- Stage 1 – Desktop review
  - Literature and regulatory review
  - Outreach program
- Stage 2 – Site specific reviews
  - Guidance document for Upland Sites
  - Development of policy framework/decision support tool(s)
  - Consultation in the field
- Stage 3 – Recommendations

Goals

Identify site characteristics that have led industry and regulators to agree that no or minimal further disturbance was required on:

- Upland forested legacy sites
- Mineral soil pads within peatlands

1) Based on Stage 1 findings, develop a framework for advancing legacy sites through the certification process.
2) Test the framework in the field with industry and government participation

5

Literature Review

- Regulatory review of applicable legislation, authorizations, guidelines and policies
- Emphasis on:
  - Factors affecting ecosystem function for naturally revegetated upland forested sites
  - Factors affecting functional peatland ecosystems
- Reviewed assessment methods outside oil and gas

6

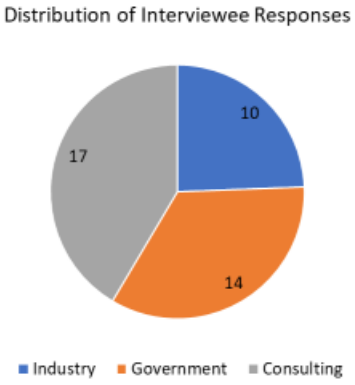
Outreach – what we asked?

- What would lead you to apply for / approve leaving a mineral soil pad in place in a peatland
- What would lead you to apply for/approve a criteria variance and/or a change in land use
- How do you define/evaluate a functioning ecosystem and appropriate trajectories to achieve ELC
- What information would be useful to enable decisions and/or for discussion with regulator/government
- How have decisions regarding certification been reached thus far

7

Outreach

- 41 participants
- 12 questions
  - 8 – All participants
  - 2 – industry and practitioners
  - 2 – regulator/government



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Key Findings - General

- Technical
  - Compiled relevant information from peer reviewed/grey literature and supported that from interviews
- Non Technical
  - Feelings, beliefs and perceptions

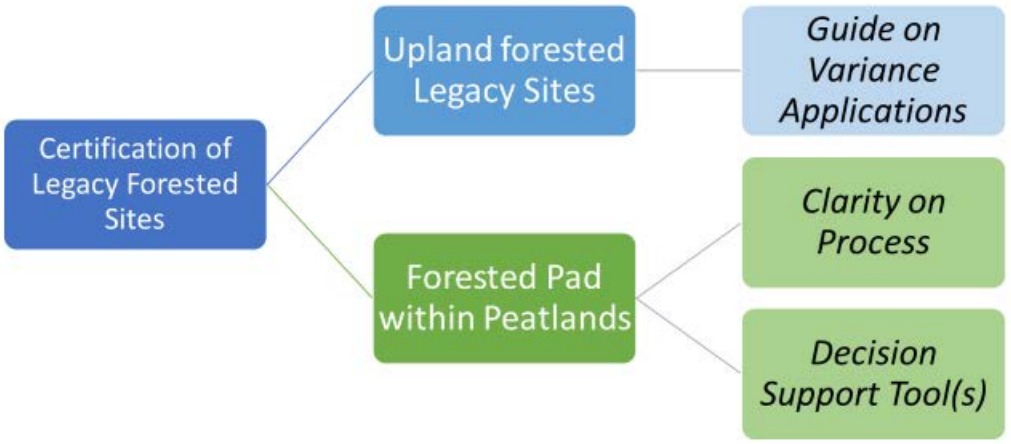
9

Key Findings - General

- Confusion about which government agency (and business unit) makes decisions regarding ***Variances*** and/or ***Land Use Changes***
- Inconsistency in terminology between Criteria (AEP) and SED 002 (AER) creates confusion
  - SED 002 – uses term "*Variance*" to refer to formal requests for deviations from applicable criteria
  - "*Variance*" is not used in either the Forested Criteria or Peatland Criteria
  - SED 002 does not use Forested Criteria term "*Vegetation Override*" – presumed to be a specific type of variance

10

Stage 2 – Divergent Paths Forward



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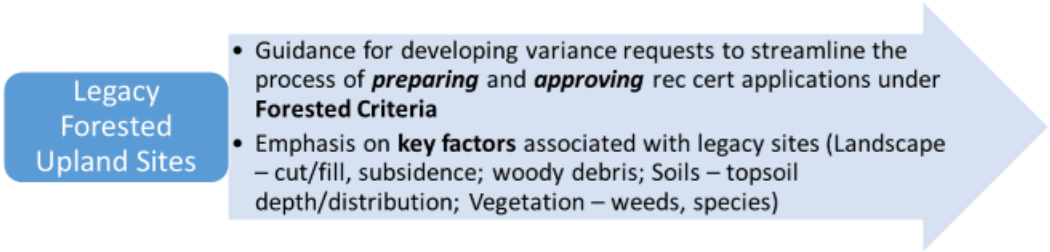
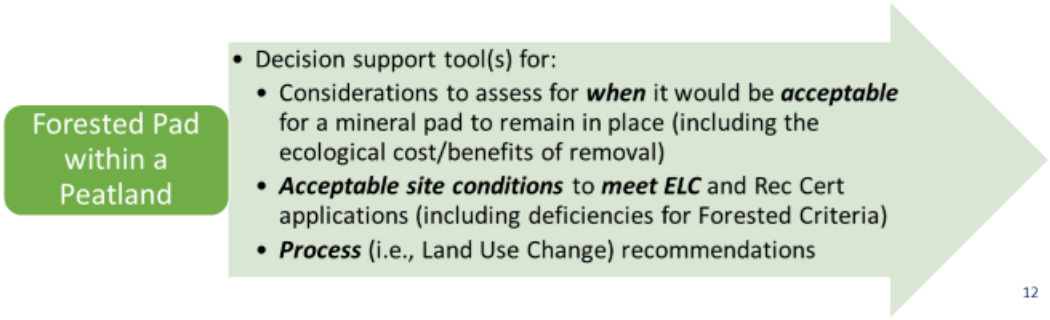




12

Key Findings – Pads in Peatlands

- Multiple government agencies involved in each decision:
  - Requires approval from AEP (effectively the "landowner") for a **Change in land use** request
  - AER **certifies** site if change in land use approved and if site meets forested criteria (vegetation override)
- Formal intake process is lacking, resulting in variable responses and timelines for approvals

Pads left in place with forest cover

13

Precedence – Change in Land Use

- Public Land Management Policy No. 7 regarding borrow activities
  - change in land use should reflect an ecological community found in the natural sub-region of the site
- Peat Operations (AEP 2016) –
  - preferred outcome is to return land to pre-disturbance condition; alternate land uses are an option.
  - "site characteristics, historical practices and/or subsequent land uses" result in requests for change in land use.
  - Should reflect an ecological community found within the natural subregion of the site
- Aggregate operations (ASRD 2010)
  - End land uses are site specific and depend on pre-disturbance conditions which depend on: regional limitations (soil type, climate, landforms within region), surrounding land uses, and costs

14

Key Findings - Pads in Peatlands

- Ultimately there is a lack of clarity on the ***process*** to obtain approvals and the ***criteria*** for evaluating the requests
  - Likely why we found a diverse range in response's to leaving pads in place

Offsite impacts from access road pad material

15

What site/local/regional characteristics and/or conditions would lead you to apply for / approve leaving a mineral soil pad in place?

Supporting
- Need to consider landscape scale for considerations even at a site scale
- Change in land use needs to be justified by more than "vegetation establishment on a mineral soil pad"; other considerations – regional implications, borrow material, borrow pit, surrounding landscape, etc.
- Justification is ECOLOGICALLY based
- Demonstrated that there are NO ADVERSE IMPACTS (vegetation, hydrology, pooling water, erosion, slumping, etc.)
- Would "partial" reclamation (pad removal) be a viable option?
- Borrow unavailable to receive fill material (already a functioning wetland and/or revegetated
- Need evidence that removing pad is "doing more harm" than leaving it in place
- Consider the structure and composition of established vegetation

16

What site/local/regional characteristics and/or conditions would lead you to apply for / approve leaving a mineral soil pad in place?

Opposed
- In general, leaving a pad in place creates a negative impact on the environment
- Extremely time consuming to review requests, particularly when not ecologically based
- Do not want to encourage/condone poor practices
- Company "historical practices" factored into decision
- "pads" do not produce the same type of forest that reclaimed upland forests produce
- Wetland policy considerations required (to change land use – requires offsets)
- Need to ensure "forests" are not considered ecologically more valuable than "wetlands"
- Industry should be doing what they agreed to in the disposition
- Cost is not an appropriate justification for leaving a pad in place
- Vegetation is likely to be impeded in the long term

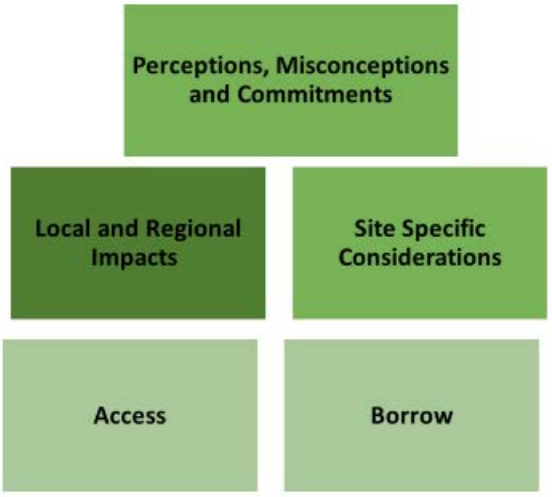
17

Key Findings - Pads in Peatlands

- There have been instances where leaving pads in place has been accepted when: 1) pads are not causing significant impact off-site and 2) pads are forested or on a trajectory to becoming a forest
- Key Challenge:
  - Leaving mineral soil features (well pad or access road) in place in peatland settings has not been well studied
  - What to do when a site is not causing significant adverse effects off site and the vegetation on site meets the forested land criteria (with or without a variance to criteria)

18

Key findings from Stage 1 broken down into the following categories:



19

Perceptions, Misconceptions and Commitments

Need to address "non-technical" aspects to enable meaningful change.

Comments such as:

- In general, leaving a pad in place creates a negative impact on the environment
- "Forest" end land use is being considered ecologically more valuable than "wetlands"
- Primary driver for leaving pad in place is "cost"
- Government not willing to consider applications for a change in land use regardless of rationale
- Industry should be doing what they agreed to in the disposition

20

Local and Regional Impacts

"Hydrology is by far the most important factor for the development and functioning of natural peatlands".

- Key factors to consider at the local and regional scale:
  - Offsite impacts
    - water pooling,
    - water chemistry,
    - erosion/sedimentation,
    - vegetation changes
  - Wetland policy
    - relative abundance,
    - historical loss
    - impact
  - Hydrologic impacts vary with
    - wetland type (bog vs fen);
    - direction of water flow;
    - type of feature (pad vs road);
    - size of feature

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Local and Regional Impacts

"Need for establishing a cumulative effects threshold based on scientific and geographical approaches".

- Key factors to consider at the local and regional scale:
  - Upland/peatland complexes present in local region
    - end land use is compatible with the natural subregion
  - Regional cumulative impacts
    - water quality,
    - hydrology,
    - biodiversity
  - Need for regional planning; one pad in place may not have adverse impacts, but multiple pads left in place may have larger implications

22

Local and Regional Impacts

"Access roads are more likely to have impacts than well pads".

- Key factors to consider at the local and regional scale:
  - Implications of removal in terms of returning functional peatland
    - Do benefits outweigh ecological costs associated with removal?
    - Potential for successful peatland reclamation
      - by peatland type and
      - proximity to upland landforms

23

Access

"Cost of reclamation due to 'remoteness' is not an appropriate justification for leaving a pad in place"

- Key factors to consider:
  - Is access to the site restricted (i.e., revegetated, only available via winter access?)
  - Is access to the site limited (i.e., extremely remote, only available via winter access?)
  - Is there an opportunity to coordinate activities with others completing reclamation in the area?
  - If access road is revegetated – would it meet the appropriate criteria?
    - Need for consideration for "net environmental benefit" associated with reclamation efforts for access vs well pad.

24

Borrow

"consider net environmental benefit to removing mineral soil material and returning to borrow pit"

- Key factors to consider:
  - Is the borrow pit available to receive the materials? If yes – what is it's status?
  - "Many borrows that were constructed 20 to 30 years ago have developed functional wetlands and are providing a similar ecosystem service at a regional scale as the 1 ha disturbance of the wellsite"
  - "landscape" borrows often have already revegetated naturally and blend well with the natural subregion.

25

Site Specific Considerations

"Need to understand the end goal to determine what trajectory the site should be on"

- Key factors to consider:
  - If the site is revegetated would it pass a DSA w/ or w/out a vegetation override using the Forested Criteria
    - Does it have the appropriate species assemblage, plant health, tree growth, structural layers, etc.
  - Are there any other limitations to the long term sustainability of an upland ecosystem (e.g., rooting restrictions, topsoil/nutrient availability, soil chemistry, etc.)
  - Are there any other "reclamation deficiencies"
    - CWD, topsoil, subsidence, contour, soil chemistry, etc.

26

Site Specific Considerations

"Net cost to the environment to 'fix' the problem needs to be taken into consideration."

- Key factors to consider:
  - Does the site need to be recontoured to blend in with the landscape within the natural sub-region?
  - Third party impacts

27

Local and Regional Impacts	Site Specific Considerations
Access	Borrow

"Holistic, ecological approach to evaluate "change in land use" requests"

Decision makers want to see:

- empirical data,
- cost/benefit analysis specific to the site in question,
- that the site meets ELC and provides necessary ecosystem functions,
- that there are minimal risks of adverse effects to off-site areas,
- information associated with cumulative effects, and
- how the site fits into the regional landscape

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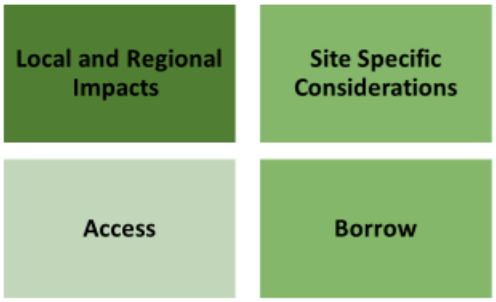

A decision framework, built together, that uses a holistic, ecological approach to evaluate "change in land use" requests and incorporates the elements from all four of these key considerations

ADDRESSES

Perceptions, Misconceptions and Commitments

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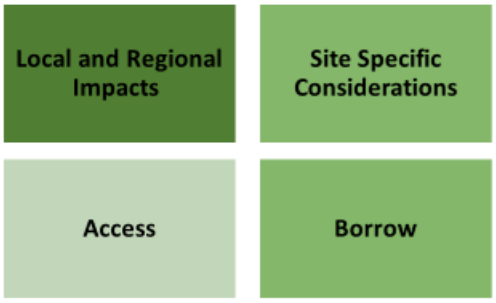

A decision framework, built together, that uses a holistic, ecological approach to evaluate "change in land use" requests and incorporates the elements from all four of these key considerations

ADDRESSES

Perceptions, Misconceptions and Commitments

Let's Discuss

30

Preliminary Decision Support Tools

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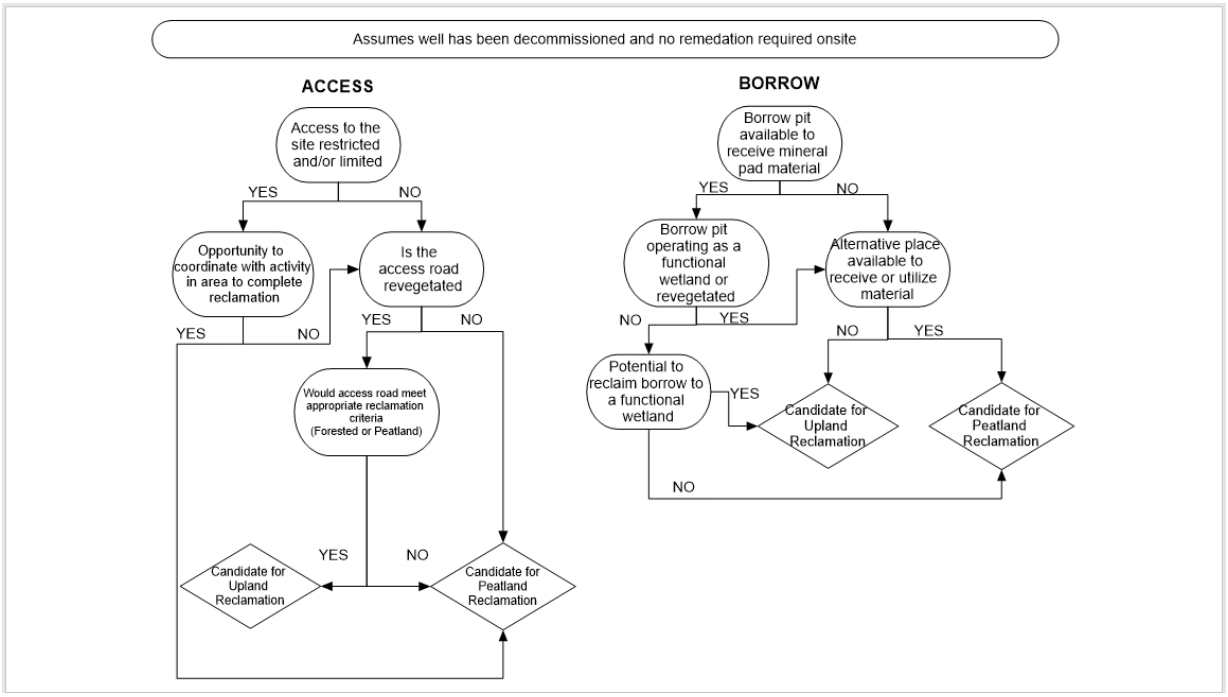
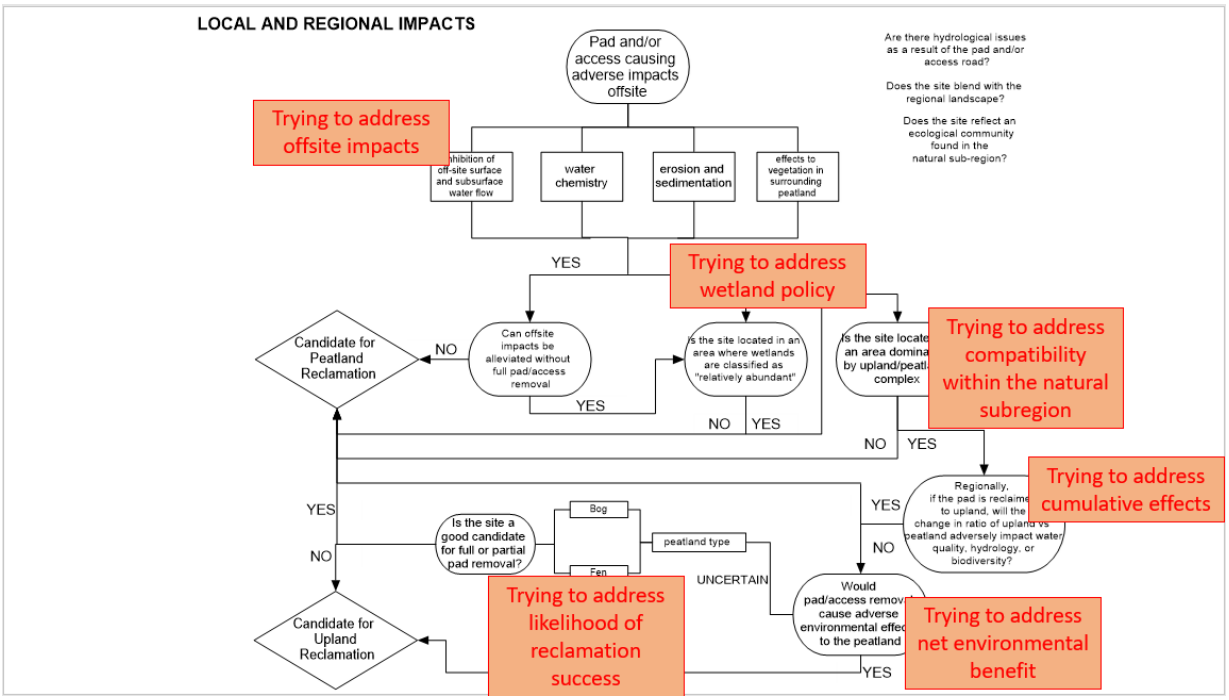
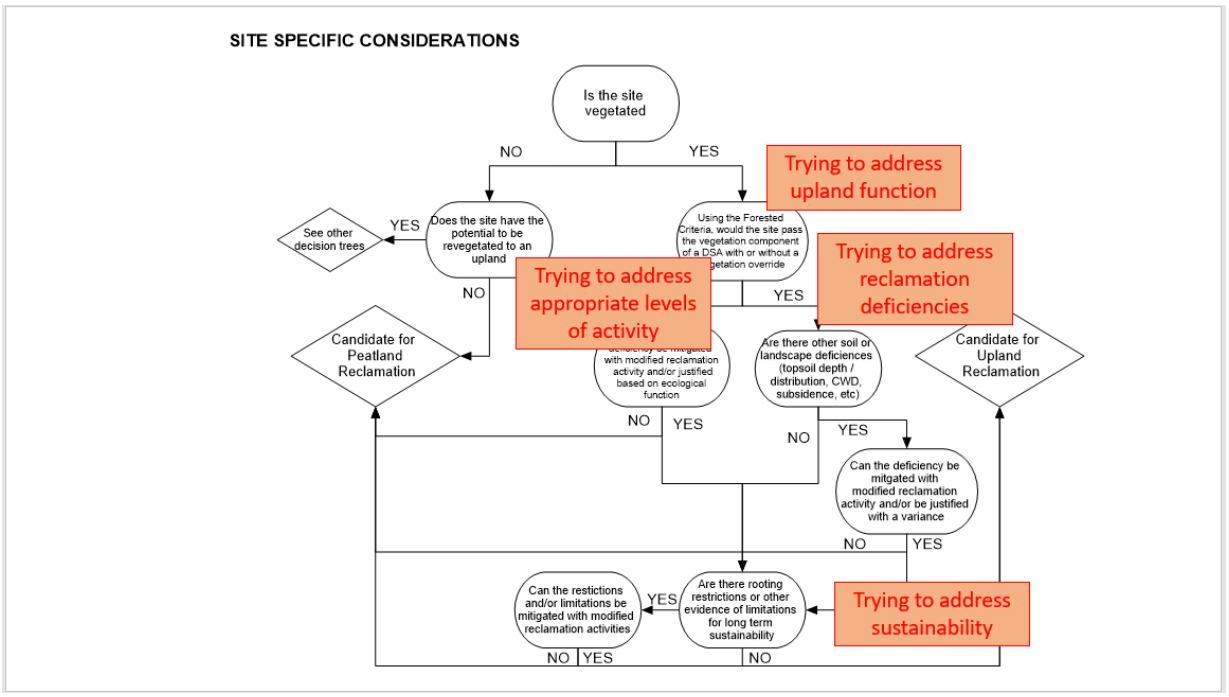
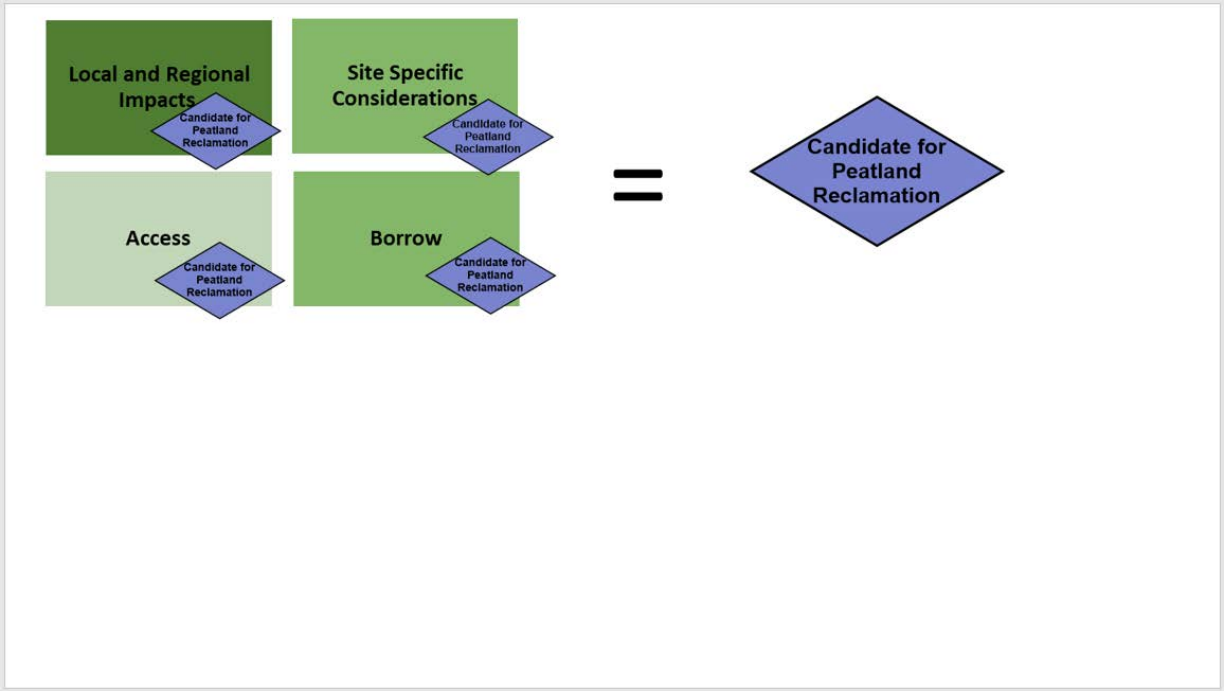






The following charts were presented to show options for merging the results from the four decision support tools into a final decision.


Local and Regional Impacts
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Site Specific Considerations
Candidate for Peatland Reclamation
Access
Candidate for Peatland Reclamation
Borrow
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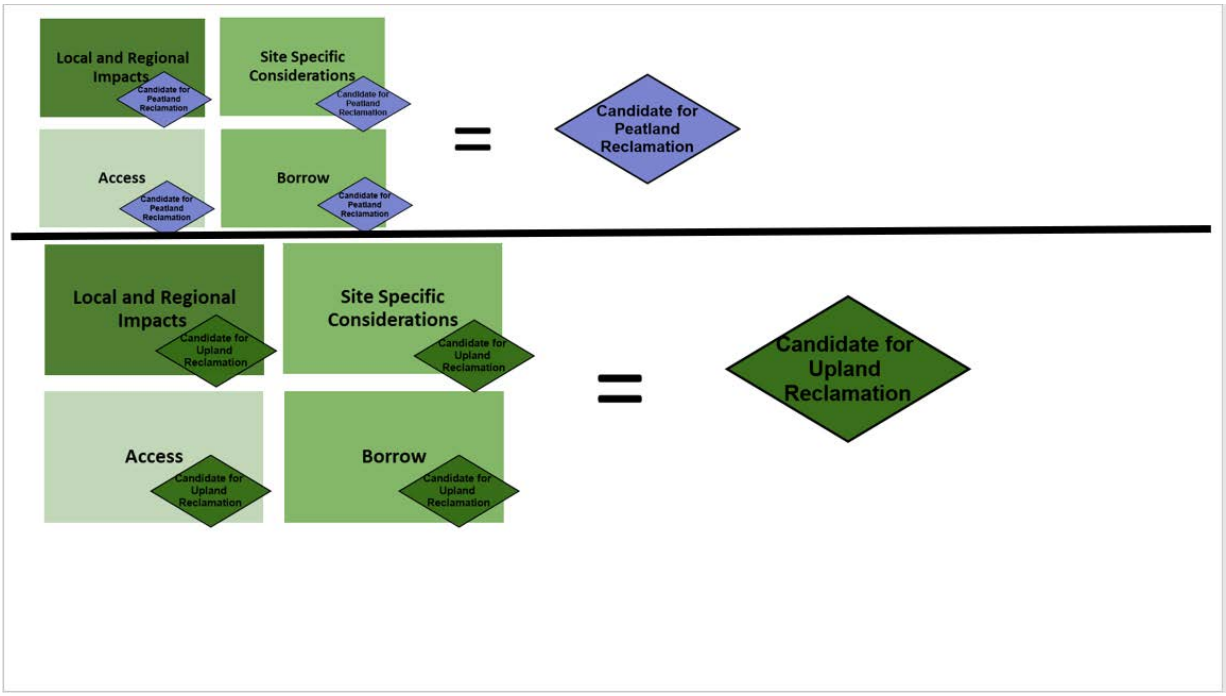
Candidate for Peatland Reclamation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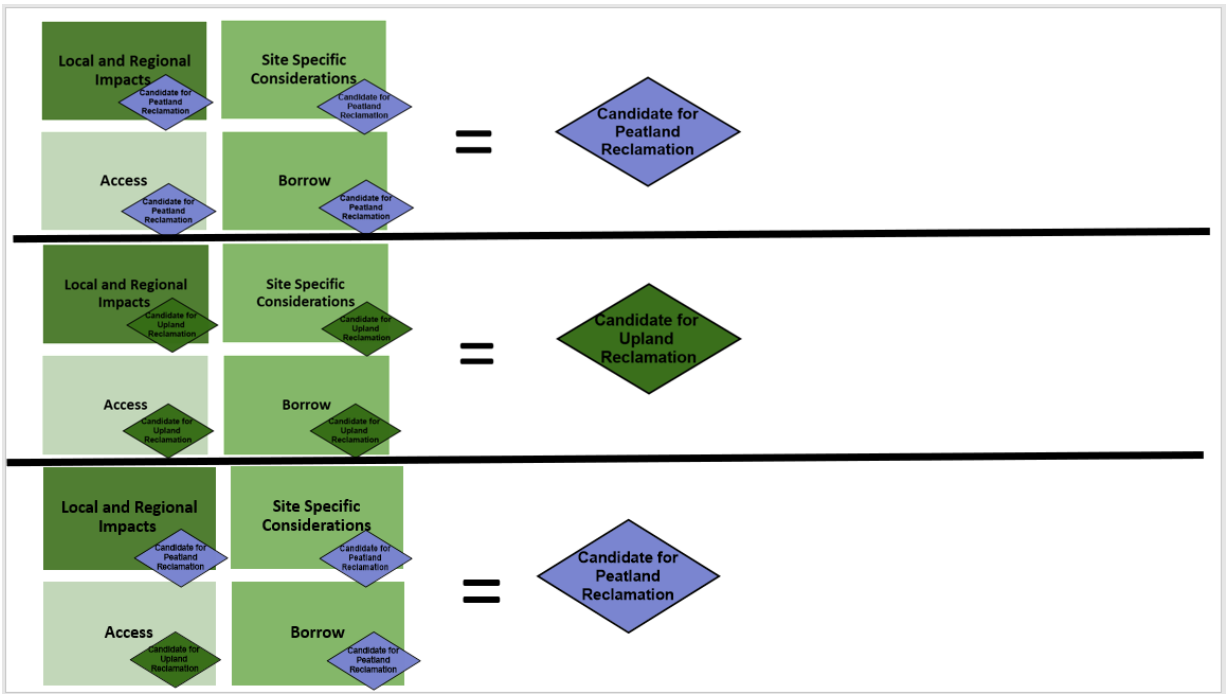
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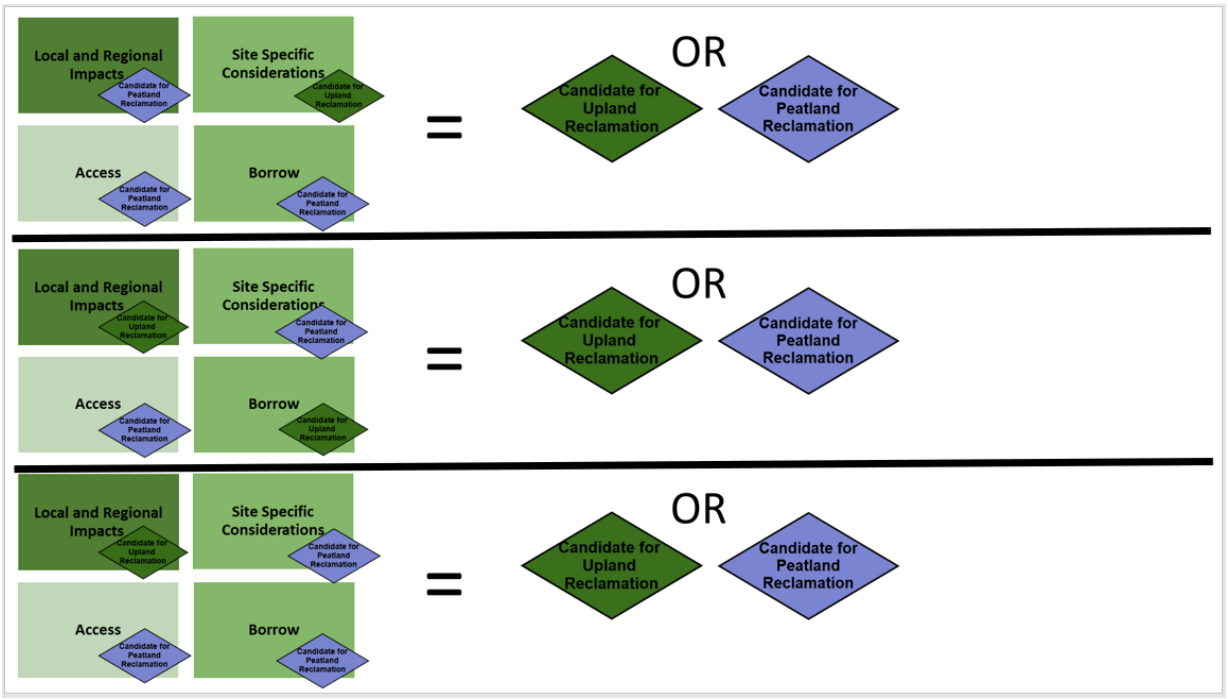
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