

Title:	Requirements for Conservation and Reclamation Plans for Peat Operations In Alberta
Number:	AEP, Land & Policy, 2016, No. 7.
Program Name:	Lands Policy Branch
Effective Date:	For all renewals and new sites on Private Land this document is effective May 25, 2016. On Public Land, this document is effective upon acceptance of new applications for Peat Operations in Alberta.
This document was updated on:	
ISBN No. 978-1-4601-2930-2 (PDF)	
Disclaimer:	

Original signed by: Kem Singh, P. Eng.
 Executive Director, Land Policy Branch
 Environment and Parks

Date: May 25, 2016

Acknowledgments

The Reclamation Requirements Working Group was initiated January 2015 and included the following contributors:

Augustyn, John (AEP Reclamation Approvals – Upper Athabasca)
Bello, Thelma (AEP Reclamation Approvals, Lower Athabasca)
Boudreau , Stéphanie (Canadian Sphagnum Peat Moss Association)
Brisson, Alexandre (Berger)
Caron, Frédéric (Premier Tech)
Landry, Jen (Sun Gro Horticulture)
Plitt ,Craig (AEP Lands Approval Lead, Upper Athabasca)
McGillivray, Susan (AEP – Reclamation Policy Specialist)
Sargeant, Tammy (AEP Reclamation Approvals, Peace)
Yowney, Bob (AEP Land Management, Lower Athabasca)

Information and copies may be obtained from: <http://aep.alberta.ca>

This document may be cited as:

Alberta Environment and Parks, 2016. Requirements for Conservation and Reclamation Plans for Peat Operations. May 25, 2016, Edmonton, Alberta PP 17.

Preface

The intent of this document is to provide the requirements for Conservation and Reclamation Plan (C&R Plan) submissions on private and public land for peat operations in Alberta.

This guide is presented as a first approximation, recognizing that revisions will be required as our knowledge of peatland communities and methods of reclaiming peat operations in Alberta is expanded. Revisions will also be required as reclamation practitioners and industry respond to the challenges of peatland reclamation with new technology designed to reduce impacts in peatland communities.

One of the goals of the *Alberta Wetland Policy* is to conserve, restore, protect, and manage Alberta's wetlands to sustain the benefits they provide to the environment, society, and economy. Peatlands are a very large part of Alberta's wetlands, comprising approximately 90% of the wetlands in Alberta¹. Peatlands, like other wetlands, serve important functions on the landscape: namely, (1) water storage; (2) a filter for surface water as it moves into ground water; (3) a habitat for wildlife² and, (4) a carbon sink³.

While this guide is focused towards reclaiming disturbed peatlands, it recognizes that other land use types may be disturbed and the importance of reclaiming the entire disturbance resulting from the peat operation. It is also critical to understand how lands that are reclaimed to other land uses, other than wetlands, trigger the requirements of the Alberta Wetland Policy.

When this document was drafted, the *Peatland Restoration Guide – Second Edition*⁴ was foundational to requirements for peatland reclamation planning. While these restoration techniques are relatively new to Alberta and variations accounting for climatic, hydrological or vegetation community differences may be required, the current version of the *Peatland Restoration Guide* should be utilized as the primary guide for reclamation planning to peatlands. Other resources such as species lists by peatland type and a detailed primer on western Canadian Peatlands, can be found with the *Reclamation Criteria for Wellsites and Associated Facilities for Peatlands*.

¹ Environment Sustainable Resource Development, 2013. Alberta Wetland Policy. Edmonton, Alberta, www.aep.alberta.ca. pp. 26

² Mitsch, W. J. and J. G. Gosselink. 2000. Wetlands, 3rd. ed. John Wiley & Sons, New York.

³ Yu, Z., I. D. Campbell, D. H. Vitt, and M. J. Apps. 2001. Modelling long-term peatland dynamics. I. Concepts, review, and proposed design. *Ecological Modelling* 145: 197–210.

⁴ Quinty, F. and L. Rochefort, 2003. Peatland Restoration Guide, second edition. Canadian Sphagnum Peat Moss Association and New Brunswick Department of Natural Resources and Energy. Québec, Québec.

Table of Contents

- 1 How to use this document 5
- 2 Regulatory Requirement for the Conservation and Reclamation Plans 5
- 3 Land Use Planning and Reclamation Outcomes..... 5
 - 3.1 Approval of Reclamation Outcomes and Land Use Plan 6
 - 3.2 Land is returned to its pre-disturbance condition 6
 - 3.3 Change in End Land Use 7
 - 3.4 Alternate End Land Use 7
- Figure 1. Reclamation Outcomes 8
- 4 Planning for Reclamation..... 8
- 5 Progressive Reclamation..... 10
- 6 Conservation and Reclamation Plan..... 11
 - 6.1 Executive Summary 11
 - 6.2 Background and Site Conditions 11
 - 6.2.1 Site Overview 11
 - 6.2.2 Pre-disturbance Site Characteristics (Biophysical Report) 11
 - 6.2.3 Post-Disturbance Site Characteristics 12
 - 6.3 Soil Salvage and Coarse Woody Debris..... 12
 - 6.3.1 Soil Salvage Plan (Topsoil, Subsoil, Stockpiles) 12
 - 6.3.2 Coarse Woody Material Handling 12
 - 6.4 Progressive Reclamation and/or Final Reclamation Scheduling..... 13
 - 6.5 Decommissioning and Remediation 13
 - 6.6 Reclamation and End Land Use Plan..... 14
 - 6.6.1 Reclamation Topography..... 14
 - 6.6.2 Reclamation Material Placement 14
 - 6.6.3 Revegetation Plan 15
 - 6.7 Monitoring 16
- 7 Final Reclamation Maps and Drawings..... 17

1 How to use this document

This document provides the base requirements for peat operations Conservation and Reclamation Plans (C&R Plan) on private and public land. The C&R Plan must cover all components (e.g. peat removal area, drainage ditches, maintenance yards, ponds, donor sites) and associated dispositions related to the peat operation (e.g. roads, borrow pits, maintenance yards, research sites). Associated activities like connecting access roads (roads outside of the surface material lease boundary) will also fall under the public lands Environmental Field Report requirements⁵. Historically on public lands, the C&R Plans were received as part of the surface materials lease application, but now is a separate report. Renewals or other updates to the C&R Plan on peat operations approved after January 1, 2014 must follow the requirements in this document. C&R Plan renewals on sites approved prior to this date should follow the requirements, recognizing that content may differ as a result of the historical biophysical data collection, construction and reclamation practices.

Prior to making the approval decision, AEP or other applicable jurisdictions may require additional relevant information to be provided during the C&R Plan review that is not outlined in this document. This is typically done through supplementation information requests to the operator.

Note: It is strongly recommended that the C&R plan be developed in close consultation with the operator's construction and reclamation personnel and must comply with all applicable approval conditions.

2 Regulatory Requirement for the Conservation and Reclamation Plans

This document is pursuant to the *Environmental Protection and Enhancement Act* (EPEA) Section 137(1) Duty to Reclaim, and the *Conservation and Reclamation Regulation* (C&R Regulation) Section 3 Standards, Criteria and Guidelines. It provides the regulatory requirements for the submission of a C&R Plan. In addition, on public lands all standards and conditions placed on an activity through the Public Lands Act and the formal disposition, approval or authorization must be followed.

3 Land Use Planning and Reclamation Outcomes

To meet the intent of **equivalent land capability**, legislated through the *Conservation and Reclamation Regulation*, the land or site must be returned to a use similar to what existed prior to disturbance, or to uses that are compatible with adjacent properties, or to an alternate use (s). End land uses are site specific and will depend primarily on pre-disturbance conditions. The types of land use possible on a site are limited by a combination of biological, geological and climactic factors that are present on and adjacent to the site. The choice of an end land use will depend on regional landscape limitation(s) and final site characteristics such as, pH, moisture regime, depth of peat removal, and surrounding land use.

Direction on land use planning and reclamation outcomes is outlined in the below hierarchy and depicted in Figure 1. For larger or more complex sites, requests to combine multiple reclamation

⁵ ESRD 2008. Instructions for Submission Of Environmental Field Reports (EFR) With Surface Disposition Applications Under The *Public Lands Act*. Revised May 2008. Pp67. <http://aep.alberta.ca/forms-maps-services/forms/lands-forms/guides-forms-completion/documents/EnvironmentalFieldReports-Instructions-SurfaceDispositions-May2008.pdf>

outcomes may be considered, through consultation with AEP approval staff and on private land, the landowner.

3.1 Approval of Reclamation Outcomes and Land Use Plan

The selection of an end land use should consider adjacent land uses and the needs of the community and landowner or land manager.

The end land use must be discussed and approved with AEP on public land, and with the municipality on private land. For private land, this includes discussions with the landowner prior to submitting a C&R Plan. When proposing an end land use, it is vital to identify soil, landscape and vegetation characteristics that will be developed through reclamation that are consistent with the identified end land use. AEP staff will play a key role under *EPEA* in determining whether reclamation planning will be effective to attain the desired end land use, regardless of which agency is the lead. Land use decisions will be made specific to a region and reflect local, regional and municipal planning for the area.

Note: The C&R Plan captures the reclamation outcomes and end land use commitments. For the purpose of the *Alberta Wetland Policy* as outlined in the *Alberta Wetland Mitigation Directive*⁶, the explicit intent to reclaim the wetland area disturbed back to a wetland, is captured in the C&R Plan's, Reclamation Plan and End Land Use section. Change in end land use from a wetland to land use other than a wetland, would be subject to the wetland replacement requirements of the *Alberta Wetland Policy*. These requirements would need to be met prior to approval of the C&R Plan.

3.2 Land is returned to its pre-disturbance condition

The preferred outcome in this hierarchy is to return land to its pre-disturbance condition, including replacement of salvaged mineral soils, presence of pre-disturbance moisture regimes and establishment of the pre-disturbance vegetation community (eco-site phase or wetland type). The pre-disturbance community will typically be early successional. To ensure that the site is on an appropriate successional trajectory, a key indicator is the presence of similar structural layers as the pre-disturbance community. For example, if woody species (trees and shrubs) were present pre-disturbance, at the time of certification the structural layer would be present on the reclaimed area.

This document is a provincial document and applies to all pre-disturbance land uses. The large land use types used in Alberta are defined below. Within each land use type, the specific eco-site phase (forested) or Alberta Wetland Classification⁷ (mineral or organic wetlands) must be referred to, when establishing the pre-disturbance vegetation community.

Wetlands are land saturated with water long enough to promote formation of water altered soils, growth of water tolerant vegetation, and various kinds of biological activity that are adapted to the wet environment. Alberta's wetlands include both peat forming wetlands (bogs and fens) and non-peat forming or mineral wetlands (marshes, swamps, and shallow open water wetlands) as outlined in the Alberta Wetland Classification System.

Forested Lands includes any treed land, with less than 40 cm of organic matter accumulation, whether or not the forest vegetation is utilized for commercial purposes. Treed (bush) lands in the

⁶ Alberta Environment and Parks. 2015. Alberta Wetland Mitigation Directive. Water Policy Branch, Policy Division. Edmonton. 11pp.

⁷ Alberta Environment & Sustainable Resource Development (ESRD). 2014. Alberta Wetland Classification System. Water Policy Branch, Policy Division. Edmonton. 38 pp.

White Area (deedable land) that is to be maintained as 'treed' are included in this definition. Land in the White Area where a land use has been changed to cultivation, falls under the cultivation definition. In the Green Area (crown land), native meadows or range improvement areas in grazing dispositions are categorized into grasslands or cultivated land use.

Cultivated Lands include lands managed under conventional, minimum or zero till practices for agricultural purposes. Land use changed from peatland, forested land or grassland to cultivated land is included here. The cultivated land use category also apply to trees planted for agroforestry (i.e., tree farms), tame forages, tame pasture, hay lands or areas seeded to perennial agronomic species.

3.3 Change in End Land Use

Site characteristics, historical practices, and/ or subsequent land uses may result in requests for a change in end land use. This change is referring to cultivated, forested, and wetland types. If a large community change is proposed (shift from a sphagnum dominated wetland to a mineral wetland or moderately or extremely rich fen) this would also require a change in land use. A request for a change in end land use should reflect an ecological community found in the natural subregion of the site. For example, if a peatland was approved to be reclaimed to an upland, the preferred upland eco-site phase would be present within the natural subregion for the area.

<p>Note: Bogs being reclaimed to the pre-disturbance community must have a plan to ensure final site conditions are conducive to sphagnum growth. However, due to the similarities in site characteristics, a shift from a bog to a poor fen does not require a change in land use.</p>
--

3.4 Alternate End Land Use

An alternate end land use may be requested that does not reflect the offsite community or a native community found in the natural subregion of the disturbance, for example municipal infrastructure, recreational areas, or subsequent industrial uses. Some innovative designs could also be incorporated into the site conditions, adding diversity to the landscape, and still complementing adjacent end land use.

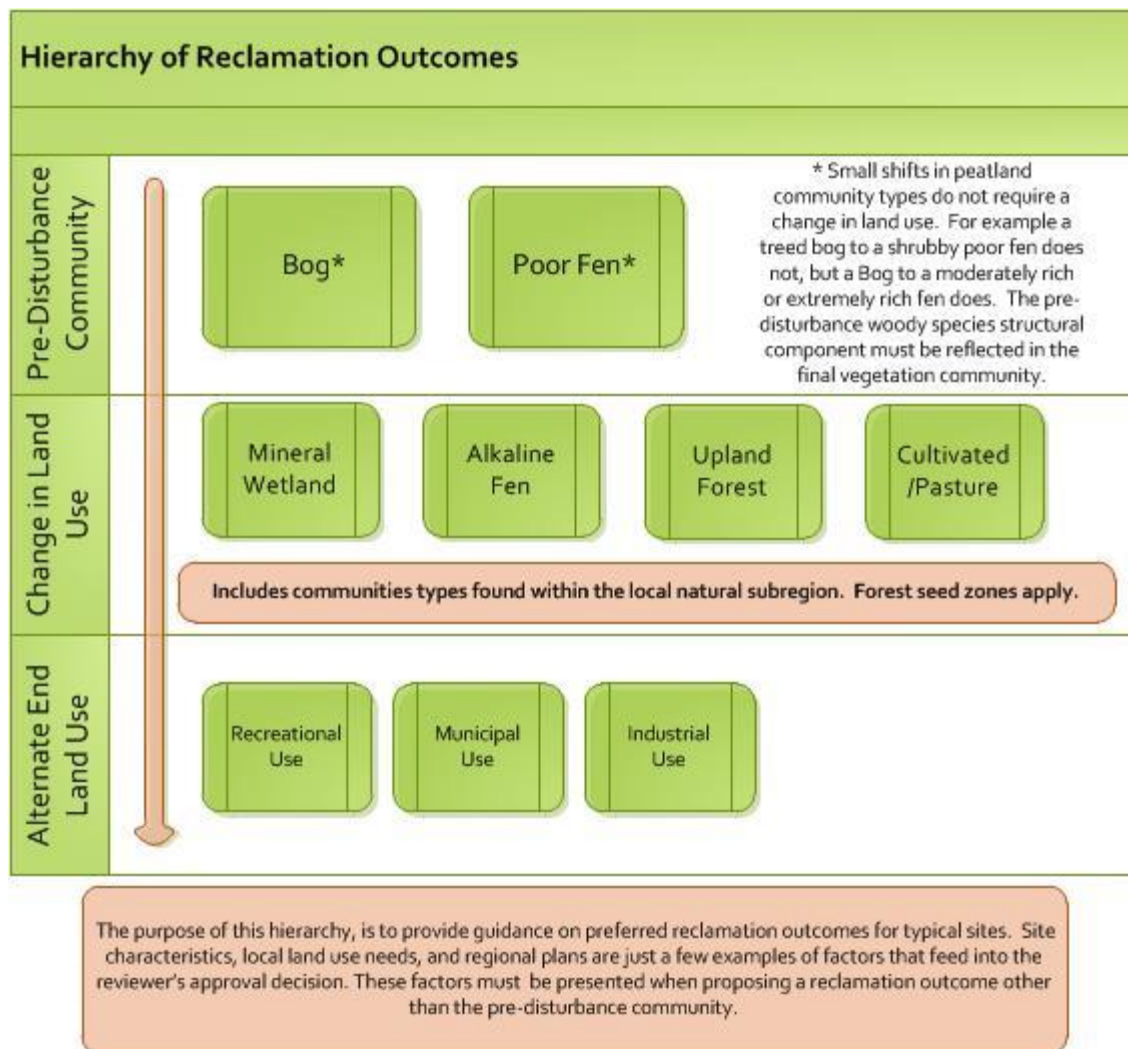


Figure 1. Reclamation Outcomes

4 Planning for Reclamation

The reclamation outcome of meeting equivalent land capability, typically involves establishing pre-disturbance conditions such as those related to hydrology, topography, soils, and a vegetation community of peat accumulating species. The landscape should be designed for the entire peat operation footprint, rather than at the scale of progressive reclamation areas. Based on the site conditions, operators should design appropriate ecosystem types. Typically, they will be peatlands, but there may be other acceptable locally common ecosystems depending on soil conditions, hydrology, topography and anthropogenic changes.

Peatland reclamation plans and designs should attempt to address each of the thresholds and site characteristics along a given pathway to a particular peatland type (e.g. pH, moisture regime, nutrient regime). Some peatland types have fewer thresholds than others, thus those with fewer thresholds often require less steps in reclamation. When reclaiming to the pre-disturbance community, the goal of the peat operations should be to limit the number of thresholds that are altered by the removal of the peat, so key site characteristics will be present at the time of reclamation. For example, an operation in a bog where the approved reclamation outcome is the

pre-disturbance community, peat removal must be limited to the depth where the pH is still conducive to sphagnum establishment. The Peatland Restoration Guideline recommends a pH of 5.1 for bog restoration outcomes⁸. Identification of those thresholds that have changed allows for more efficient and successful restoration planning. Examples of wetland thresholds can be found in Figure 4 “A Classification of Western Canadian Peatlands” in the *Reclamation Criteria for Wellsites and Associated facilities for Peatlands*⁹.

When planning for reclamation, final indicators of reclamation success is a key element. The final indicators at the time of certification include elements of, but are not limited to, topography, hydrology, replacement depths of mineral soils and with a large focus on the vegetation community components. For peatland reclamation, vegetation components would focus on communities of peat accumulating species dominating the site, presence of multiple structural layers and monitoring to show sustained and resilient growth. For vegetation components for upland communities, establishment of the pre-disturbance eco-site phase or another locally common eco-site phase, as well as the presence of similar structural layers and monitoring as stated above. Planning for final reclamation has been covered here, recognizing that progressive reclamation overlaps but also has unique considerations.

⁸ Quinty, F. and L. Rochefort, 2003. Peatland Restoration Guide, second edition. Canadian Sphagnum Peat Moss Association and New Brunswick Department of Natural Resources and Energy. Québec, Québec.

⁹ Environment and Parks. 2015. Reclamation Criteria for Wellsites and Associated Facilities for Peatlands, October, 2015, Edmonton, Alberta PP 142.

5 Progressive Reclamation

Progressive reclamation is defined in the Alberta Reclamation Glossary as “Any interim or concurrent reclamation of land undertaken during, following or in connection with construction/development and ongoing operations associated with an active disposition”¹⁰. Progressive reclamation of the disturbance requires careful considerations through the planning, construction, operational and closure phases. If progressive reclamation has been applied successfully throughout the life of the operation, then depending on the size and type of operation, final vegetation communities will be in the process of establishing at the end of operations. Important natural processes, such as the re-establishment of pre-disturbance surface and subsurface hydrology, will begin to function within the reclaimed areas. Progressive reclamation should result in lands being reclaimed sooner, lowering the liability to the operator and on public lands to the crown. Additionally, well planned progressive reclamation can result in decreased overall reclamation costs.

A plan for progressive reclamation is a requirement of the C&R Plan for all operations larger than 250 ha. Plans without progressive reclamation schedules and timelines will require technical justifications that are approved through the C&R Plan submission. Acceptable justifications would clearly provide how the temporal loss of the wetland is being decreased through accelerated operations, timely reclamation and consistent reclamation reporting. An alternate plan may be required for progressive reclamation if operations are not conducted at the planned rate. Updates to the C&R Plan must include the current status of the progressive reclamation schedule. For sites smaller than 250 ha, where progressive reclamation is not proposed, adherence to timelines such as ready for reclamation, reclamation initiation, reclaimed status, and estimated reclamation certification dates are required.

Terminology for reporting development, operations and reclamation milestones include:

- **Non Entry:** Areas where no site preparation has occurred. For the peat removal area, this would include any alteration of drainage or removal of vegetation, outside of what is required to survey the land.
- **Disturbed:** Area that has been drained or cleared, where the soil (organic or mineral) has been disturbed.
- **Cleared:** Areas where vegetation has been removed for the purposes of preparing the land for drainage, soil removal, peat removal etc. but where soil (organic or mineral) has been left mostly intact and relatively undisturbed.
- **Active Peat Removal:** Area where the peat is currently being removed from the bog.
- **Ready for Reclamation:** Areas that are no longer required for peat removal or are available for reclamation but where reclamation activities have not yet begun.
- **Reclamation Initiation:** Area where drainage and landscape contour have been returned to pre-disturbance conditions or approved end land use, reclamation materials have been replaced and plant re-introduction has been completed, if needed.
- **Reclaimed Status:** Land is considered at a reclaimed status when landform construction, contouring, reclamation material placement, preparation of the seedbed, revegetation and a minimum 3 growing seasons has occurred. Land cannot be listed under reclaimed status until revegetation has occurred which is reflective of the approved plant community as outlined in the C&R Plan. Within the area where the site was prepared and revegetated

¹⁰ Powter, C.B. (Compiler), 2002. Glossary of Reclamation and Remediation Terms Used in Alberta – 7th Edition, Alberta Environment, Science and Standards Branch, Edmonton, Alberta. Pub. No. T/655; Report No. SSB/LM/02-1. 88 pp. ISBN 0-7785-2153-2 (Printed Edition) or ISBN: 0-7785-2156-7 (Online Edition).

the target community must dominate (>50%). These areas are not counted in the Total Active Footprint.

- **Certified:** Areas that are "certified" have received a reclamation certificate under the EPEA. These areas are not counted in the Total Active Footprint because they are no longer active; they are returned to the Crown.
- **Total Active Footprint:** Hectares of land not at reclaimed status or certified for operations approved after January 1st, 2014.
- **Historical Active Footprint:** Operations approved prior to January 1, 2014, not at reclaimed status or certified.
- **Age of Reclamation:** The age of reclamation is calculated based on the year reclamation was initiated as defined above.

6 Conservation and Reclamation Plan

The following sections provide direction on the specific content requirements of a C&R Plan. The C&R plan is a site-specific plan and should be based on current knowledge and best practices for achieving successful reclamation. This plan must use the site-specific information collected during the biophysical assessment to develop the conservation and reclamation content.

6.1 Executive Summary

An executive summary highlights the key considerations of the background and site conditions, pre-disturbance land uses, adjacent land uses, construction, operations, progressive reclamation and final reclamation phases for the proposed land disturbance. As well, this summary should highlight specific environmental issues and considerations associated with the development together with any specific mitigation techniques or variances. Lastly any Change in Land Use or Alternate End Land Use Approvals received previously from AEP, a landowner, or a municipality must be summarized.

6.2 Background and Site Conditions

6.2.1 Site Overview

This section provides an overview of the project with respect to disturbance characteristics such as size of disturbance, associated infrastructure, and general timing of construction, operational, progressive reclamation and final reclamation communities. This section must include all of the following information:

- disposition application or water act approval status if applicable,
- site legal land description. On public land include the formal disposition number and the EPEA Water Act approval number if received (private and public lands),
- surrounding area land use and landscape units (bog, fen, upland eco-site, agricultural etc.),
- size (disposition boundary, disturbance area and associated facilities), and
- infrastructure and roads (i.e. settling ponds, ditches, outlet).

6.2.2 Pre-disturbance Site Characteristics (Biophysical Report)

This section must contain a summary of the conditions found at the site prior to disturbance. This information creates the foundation of the reclamation outcomes required in the C&R Plan.

The *Guide to Surface Material Leases Information Requirements for Peat Bog Developments* outlines the full requirements in the biophysical report section. The document can be referenced but key figures, as outlined in Section 7 must be included in this report. For C&R Plans on private land, the biophysical report must be included with the C&R Plan. The public land's biophysical

report requirements must be used on private lands unless alternate requirements were previously approved by the AEP reclamation approvals reviewer.

6.2.3 Post-Disturbance Site Characteristics

For C&R Plan updates, the current post-disturbance site characteristics must be outlined. Where deviations from the proposed occurred, these are documented here. Where the post-disturbance characteristics section is applicable as stated above, it must include:

site diagram figure (showing peat removal locations, infrastructure, settling ponds, roads, etc.), and

original cross-section figures and an update depicting remaining peat depths (depth between surface and mineral), corresponding von Post scale, depth of the water table prior to rewetting and elevation of extracted area.

6.3 Soil Salvage and Coarse Woody Debris

6.3.1 Soil Salvage Plan (Topsoil, Subsoil, Stockpiles)

A critical part of the C&R Plan is the site specific soil salvage plan. For peat operators this would be most applicable for disturbances to mineral soil (e.g. maintenance yards, borrow pits, drainage ponds, access). The soil salvage plan addresses the salvage of both topsoil and subsoil and must be based on the pre-disturbance baseline soil information gathered during the biophysical assessment. The soil salvage plan must also include estimated soil salvage volumes that are calculated based on recorded soil depths across the site as well as proposed stockpile storage locations. The soil salvage plan must include the following:

- topsoil salvage depths and range of variability (minimum and maximum);
- detailed volume estimates of salvageable topsoil;
- topsoil storage location (s) (illustrated on a map or air photo);
- subsoil salvage depths (where required);
- detailed volume estimates of salvageable subsoil;
- subsoil storage location (illustrated on a map or air photo);
- soil conditions that may require special consideration or handling techniques as well as a proposed mitigation approach;
- proposed mitigation measures or special soil handling procedures that pertain to any weed issues identified in the proposed disturbance area;
- a description of the soils in any previously disturbed areas and a description of how soil salvage in these areas will be addressed; and
- a description of the potential for loss of topsoil and subsoil by wind or water erosion and a description of mitigative measures, including a description of any stockpile stabilization requirements.

Note: For previously disturbed sites with insufficient topsoil materials, or sites where topsoil and/or subsoil has been previously disturbed or improperly salvaged, the soil salvage plan must describe the nature of the existing disturbance and whether soils have been completely salvaged from the area. This is to ensure adequate and complete salvage of soil materials.

6.3.2 Coarse Woody Material Handling

The need to conserve non merchantable coarse woody debris (e.g. whole logs, tree-tops and stumps) for reclamation purposes is important to assist in meeting **forested land use** reclamation outcomes. The use of coarse woody debris in reclamation has important ecological benefits in forested ecosystems. The purpose of this section is to discuss how coarse woody debris will be obtained or stored for final reclamation of forested lands. For example, nearby donor sites may be appropriate for obtaining coarse woody debris at the time of any forested reclamation. For

storage, the management of fire fuel loading is a primary consideration. Acceptable storage of coarse woody debris longer than 12 months, would include salvaging and storing with the surface mineral soil or storing flat to the ground as rollback on non-operational areas. When progressive, interim and/or final reclamation is occurring, rollback of coarse woody material is encouraged. The current version of the *Integrated Standards and Guidelines*¹¹ document provides the definition and acceptable amounts of rollback on public land.

For sites with excess coarse woody debris where mulching is completed, the *Management of Wood Chips on Public Land* directive SD 2009-01 must be followed.

Where storage and/or rollback is occurring, the site-specific plans for handling non-merchantable timber and coarse woody material must be provided, and these include:

- approximate volume of woody material; and
- how the material will be cleared and stored or spread as rollback.

6.4 Progressive Reclamation and/or Final Reclamation Scheduling

The Development and Operations Plan describes how the proposed peat harvesting activity will be designed and conducted over the life of the operation, as well as how any planning, environmental, and operational issues will be addressed. However, the milestones and timelines of the peat operation are captured in the C&R Plan and must be provided in all C&R Plan updates.

For progressive reclamation, a figure must be supplied that shows the footprint of disturbed lands, presenting each proposed reclamation area and associated timelines listed below. For smaller operations, similar plan and timelines are required without the sequential phasing of reclamation areas.

Timelines may be provided as date ranges, but must provide clear commitment to reclaim in a responsible manner. These timelines are commitments and a condition of the operator's approval.

- Development Area or Bog Area (hectares)
- Reclaimed community type
- Timelines for:
 - disturbed (cleared and drained);
 - active peat removal;
 - ready for reclamation;
 - reclamation initiated;
 - reclaimed status projected; and
 - ready for reclamation certification projected.

Environmental factors may occur that result in adaptive management and adjustment of timelines. The reporting of these timelines after reclamation is initiated is the mechanism to report minor changes due to operational and environmental factors.

6.5 Decommissioning and Remediation

In this section, provide a summary of any decommissioning activities at closure. As well, if there are sources of potential contamination present as a result of operations, (e.g. fuel tanks), provide the spill prevention mitigation for these items (e.g. secondary containment, spill response kits).

¹¹ Environment and Sustainable Resource Development, 2013. *Integrated Standards and Guidelines Enhanced Approval Process*. Government of Alberta and Alberta Energy Regulator, Edmonton. Pp. 84.

6.6 Reclamation and End Land Use Plan

This section is a detailed description of proposed reclamation activities, highlighting a site specific overview of the reclamation plan for each disturbance area, including the peat removal area and all associated disturbances (e.g. roads, borrow pits, maintenance yards, research sites, donor sites).

It also provides site specific information with respect to reconstructed landforms, soil conditions, vegetation communities, and revegetation techniques.

The reclamation and end use plan must provide the following information:

- a description of the reclamation outcome and proposed end land use(s), and
- an illustration of the reclaimed site upon removal of the peat resource.

A description of the intended reclamation program must include reclamation topography, reclamation material replacement plan and revegetation, along with the drawings included in section 7.

6.6.1 Reclamation Topography

The development of the post-reclamation topography is important to the success of the reclaimed development. Information regarding the reclaimed topography must include:

- the identification of any topographic conditions that may require special consideration, as well as a proposed mitigation approach;
- post-reclamation goals for topography and how it will integrate with adjacent land use;
- cross-sectional diagrams indicating expected post-reclamation topography as outlined in Section 7;
- post-reclamation goals regarding drainage, including a discussion about wetland construction (if applicable); and
- a plan outlining the re-establishment of local drainage patterns, the methods to re-establish and control drainage.

6.6.2 Reclamation Material Placement

A conventional detailed reclamation material placement plan is required for any disturbance on mineral soil.

This plan must include:

- detailed descriptions of the suitability of reclamation material (if subsoil is brought to surface) and material placement strategies for topsoil, subsoil (as required) and coarse woody debris (lands reclaimed to forests);
- replacement depths of all mineral soil disturbances and a reclamation material balance discussion (i.e. the estimated volumes of soil material required to achieve the reclamation objective balanced against the estimated volumes of the material salvaged and stored);
- soil conditions that may require special consideration or handling techniques, as well as a proposed mitigation approach (e.g. steep slopes, sandy soils); and
- details on any topsoil additions (e.g. texture, detailed salinity, weed analysis, volume) and/or amendments (e.g. rates). On public lands, if this is not documented in the approved C&R Plan, it must be approved by a public lands officer prior to application.

For disturbed or removed organic soil (peatlands), the focus of the reclamation material section includes:

- surface preparation methodology (e.g. re-profiling, filling ditches, berms, straw application, fertilization); and

- discussions on the final depths of the peat removal area, as it relates to von Post scale, pH, electrical conductivity, and final peatland type.

6.6.3 Revegetation Plan

The discussion of post reclamation vegetation must be consistent with the end land use proposed for the site. Revegetation strategies are specific to the land use type. Examples of guidance documents that may be referenced include *Peatland Restoration Guide*, *Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region* and “*General Design Guidelines for a Constructed ‘Habitat’ Wetland – Boreal Forest Natural Region of Alberta*”.

At a minimum the revegetation plan must include:

- identification of the revegetation target community (for peatlands and mineral wetlands the Alberta Wetland Classification, for forested sites the eco-site phases and for cultivated end land use, agronomic community is require, including corresponding hectares of sites for each land use);
- methodology and rates for collecting and spreading of donor material (depth of collection, seeding or stocking rates and methods);
- fertilization rates, methods and rationale/reference (e.g. *Peatland Restoration Guide*);
- estimated time to establish vegetation;
- location of the donor site and its description according to the Alberta Wetland Classification. A discussion on the suitability of the donor material as it relates to the targeted vegetation community. For forested reclamation, adherence to the *Alberta Forest Genetic Resource Management and Conservation Standards* for all tree/shrub stock; and
- plan for weed control plan of the reclaimed site.

Note: The revegetation plan must incorporate any specific requirements identified prior to the activity commencing by the local Authority (e.g., Municipality, public land approvals) and/or an agreement, or land use plan. To meet the intent of the Alberta Wetland Policy, the area (ha) of wetland not being reclaimed to wetland must be clearly documented.

6.7 Monitoring

Monitoring programs are necessary to determine if reclamation is on the trajectory to the intended land use type and/or vegetation community. The purpose of reclamation monitoring is to prevent alternate trajectories and/or costly remedial reclamation work. Key monitoring categories include landscape, hydrology, soil, and vegetation. Timelines for monitoring should be reflective of the stage of reclamation. Recognizing at earlier stages of reclamation will require a higher frequency of monitoring. The following must be included in your reclamation plan:

Monitoring protocol, frequency and timelines for:

- landscape and drainage assessment (e.g. erosion control, presence of debris, drainage patterns, slope stability and contour);
- hydrology and water levels (e.g. monitoring water levels at a frequency that allows for adaptive management of the site or surface water pH for areas where vegetation is not establishing);
- mineral soil assessment (e.g. one time assessment to verify soil replacement depths and compaction/rooting restrictions as required); and
- vegetation assessment of all disturbed areas, including donor sites (e.g. dominant species, percent canopy cover, structural layers, health, bare soil, presence of invasive species and/or weeds).

The monitoring section must also include a discussion on how corrective measures will be identified and implemented and how this data will be used in adaptive management for future reclaimed areas. The *Peatland Restoration Guide* provides examples of corrective measures for many stages of peatland reclamation.

Adaptive management examines the causes, conditions, and other ecological factors that may be affecting the progress of a treated area to meet the targets and objectives. Adaptive management may be required if there is uncertainty as to whether the treatment area is on a trajectory to meet the measurable targets. Monitoring data is analyzed after each year of monitoring; if any uncertainty exists as to the progress of the treatments, remedial actions may be implemented after discussions with regulators. Actions may include modification of drainage patterns, manual vegetation control (for invasive or non-native species), additional revegetation strategies, and access control actions or procedures.

7 Final Reclamation Maps and Drawings

The minimum maps and drawings required as part of the C&R Plan are listed below. Only key figures will be required in both the C&R Plan and the *Guide to Surface Materials Lease Information Requirements for Peat Bog Developments* as indicated by an asterix. All figures must be drawn to scale, with clear notation of north, title, and corresponding legends.

1. Cross-sections:
 - a) Provide a sufficient number of cross-sections of the peatland profile to adequately show topographic, peat profile by von Post Scale, corresponding pH and mineral surface variations along the long axis and short axis of each deposit. On the cross-sections, also include soil profile variations and identify peat horizons to be removed.*
 - b) Figure showing the location of cross-sectional lines, e.g., A-A¹, B-B¹.

2. An operational site map, including:
 - All operational areas (e.g. peat removal areas and ditch locations).
 - Topsoil/subsoil (as required) stockpile locations.
 - Infrastructure (buildings, fences, ponds access roads, monitoring research sites).
 - Area designated for donor material (including their pre-disturbance vegetation community classification). This may be placed on a separate figure, if the designated donor material is not onsite.

3. Reclamation closure drawings:
 - a) Reclaimed final organic soil depth, von Post Scale, surface pH or mineral topsoil depth targets per soil map unit, target vegetation community, and post-reclamation topographic condition.
 - b) Proposed disturbed areas after they have been reclaimed showing the surface landscape features of the reclaimed area drawn to scale. The original land surface can be added to show clearly the difference between original and reclaimed ground levels. The bank location of any created waterbodies (separate plan if necessary) and the direction of drainage on the reclaimed land.
 - c) The development, operational and reclamation sequence and anticipated timing (in reference to development, operations and reclamation milestones outlined in Section 6.4).