

# **Direction for Conservation and Reclamation Submissions**

**Under an *Environmental Protection  
and Enhancement Act* Approval for  
Mineable Oil Sands Sites**

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Direction for Conservation and Reclamation Submissions

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Suite 1000, 250 – 5 Street SW

Calgary, Alberta

T2P 0R4

Telephone: 403-297-8311

Toll free: 1-855-297-8311

E-mail: [inquiries@aer.ca](mailto:inquiries@aer.ca)

Website: [www.aer.ca](http://www.aer.ca)

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# 1 Introduction

## 1.1 Purpose of this Direction

This specified enactment direction (SED) outlines the criteria for the collection, content, reporting, and submission of conservation and reclamation information to the Alberta Energy Regulator (AER) to fulfill the regulatory requirements of *Environmental Protection and Enhancement Act (EPEA)* approval terms and conditions for mineable oil sands sites.

This consolidation and alignment of requirements results in clarification of information submissions, more consistency, and less duplication with enhanced regulatory oversight.

The numbered requirements outlined in this SED must be fulfilled by the approval holder unless otherwise authorized by the AER in order to demonstrate compliance with *EPEA* approval terms and conditions.

Approval holders are encouraged to ask the AER any questions they might have about this SED.

## 1.2 Overview

Due to the longevity of a mineable oil sands development, conservation and reclamation planning is to be undertaken throughout the life of the project. This is especially important during site-specific planning where on-site activities can be adapted and updated based on site development and reclamation technologies.

This SED is structured as three submissions for conservation and reclamation requirements:

- Life of mine closure plan (LMCP)
- Mine reclamation plan (MRP)
- Annual reclamation progress tracking report (ARPTR)

The separation of what conservation and reclamation information is collected, when information is provided, and how information is to be reported is meant to help the AER develop and manage regulatory processes that are effective and efficient for all stakeholders while ensuring that energy development occurs in an environmentally responsible manner. The conservation and reclamation regulatory submissions are compared in appendix 3.

Each required submission addresses specific milestones throughout the life of a project, including the eight milestones referenced in the *Lower Athabasca Regional Plan* progressive reclamation strategy section with improved milestones for mineable oil sands: cleared, disturbed, ready for reclamation, soils placed, permanent reclamation (terrestrial, and wetlands and aquatic), temporary reclamation, and reclamation certified.

## 1.3 Regulatory Overview

### 1.3.1 Requirements

*EPEA* is one of the regulatory instruments that supports and promotes the protection, enhancement, and wise use of the environment. The *Public Lands Act* also promotes environmental conservation through the condition requirements in mineral surface leases (MSLs) and other dispositions. A critical component of *EPEA* is the requirement to integrate environmental protection and economic decisions at the earliest stages of planning.

Section 137 of *EPEA* outlines an operator's requirement to conserve, to reclaim, and to obtain a reclamation certificate for specified land. The approval holder is to ensure that activities that will be undertaken during the various phases of construction, operation, and reclamation are appropriate for ensuring that the disturbed areas will be reclaimed to an equivalent land capability as defined in the *Conservation & Reclamation Regulation (CRR)* and the *Public Lands Administration Regulation*. Reclamation certification for specified land is assessed against *EPEA*, *CRR*, and *EPEA* approval terms and conditions and applicable regulatory guidelines.

The requirements for an *EPEA* application help demonstrate the predisturbance conditions before construction begins in order to ensure that effective site-specific conservation planning occurs. In the *Guide to Content for Energy Project Applications* (guide to content), where information is required as part of a renewal or amendment application for a mineable oil sands site to support the development of a LMCP, this SED supersedes parts of those requirements. Refer to the AER's website for a description of application content requirements that will be met by submission of a LMCP in accordance with the SED.

Mineable oil sands *EPEA* approval terms and conditions define the requirements for submission of the LMCP, MRP, and ARPTR. If there is a conflict between this SED and the approval terms and conditions, the approval terms and conditions supersede the requirements of this SED, unless otherwise authorized by the AER.

This SED outlines the content that is required and expected as part of each submission. Each requirement is numbered.

### 1.3.2 Regulatory Decisions

Review and authorization of a LMCP submitted with an *EPEA* renewal or amendment application follows the process for all applications submitted to the AER. Changes to an activity that is the subject of an *EPEA* approval requires an approval or an amendment to an existing approval authorizing the change, as outlined in section 67 of *EPEA* following the AER's application processes. Minor changes that meet the requirements of section 67(3) of *EPEA* and do not contravene the purpose or intent of the approval can be incorporated into the updated LMCP.



In some instances, approval holders may be required to submit a standalone LMCP outside of the renewal or amendment application process. Standalone LMCP submissions are also reviewed by the AER, and written authorization is required before implementation.

MRPs are reviewed by the AER, and written authorization is required before implementation. Proposed changes to an authorized MRP can occur as follows, depending on the type of change:

- Minor changes that do not change MFSP calculations or targets should be noted in the ARPTR.
- Changes that directly or indirectly affect MFSP calculations need to be sent to the AER for written authorization before being implemented (e.g., permanent reclamation targets used in calculating the outstanding reclamation deposit).
- Redisturbance of permanently reclaimed lands (i.e., permanent reclamation deletions) does not require prior authorization from the AER. However, all permanent reclamation deletions must be reported in the ARPTR.

The ARPTR does not require an AER decision and is a submission to the AER that will be reviewed and audited as required to ensure compliance with the *EPEA* approval, LMCP, and MRP.

### 1.3.3 Compliance Requirements

The term “must” indicates a requirement, while terms such as “should,” “recommends,” and “expects” indicate a recommended practice. The requirements outlined in this SED must be fulfilled by approval holders in order to demonstrate compliance with *EPEA* approval terms and conditions.

AER staff will take a risk-based approach, through both audits and inspections, to verification of the data and information submitted as required in this SED. *Manual 013: Compliance and Enforcement Program* will guide compliance activities.

Information about compliance and enforcement can be found on the AER website.

#### 1.3.3.1 Life of Mine Closure Plan Audits

The LMCP outlines the planned outcomes for reclamation and closure, the targets that will guide site-specific planning, and the practices that will achieve the outcomes. Targets and methods are to align with the approval holder’s approvals and plans and will take into consideration commitments to stakeholders. Activities, methods, and progress presented in the MRP will be compared with the outcomes described in the LMCP.

### 1.3.3.2 Mine Reclamation Plan Audits

A risk-based approach will be taken to verifying activities and methods presented in the MRP.

MRP audits are directly related to the Mine Financial Security Program (e.g., outstanding reclamation deposit calculation).

### 1.3.3.3 Annual Reclamation Progress Tracking Report Audits

ARPTRs will undergo a risk-based multidisciplinary audit by the AER. Progress reported in the ARPTR will be compared to the authorized mine reclamation plans and validated through audits and inspections.

If ARPTR content is found deficient it may be refused, result in noncompliance, or require further correspondence before AER confirmation of completion.

## 1.4 General Requirements and Methods

The information in this section is for any of the submission requirements in this SED. Approval holders are encouraged to contact the AER at the earliest opportunity to discuss any unique or site-specific circumstances in order to ensure that this SED's requirements are appropriately interpreted.

Terminology used in this SED will follow the glossary of terms (appendix 2) and the EPEA approval, act, and regulations. Footnotes are encouraged for brief explanatory comments where appropriate.

- 1) Tables must follow the content (information required) and format<sup>1</sup> (columns, rows, units) defined in the tables of this SED where specified in table footnotes. Units are defined in the tables. Extend tables beyond their default lengths as necessary to ensure complete reporting. Provided the minimum required data is provided for each table, optional data (rows and columns) can be added as required (e.g., data separated by mine areas or pits).
- 2) Unless otherwise directed by the AER, mandatory tables must be submitted in a digital format that is extractable.
- 3) A list of any key references, personal communications, or websites accessed or used to support the information in this SED must be provided.
- 4) If a section of this SED does not apply to a specific submission due to activities that are planned or have occurred, the absence of content must be clearly indicated in the submission.

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<sup>1</sup> Some tables have merged headings for presentation purposes; these should be submitted in database format.

#### 1.4.1 Best Management Practices

- 5) Approval holders must follow *EPEA* approvals terms and conditions for best management practices and guidelines (e.g., *Best Management Practices for Conservation of Reclamation Materials in the Mineable Oil Sands Region of Alberta*, Alberta Environment and Water, 2012).

It is recognized that in some cases significant changes to best management practices may take place over time (e.g., soil salvage vs. soil placement, or impacts of natural disaster on conservation of vegetation), and these specific cases must be addressed as best management practice discrepancies in the MRP and ARPTR, as appropriate.

Approval holders should use the most current best management practices for the year in which the activity occurs.

#### 1.4.2 Mapping Requirements

- 6) Specific maps are required for each submission discussed in this SED. The content and detail requirements of each map are outlined in relevant sections of the SED.

While specific mapping scales have not been identified, the AER expects legible and practical maps to be prepared based on the specific content being requested. All maps are to contain relevant approval boundaries (e.g., approved *EPEA* footprint and MSL boundaries) and the minimum standard mapping information, including a title, north arrow, scale, and legend. All maps provided under this SED are to align, to the extent possible, with the most recent applicable submissions to the regulator, including mine plans, tailings management plans, and geodatabase submissions.

Mapping is to support the tracking of progressive reclamation through the life of a mine to ensure that reclamation outcomes will be achieved.

There must be a consistent use of closure polygons and sub-closure polygons to enable alignment of reclamation outcomes in the LMCP, MRP, and ARPTR.

#### 1.4.3 Closure Polygons and Sub-Closure Polygons

Closure polygons are geographic areas within the approved *EPEA* footprint that are defined by the approval holder and based on reclaimed landform features or considerations related specifically to reclamation and closure planning and management. The closure polygon is used to track distinct parcels of land within the project boundary as the project moves through reclamation milestones. These polygons will be used to track progress toward reclamation outcomes. Where closure polygons align with operational areas defined in other regulatory submissions (e.g., *Directive 085: Fluid Tailings Management for Oil Sands Mining Projects*), terminology is to be consistent.

Approval holders need to consider the mine operational plan and closure plan in addition to project-specific conditions, constraints, and commitments when defining closure polygons.

Sub-closure polygons are geographic areas within each closure polygon. The purpose of the sub-closure polygons is to link planned and completed operational reclamation activities in the MRP and ARPTR to reclamation outcomes defined in the LMCP. The names of sub-closure polygons should clearly link them to closure polygons.

#### 1.4.4 Geospatial Data Submissions

Geospatial information is required as part of this SED.

- 7) Geospatial data and associated attribute tables must be submitted to the reclamation information system (RIS) for the LMCP, MRP, and ARPTR in accordance with data submission requirements and standards. Information provided as part of SED submissions must be consistent with the data submitted to the RIS and with any updates done as a result of review of that data.
- 8) Data submitted to the RIS must also have undergone a quality assurance, quality control confirmation and will not be accepted until it meets the geospatial data quality analysis and quality control requirements defined for the RIS.

## 2 Life of Mine Closure Plan

### 2.1 Context

A LMCP is required under *EPEA* approval terms and conditions for mineable oil sands projects. It depicts the approval holder's targets and conceptual plan for progressing reclamation activities to achieve a final closure of a mine project. The LMCP outlines what the approval holder is planning to achieve through its conservation, reclamation, and closure activities. The LMCP is updated periodically through the life of the project.

The LMCP is a project-level plan that must align with regional planning and with the tailings management framework. The approval holder is responsible for preparing and following the LMCP, for ensuring that its MRP is aligned, and for reporting on the outcomes of the plan in its ARPTR.

The LMCP should be used to guide all other planning activities (e.g., mine plans, tailings management plans, water management plans, etc.), and the approval holder is responsible for showing the alignment between these plans and the LMCP.

- 9) The LMCP must address the full life of the project and align both with the conditions of approvals and with application commitments and plans. When the LMCP is updated, the results from performance measurements and research must be incorporated into the planning.

## 2.2 Submission of the Life of Mine Closure Plan

LMCPs are to be submitted electronically to [EPEA.WA.Applications@aer.ca](mailto:EPEA.WA.Applications@aer.ca) as an appendix to an *EPEA* approval renewal or amendment application.<sup>2</sup> These plans undergo a multidisciplinary review and are part of the *EPEA* approval decision. In some instances, the AER may ask an approval holder to submit a standalone LMCP outside of an approval renewal or amendment process. Standalone LMCP submission will be reviewed in a similar manner; however, public notice is not required for such submissions.

- 10) Following the initial submission of the LMCP, the LMCP must be updated and submitted every ten years or with an amendment, unless otherwise authorized by the AER in accordance with the AER *EPEA* application procedure.

## 2.3 Life of Mine Closure Plan Mapping Requirements

Several maps are required to support the LMCP. Table 1 is a summary of all of the maps identified for the LMCP. The details of what should be in each map are outlined in relevant sections.

**Table 1. LMCP summary of mapping requirements**

LMCP maps	Purpose/context	Section
Current land use	Shows land use of the project area and surrounding land. Approved and planned project components and disturbance are also illustrated.	Reclamation outcomes
Final reclaimed landscape	Shows the overall closure vision for the project, and shows integration and targeted ecosites.	Reclamation outcomes
Reclamation progression	Provides context for reclamation progression, and conceptual timelines for reaching reclamation milestones. Shows progress of all reclamation activities that have occurred and of those planned.	Reclamation progression
Closure surface drainage	Illustrates water connectivity and the transition between reclaimed areas and surrounding operations, or the natural environment for the full project, or both.	Surface water & groundwater
Reclamation material stockpile locations	Reclamation material stockpile locations over the life of the project.	Salvage & conservation of reclamation material
Merchantable timber	Shows where salvageable timber exists for the life of the project.	Vegetation clearing

<sup>2</sup> When an LMCP is submitted with a renewal or amendment application, some of the application requirements related to conservation and reclamation in the *Guide to Content for Energy Project Applications*, AER, 2014, are fulfilled.

## 2.4 Life of Mine Closure Plan Content Requirements

### 2.4.1 Regulatory Framework

- 11) Identify changes to the regulatory framework (e.g., policy, legislation, approvals, commitments, and guidance documents) since the last LMCP that have influenced the current plan and the impact on reclamation and closure planning, if applicable.
- 12) Identify all government-approved regional initiatives or plans that relate to the LMCP and describe how the LMCP is consistent with the requirements of regional plans; e.g., *Fort McMurray-Athabasca Oil Sands Subregional Integrated Resource Plan* (Alberta Sustainable Resource Development, 2002), *Lower Athabasca Regional Plan* (Government of Alberta, 2012).

### 2.4.2 Reclamation Outcomes

- 13) Provide a map of the current land uses in and around the project area that includes the following information:
  - Project components approved under the *EPEA* approval (e.g., plant site, mine pits, tailings storage, treated tailings deposits, coke storage, etc.)
  - Current approved disturbance areas related to existing approvals
  - Any applied-for or future expansion of the project
- 14) Identify and describe the end land use objectives for the mine.
- 15) Identify any assumptions fundamental to achievement of the end land use objectives.
- 16) Using the predisturbance landscape as a reference, assess and discuss the return of the locally common boreal forest ecosystem integrated into the surrounding area on the postdisturbance landscape.
- 17) Demonstrate alignment with the tailings management plan for tailings deposits milestones and reclamation outcomes. Where alignment does not occur, identify the inconsistencies and describe how alignment will be achieved.
- 18) Provide the rationale for the location, spatial extent, and type of wetlands targeted on tailings deposits. Explain why these wetlands are equivalent to locally common boreal forest wetlands, based on the *Alberta Wetland Classification System*. Explain how the targeted wetlands support a range of land uses, including commercial forest, biodiversity, wildlife habitat, and traditional use.
- 19) Use table 2 to compare predisturbance ecosites, wetland classes, or aquatic features with targeted closure ecosites, wetland classes, or aquatic features.

**Table 2. Comparison of predisturbance with closure target ecosite / wetland class / aquatic distribution**

<b>Ecosite / wetland class / aquatic</b>	<b>Predisturbance area (ha)</b>	<b>Predisturbance % of total area</b>	<b>Closure target (ha)</b>	<b>Closure % of total area</b>	<b>Change from predisturbance to closure (ha)</b>	<b>Change from predisturbance to closure (%)<sup>1</sup></b>
a						
b						
c						
d						
e						
f						
g						
h						
<b>Total upland</b>						
Bog (i)						
Fen (j,k)						
Marsh (l)						
Swamp						
Shallow open water / littoral zone < 2 m						
<b>Total wetland</b>						
Aquatic (flowing water or standing > 2 m deep)						
<b>Total</b> (Ecosite + wetland class + aquatic)						

<sup>1</sup> Indicate whether there is an increase (+) or decrease (-) in the percentage of each ecosite / wetland class / aquatic feature. Standardization of this table is optional.

Provide one or more maps that show the intended final reclaimed landscape and that illustrate the following:

- Hydrological features, such as watercourses, end pit lakes, wetlands, and waterbodies
- Targeted ecosites, wetland classes, and aquatic features
- Topographic contours
- Locations where end land use restrictions may be considered (and provide an explanation)
- Integration with adjacent development and the surrounding undisturbed landscape
- Closure polygons

20) Use table 3 to identify the necessary requirements for achieving targeted ecosites, wetland classes, and aquatic features for the project. Sub-closure polygons may be used to describe and define the reclamation outcomes further within the closure polygons.

**Table 3. Targeted ecosite, wetland class, or aquatic feature and associated landscape elements and end land use<sup>1</sup>**

Closure polygon	Substrate	Capping material type	Reclamation material cover design	End land use	Targeted ecosite, wetland class, or aquatic feature	Area (ha)
Closure polygon 1						
Closure polygon 2						
Closure polygon 3						
<b>Totals</b>						

<sup>1</sup> Examples of targeted land use: forested commercial, noncommercial, traditional use, wildlife habitat, littoral, and wetland land uses. Standardization of this table is mandatory.



### 2.4.3 Stakeholder Engagement & Traditional Use

- 21) Describe how the reclamation outcomes identified in the LMCP address traditional end land use.
- 22) Describe how stakeholder feedback and traditional land use information shared by indigenous communities or people have been integrated into reclamation outcomes for the mine.

### 2.4.4 Conservation, Reclamation, and Closure Commitments

When developing LMCP, it is important for the approval holder to identify, track, and incorporate the project-specific commitments related to conservation, reclamation, and closure. In turn, AER staff need to understand how these commitments are being considered in the planning process, and they need to determine whether the LMCP adequately addresses the commitments.

Project-specific commitments are not restated *EPEA* approval terms and conditions, but commitments related to conservation, reclamation, and closure made by approval holders through

- combined environmental impact assessments (EIAs) and applications (*EPEA*, *Oil Sands Conservation Act*, *Public Lands Act*, and *Water Act*);
- hearings;
- other authorizations issued by the AER (*Oil Sands Conservation Act*, *Public Lands Act*, *Water Act*);
- authorizations issued by a regional authority or municipality;
- government-approved regional initiatives or plans that pertain to the area (e.g., land use framework regional plans and management frameworks, integrated resource plans, water management plans, or municipal development plans);
- stakeholder agreements, with the exception of confidential commitments; or
- any process or document deemed appropriate by the approval holder.

- 23) Provide a summary in table 4 of the commitments that were made to stakeholders, including indigenous communities and people, related to conservation, reclamation, and closure, and of how the commitments are integrated into the LMCP.

**Table 4. Commitment integration summary**

Commitment	Description	Status/result of commitment	Source of commitment

Standardization of this table is optional.

2.4.5 Reclamation Progression

24) Provide a completed table 5 detailing the conceptual life-of-mine progressive reclamation timeline for the mine from the current state to reclamation certification. Provide the information in 5-year increments for the first 10 years, then in 10-year increments to closure.

**Table 5. Projected land status (ha)**

<b>Date</b>	<b>EPEA approved footprint</b>	<b>Mine site footprint</b>	<b>Plant site footprint</b>	<b>Total active footprint</b>	<b>Cleared</b>	<b>Disturbed</b>	<b>Ready for reclamation</b>	<b>Soils placed</b>	<b>Permanent reclamation (terrestrial)</b>	<b>Permanent reclamation (wetlands &amp; aquatics)</b>	<b>Temporary reclamation</b>	<b>Certified</b>
December 31 of YYYY proceeding LMCP												
YYYY												
YYYY												
YYYY												
YYYY												
Closure												

Standardization of this table is mandatory.

25) Provide reclamation progression maps of the mine to support table 5.

#### 2.4.6 Schedule of Infrastructure Decommissioning

As defined by *EPEA*,<sup>3</sup> infrastructure decommissioning is crucial to ensuring timely, progressive reclamation. Where applicable, the proposed timeline for infrastructure decommissioning needs to align with timelines proposed under associated AER authorizations (e.g., tailings management plans, etc.). If infrastructure is being decommissioned but the area remains part of the operations, it should not be included.

- 26) Provide an approximate timeline for infrastructure or structures that will be progressively decommissioned or removed to enable progressive reclamation over the life of the mine.

#### 2.4.7 Topography, Landform Design, and Water

Closure landscape goals are to align with a landscape that

- is geotechnically stable and will remain stable under a natural disturbance regime typical for the location;
- does not pose a threat to public safety or the environment (e.g., is safely accessible for traditional use by local communities);
- has a natural appearance consistent with the region;
- is a functioning, self-sustaining ecosystem (maintains its form and function as designed over time);
- is integrated into the adjacent landscapes; and
- supports the proposed reclamation outcomes.

##### 2.4.7.1 Landform and Reclamation Continuity Design

- 27) Outline how the proposed closure landscape and LMCP addresses each of the design actions in the landscape design checklist in appendix 4.
- 28) Describe how the proposed closure topography will achieve equivalent land capability and meet the end land use objectives. Discuss the proposed final closure landforms with respect to the predisturbance landforms and how the closure landforms will achieve equivalent capability.
- 29) Identify areas of the reclaimed landscape that are expected to experience settlement (see settlement definition in the glossary of terms). For these areas, do the following:
  - Identify the types of substrates and discuss the characteristics that contribute to settlement.
  - Discuss the settlement model forecast (rate and amount) for these areas. Include a discussion on validating the models with settlement data collected from constructed landforms, research, and completed consolidation models or engineering analysis.

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<sup>3</sup> *Environmental Protection and Enhancement Act*, RSA 2000, cE-12, section 1(ddd)

- Identify the nature and degree of uncertainties in current settlement predictions.
- Discuss how settlement is incorporated into the reclamation planning to reduce the risk to reclamation outcomes and milestones.
- Describe how the uncertainty associated with settlement will be reduced, managed, and resolved.
- Outline how post-reclamation settlement mitigation will be determined and implemented.

#### 2.4.7.2 Surface Water and Groundwater

- 30) Provide a map of the closure surface drainage that shows all hydrologic features (i.e., lakes, streams, compensation lakes, wetlands) in the closure landscape and connectivity with surrounding operations and the natural environment. Include watershed boundaries, contours, and direction of flow for each feature.
- 31) Describe how the proposed closure surface drainage will achieve equivalent land capability and meet the end land use objectives. Include a comparison of the proposed final closure surface drainage systems with the predisturbance drainage systems to support an equivalency determination and to determine whether the closure surface drainage system will be relatively natural in appearance and will tie in to adjacent undisturbed surface drainage systems.
- 32) Provide a water budget that aligns with sustainability of the closure drainage design after surface water and groundwater systems are re-established.
- 33) Provide conceptual representative cross sections of major drainage features in the closure landscape that show connectivity between groundwater and surface water.
- 34) Discuss the assumptions that are made and results that indicate that the proposed hydrogeology will be functional and sustainable after closure. Include a discussion of validation of models with hydrologic data collected from constructed landforms.
- 35) Identify any potential hydrogeological gaps in the conceptual plan and describe how adaptive management will mitigate the impacts.
- 36) Discuss the hydrologic modelling used for the closure drainage system design. Modelling needs to include a range of regional late-21st-century climate-change scenarios (e.g., 2070 to 2099) using the current Intergovernmental Panel on Climate Change scenarios available at the time of the modelling. Run the models (the same models that were run under historical climate conditions) under a range of future climate conditions (typically five: median, warm-dry, warm-wet, cool-dry, and cool-wet). If hydrologic modelling of climate change scenarios for water capped fluid tailings and for the model's contributing watershed area has been accepted by the AER for evaluation in another submission or application, discuss updated modelling results and their implications on hydrological sustainability, water quality outcomes, and the closure drainage system design.

- 37) Provide a summary of the modelling results to demonstrate the sustainability of the closure drainage design for all planned ecosystems (e.g., pit lakes, wetlands, watercourses, riparian areas and non-pit lakes, etc.) and to demonstrate alignment with proposed reclamation outcomes and end land-use objectives.
- 38) Describe how the results of the climate change modelling were considered when finalizing the proposed closure drainage design. Include a discussion of potential future mitigation action or risk management plans to reduce the risk to the reclamation outcomes.

#### 2.4.7.3 Water Quality

- 39) Identify major aquatic ecotypes on which closure water quality conditions are being modelled. For each major ecotype, summarize predisturbance and/or locally relevant reference water quality conditions. Compare predisturbance/reference aquatic ecotype water quality conditions to relevant guidelines, targets, triggers, and limits.
- 40) Provide a plan for managing water quality at closure. Include
  - the duration of surface water and groundwater control-measure operations;
  - the duration, quantity, and quality of water released from tailings areas
  - duration, quantity, and quality of water released into receiving water bodies (e.g., treatment wetlands, active water treatment, end pit lakes, streams, and rivers).

The plan must refer to the hydrologic features established at closure as defined in section 2.4.8.2. The plan must align with the most current operation performance (such as tailings treatment and deposit performance) and reclamation progress (such as pace and impact on the reclamation pace due to capping and reclamation material availability), and it must consider relevant research.

- 41) Provide updated water-quality model predictions for closure landscape aquatic features. Provide an overview of changes (new or updated models used, model assumptions, dataset used, changes in closure landscape, and other) from previous submissions. Compare current model predictions with predisturbance and locally relevant reference conditions, relevant guidelines, targets, triggers, and limits. Confirm how model results will be verified, and include potential timelines for verification of results. For parameters not meeting relevant guidelines, targets, triggers, or limits, discuss reasons why, and discuss any planned monitoring, management, or mitigation measures.
- 42) Describe how climate change is accounted for in modelled results, and describe any implications of achieving planned water quality outcomes in the aquatic features.

## 2.4.8 Reclamation Material Management

### 2.4.8.1 Material Balance

- 43) Provide a list of the planned reclamation and capping material types. Include a definition of each type and a description of the criteria and methodology used for identification and delineation.
- 44) Discuss the rationale for defining land-capping requirements for tailings deposits (based on research), including capping material type, capping objectives (e.g., landform development and stability, settlement management, the expression of tailings pore water and controlling the expression of tailings pore water, water-table control, landform contouring to facilitate the flushing of salts from the capping material, etc.), and implications to the development of self-sustaining boreal forest terrestrial or wetland ecosystems.
- 45) Where tailings are used for capping material, do the following:
  - Provide the properties, volume, and duration used for capping for each type of tailings.
  - Identify inconsistencies in tailings material balance between LMCP and the tailings plan, if any. Describe how the inconsistencies will be resolved.
- 46) Using tables 6 and 7, provide a project-material balance for both reclamation and capping materials, by type, for the life of mine. Explain how volumes were calculated.

**Table 6. Reclamation material life of mine balance**

	Reclamation material type <sup>1</sup> (e.g., peat mineral mix)	Disturbed area <sup>2</sup> requiring reclamation (ha)	Volume of reclamation material required <sup>3</sup> (m <sup>3</sup> )	Volume available in stockpiles and in situ (m <sup>3</sup> )	Net reclamation material balance (m <sup>3</sup> )
As of Dec. 31, YYYY <sup>4</sup>					
YYYY-YYYY (First 5 years)					
YYYY-YYYY (Next 5 years)					
YYYY-YYYY (10 years)					
YYYY-YYYY (10 years)					
YYYY-YYYY (Last 10 years to closure)					

1 List all reclamation material types as defined in the approval holder's *EPEA* approval.

2 Includes all disturbance that is planned to be reclaimed to terrestrial ecosystem (i.e., excludes aquatics such as end pit lakes and permanent infrastructure that is planned to be left in place)

3 This is a sum of all volume required for each reclamation material type factoring in variable placement depths based on the approval holder's reclamation cover design requirements.

4 Indicates the material balance as of December 31 of the previous year of the LMCP submission date. Material balance for the life of mine is to be provided in 5-year segments for the first 10 years followed by each 10 year segment to closure.

Standardization of this table is mandatory.

**Table 7. Capping material life of mine balance**

	<b>Capping material type (i.e., sand or suitable overburden)</b>	<b>Disturbed area requiring capping<sup>1</sup> (ha)</b>	<b>Volume of capping material required (m<sup>3</sup>)</b>	<b>Volume available in stockpiles and in situ (m<sup>3</sup>)</b>	<b>Net capping material balance (m<sup>3</sup>)</b>
As of Dec. 31, YYYY <sup>2</sup>					
YYYY-YYYY (First 5 years)					
YYYY-YYYY (Next 5 year)					
YYYY-YYYY (10 years)					
YYYY-YYYY (10 years)					
YYYY-YYYY (Last 10 years to closure)					

1 Includes all areas that are required to have capping placed as per EPEA approval

2 Indicates the material balance as of December 31 of the previous year of the LMCP submission date. Material balance for the life of mine is to be provided in 5 years segments for the first 10 year followed by each 10 year segments to closure.

Standardization of this table is mandatory.

47) Identify any shortages of reclamation material or capping material. Describe the plan for mitigation.

2.4.8.2 Salvage & Conservation of Reclamation Material

48) Provide a map of reclamation material stockpile locations. Illustrate planning to minimize double handling of salvaged materials due to future disturbance and mine operations.

2.4.8.3 Reclamation Material Placement

49) Provide a table (table 8) defining the cover designs that will be used. Identify the target ecosite or wetland class, soil moisture, and nutrient regime associated with each cover design.

**Table 8. Reclamation material cover design**

<b>Cover design name</b>	<b>Description</b>	<b>Target ecosite or wetland class</b>	<b>Soil moisture regime</b>	<b>Nutrient regime</b>

Standardization of this table is optional.

2.4.9 Vegetation Conservation

50) Discuss how the approval holder plans to fulfill vegetation conservation commitments identified in section 2.4.5, table 4, during salvage operations.

2.4.10 Vegetation Clearing

51) Provide a map that shows where merchantable timber exists, and identify the applicable forest tenure holders with the authority to salvage timber.

#### 2.4.11 Revegetation Plans

In developing revegetation plans and planting prescriptions, consideration must be given to targeted ecosites and to the wetland class or aquatic feature identified in table 3 of *Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region* (Alberta Environment, 2010), and the *Guidelines for Wetlands Establishment on Reclaimed Oil Sands Leases* (Cumulative Environmental Management Association, 2014).

- 52) Provide a planting prescription that links target ecosites or wetland classes, tree species, shrub species, and herbaceous species to reclamation material, capping material, and other landscape features.
- 53) Indicate how the targets specified in the ecosite phase growth and yield table<sup>4</sup> will be met, and identify how commercial forestry targets are measured and when (growth and yield plan).
- 54) Describe how revegetation plans for each targeted ecosite or wetland class align with landform construction (topographical connectivity) and are supported by their substrate and reclamation material profiles to achieve the planned end land use.
- 55) Identify limiting factors, where they exist, for each vegetation community. Explain how limiting factors will be addressed.

#### 2.4.12 Biodiversity

- 56) Define biodiversity elements that will be targeted (e.g., ecosystems, species), and end land uses (traditional use, recreation, hunting and fishing, forestry), and how the LMCP addresses each.
- 57) Describe how reclamation and closure activities address biodiversity for focus species.
- 58) Using table 9, provide reclamation diversity targets to show links between target ecosites, wetland type, or aquatic feature, and target wildlife or aquatic species.
- 59) Identify overarching plans for creating and connecting wildlife habitat in and across the reclaimed landscape and adjacent lease holders. Include any unique requirements for species of management concern (e.g., species at risk) or for species that are currently significant to indigenous communities (e.g., moose, caribou, bison, etc.). Incorporate target wildlife species into reclamation diversity targets (see table 9).
- 60) Identify overarching plans for creating fish habitat in the reclaimed landscape. Include species targeted for recolonization of the closure landscape, and show the reconnection of reclaimed watersheds and aquatic features (e.g., end pit lakes, wetlands, watercourses) to downstream aquatic habitats and how reclamation will establish self-sustaining populations.

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<sup>4</sup> Ecosite phase growth and yield tables developed by the Cumulative Environmental Management Association.



**Table 9. Reclamation diversity targets**

Pre-disturbance				Closure					
Ecosite phase / wetland class / aquatic feature	Area (ha)	# of vegetation spp recorded	# of wildlife spp recorded	Target ecosite / wetland class / aquatic feature	Broad cover class	Area reclaimed to date (ha)	Potential # of vegetation spp 1	Potential # of wildlife spp 1	Targeted area at closure (ha)
a				Aquatic	Coniferous- jackpine leading				
b1				b	Mixedwood- jackpine leading				
b2			Deciduous						
b3			Mixedwood-deciduous leading						
b4			Coniferous- white spruce leading						
c1					Coniferous- jackpine leading				
d1				d	Deciduous				
d2			Mixedwood-deciduous leading						
d2			Coniferous						
e1/f1				e/f	Deciduous				
e2/f2			Mixedwood-deciduous leading						
e3/f3			Coniferous						
g1				g	Coniferous				
h1				h	Coniferous				
Wetland				Wetland	Organic wetland				
Wetland				Wetland					
Wetland				Wetland	Swamp				
Wetland				Wetland	Marsh				
Wetland				Wetland	Shallow open water / littoral zone < 2 m deep				
Aquatic				Aquatic	Flowing water or standing > 2 m deep				

Listing more than one type of end land use or target wildlife species is acceptable. Standardization of this table is optional.



## 2.5 Reclamation Monitoring Program

### 2.5.1 Reclamation Monitoring Program

The approval holder is required to implement a reclamation monitoring program to enable performance evaluation of compliance with regulatory requirements and achievement of reclamation outcomes.

- 61) The reclamation monitoring program must ensure that data is available to confirm that reclaimed areas are diverse, self-sustaining boreal forest ecosystems that are integrated into the surrounding landscape.

### 2.5.2 Reclamation Performance Evaluation

- 62) Provide a summary of reclamation performance evaluation completed. Discuss how reclamation performance evaluations are demonstrating that the reclaimed areas are progressing in the appropriate trajectories to achieve the targeted reclamation outcomes and end land use objectives.
- 63) Identify new practices or approaches that are being applied in the current plan and that result from analysis of monitoring results. Descriptions must be discipline-specific and must align with the summary of reclamation performance evaluation.

## 3 Mine Reclamation Plan

### 3.1 Context

A mine reclamation plan is required under EPEA approval terms and conditions for mineable oil sands sites. It depicts the approval holder's conservation and reclamation plans after the project is approved. The MRP is updated through the life of the project and is to incorporate research findings, results, and best practices that reflect an adaptive management approach to conservation and reclamation.

The MRP is an operational plan that uses location-specific information and integrates site-specific constraints and commitments made in preceding applications and the LMCP. The MRP outlines how the approval holder will achieve its commitments to conservation, reclamation, and closure.

The approval holder is responsible for preparing and following the MRP and is required to report on both the plan and the results through the ARPTR.

- 64) The MRP must include three years of forward planning (presented in one-year increments) and must be submitted to the AER every three years, except for section 3.4.4, Reclamation Progression, which must address five years of annual planning. Planning details are only required for closure polygons where conservation and reclamation activities are occurring or where reclaimed areas are affected.

### 3.2 Submission of the Mine Reclamation Plan

MRPs are to be submitted electronically to [EPEA.WA.Plans.Authorizations@aer.ca](mailto:EPEA.WA.Plans.Authorizations@aer.ca) in accordance with the *EPEA* operational information submission procedure. MRPs will be reviewed by a multidisciplinary AER team and, if found deficient, may be refused, or supplemental information may be requested. MRPs require authorization in writing by the AER prior to implementation.

- 65) After the initial submission of the MRP, the MRP must be submitted every three years. These plans must be submitted independent of any other submission; i.e., MRP's must be submitted independent of an amendment application or LMCP.

### 3.3 Mine Reclamation Plan Mapping Requirements

Several maps are required to support the MRP. Table 10 is a summary of the maps required. The details of what should be presented in each map are outlined throughout MRP content requirements.

**Table 10. MRP summary of mapping requirements**

MRP maps	Purpose/context	Section
Reclamation progression (five year)	Provides planned progression of conservation and reclamation activities for the next five years	Reclamation Progression
Landform recontouring and water	Shows integration of landforms and drainage for areas planned for reclamation in the next three years	Topography, Landform Design and Water
Settlement areas	Shows potential settlement areas	Topography, Landform Design and Water
Reclamation material salvage	Progression of reclamation salvage, and direct placement and stockpiling locations	Salvage & Stockpiling of Reclamation Material
Reclamation material placement	Reclamation material placement, including source of materials	Reclamation Material Placement
Vegetation clearing	Shows locations planned for timber salvage and woody debris management	Vegetation Clearing
Permanent revegetation	Shows permanent revegetation areas based on end land use and on targeted ecosite or wetland class used to define the planting prescriptions	Revegetation

### 3.4 Mine Reclamation Plan Content Requirements

#### 3.4.1 Regulatory Framework

- 66) Identify any changes to the LMCP and to reclamation outcomes that have occurred since the last MRP. Identify the reason for the change; e.g.,
- change in government policy;
  - federal or other provincial government direction (Department of Fisheries and Oceans, Alberta Environment and Parks [AEP], Environment and Climate Change Canada);
  - letters of authorization;

- changes to a mine plan or tailings plan;
- changes due to technology updates, tailings deposits performance, material availability, or research progress;
- agreements with third parties on the site (e.g., sand and gravel operations) or with adjacent operations; or
- previous reclamation targets not met.

67) Discuss how the changes to the LMCP and the reclamation outcomes affect the approval holder's ability to deliver the plans outlined in the preceding MRP and how the changes affect the MRP.

68) List any changes to the regulatory framework (e.g., policy, legislation, approvals, commitments, and guidance documents) since the last MRP that have influenced the current plan.

### 3.4.2 Conservation, Reclamation, and Closure Commitments

When developing the MRP, it is important for the approval holder to identify, track, and incorporate the project-specific commitments related to conservation, reclamation, and closure. In turn, AER staff need to understand how these commitments are being considered in the planning process and to determine whether the MRP adequately addresses the commitments.

Project-specific commitments are not restated EPEA approval terms and conditions, but commitments related to conservation, reclamation, and closure made by approval holders through

- a LMCP;
- combined EIAs and applications (*EPEA, Oil Sands Conservation Act, Public Lands Act, and Water Act*);
- hearings;
- other authorizations issued by the AER (*Oil Sands Conservation Act, Public Lands Act, and Water Act*);
- a field-based inspection (assessment);
- authorizations issued by a regional authority or municipality;
- government-approved regional initiatives or plans that pertain to the area (e.g., land use framework regional plans and management frameworks, integrated resource plans, water management plans, municipal development plans);
- stakeholder agreements, with the exception of confidential commitments; or
- any process or document deemed appropriate by the approval holder.

- 69) For sites or activities that will be constructed or undertaken in the planning period, provide a summary of the commitments that were made related to conservation, reclamation, and closure and how they are integrated into the MRP (see table 11).

**Table 11. Commitment integration summary**

Commitment	Description	Status/result of commitment	Source of commitment

Standardization of this table is optional.

### 3.4.3 Reclamation Outcomes

- 70) For specific locations to be reclaimed, identify and describe the end land use objectives. Discuss how the MRP links to the end land use objectives identified in the LMCP.
- 71) Discuss alignment of reclamation outcomes for specific locations to be reclaimed that are adjacent to undisturbed areas or other operations.
- 72) Provide a table of the targeted ecosite, wetland class, or aquatic feature, and associated landscape elements for specific locations to be reclaimed (table 12). The locations identified must be aligned with the LMCP and presented through the closure polygon and sub-closure polygons.
- 73) Discuss alignment of the reclamation outcomes identified in the LMCP at the landform scale with the polygon-level reclamation outcomes identified in the MRP.

**Table 12. Targeted ecosite, wetland class, or aquatic feature, and associated landscape elements and end land use**

Sub-closure polygon	Closure polygon	Substrate	Capping material type	Reclamation cover design	End land use	Aspect	Slope position	Soil moisture regime	Target ecosite	YYYY (Ha)	YYYY (Ha)	YYYY (Ha)
<b>Totals</b>												

Standardization of this table is mandatory.

### 3.4.4 Reclamation Progression

The area planned for permanent reclamation (terrestrial and wetland) provided in this section will be used for MFSP reclamation target calculations.

74) Using table 13, provide the progression of land status for every year.

**Table 13. Reclamation progression YYYY to YYYY**

Date	EPEA approved footprint (ha)	Mine site footprint (ha)	Plant site footprint (ha)	Total active footprint (ha)	Total active footprint				Soils placed (terrestrial and wetlands & aquatics)	Permanent reclamation (terrestrial)	Permanent reclamation (wetlands & aquatics)	Temporary reclamation (terrestrial)	Reclamation activity complete	Certified
					Cleared (ha)	Disturbed (ha)	Ready for reclamation (ha)							
Pre-YYYY														
YYYY														
YYYY														
YYYY														
YYYY														
YYYY														

Standardization of this table is mandatory.





- 75) Provide maps to support annual reclamation progression that is planned. Maps must illustrate the cumulative progression of permanent reclamation as well as annual land status.
- 76) Discuss alignment of reclamation progression presented in the MRP with plans outlined in the LMCP.

### 3.4.5 Infrastructure Decommissioning

As defined by *EPEA*,<sup>5</sup> infrastructure decommissioning is the first step in the reclamation process and is crucial to ensuring timely, progressive reclamation. Information in this section is used to determine whether any obstacles exist for the upcoming three-year planning period that could affect timely, progressive reclamation and, ultimately, the reclamation outcome.

The information provided for infrastructure decommissioning needs to align with the goals set out in the LMCP and, when applicable, with approval conditions from *EPEA* decommissioning and reclamation approvals and decisions under associated AER authorizations (e.g., tailings management plans, abandonment under the *Oil Sands Conservation Act* [*OSCA*], etc.).

If infrastructure is being decommissioned but the area remains part of the active operations, it should not be included.

- 77) Provide planned decommissioning and abandonment activities (see table 14), including reference to specific infrastructure, that will be started in order to prepare for recontouring.

**Table 14. Progressive decommissioning and abandonment activities**

Infrastructure name	Description of decommissioning or abandonment activity	Closure polygon or sub-closure polygon	Estimated start date (mm/dd/yyyy)	Estimated completion date (mm/dd/yyyy)

Examples of decommissioning or abandonment activities: remediation; decommissioning of dams; removal of surface infrastructure, such as buildings, roads, pipes, and culverts; and removal of underground infrastructure.

Can include reference to another document that includes the details of the activity. Standardization of this table is optional.

### 3.4.6 Topography, Landform Design, and Water

- 78) Content in this section must align with the LMCP, the plans for decommissioning dams (as required by section 32 of the *Water (Ministerial) Regulation*), and applicable regional plans (e.g., *Lower Athabasca Region Groundwater Management Framework*; *Lower Athabasca Region: Surface Water Quantity Management Framework for the Lower Athabasca River*, etc.).
- 79) The type of substrate below the reclaimed surface must be considered.

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<sup>5</sup> *Environmental Protection and Enhancement Act*, RSA 2000, cE-12, section 1(ddd)

#### 3.4.6.1 Landform Design and Reclamation Continuity

- 80) Provide designs of the landforms, or portions of landforms, being developed. For each landform, include recontouring/grading (e.g., aspect, slope) plans and a summary of geotechnical and slope stability analysis, and refer to any detailed geotechnical stability analysis completed for the landform and describe how it ties into the overall closure landscape of the LMCP.
- 81) Provide annual maps to show where recontouring activities will occur. Demonstrate integration of the landform into the closure landscape and surrounding topography, including key hydrologic features, and demonstrate alignment with undisturbed or adjacent operator boundaries. Include representative cross-sections. Discuss how the design aligns with the closure plan in the LMCP.
- 82) Detail the procedure for incorporating micro- and meso-topographic diversity into the reclaimed landforms.
- 83) Discuss erosion and stability concerns with the planned reclamation areas, and include mitigation measures that will be implemented to address potential concerns.
- 84) Detail how settlement will be predicted and managed within planned reclamation areas:
  - Identify on a map any potential settlement areas.
  - Evaluate any impact on potential reclamation outcomes.
  - Identify which of the potential settlement areas could become shallow wetlands.
  - Include a plan to monitor the settlement rate in identified settlement areas.

#### 3.4.6.2 Surface Water and Groundwater

- 85) Identify the hydrologic features that will be incorporated after landform construction and before reclamation material placement to achieve reclamation outcomes specific to the areas identified on the annual landform recontouring and water maps. List the activities required to develop these features, including the planned timing.
- 86) Provide a series of figures (plan views and cross-sections) that show representative design and interconnections (including connectivity with groundwater) for each drainage feature (including littoral zones for aquatic features) that will be reclaimed or incorporated into the closure surface drainage.
- 87) Describe changes to existing operational drainage features that will be prepared for closure.
- 88) Provide detailed water budgets and solute mass balances for pit lakes being reclaimed. Include the quantity, source, and quality of water that will fill the pit lake. Indicate the groundwater recharge and seepage rates and groundwater quality. Verify that predictive models have been validated.

- 89) Provide a description and representative design for any engineered seepage or natural hydraulic management systems that will be constructed for landforms reclaimed. Clearly indicate locations of the systems on the landform recontouring and water map.
- 90) Provide a design plan for treatment wetlands to be constructed. Include location, input and output water quality, water retention times, treatment capacity, active management requirements, littoral zones, targeted vegetation species and densities, any additional criteria, and long-term plans for conversion to self-sustaining wetlands.

3.4.6.3 Water Quality

- 91) Provide an overview of management and mitigation activities for water quality that will take place to meet water quality objectives.
- 92) List the criteria and supporting rationale that will be used to define low-quality groundwater. Discuss whether seepage of low-quality groundwater is a concern for the reclamation outcomes, and discuss how seepage is being mitigated.

3.4.7 Reclamation Material Management

3.4.7.1 Reclamation Material Inventory and Balance

- 93) Provide a table (table 15) that outlines the planned reclamation material inventory. Include information annually by reclamation material type. Discuss differences and changes from the previous MRP.

**Table 15. Reclamation material inventory planned (Year YYYY to YYYY)**

	YYYY	YYYY	YYYY
Reclamation material type (s) <sup>1</sup> (e.g., cover soil, subsoil, peat, mineral mix, etc.)	Reclamation material stockpile (RMS) starting volume (m <sup>3</sup> ) <sup>2</sup>		
	Planned salvage volume (m <sup>3</sup> )		
	Planned direct placement for wetland reclamation (m <sup>3</sup> )		
	Planned direct placement for upland reclamation (m <sup>3</sup> )		
	Sent to or removed from RMS (m <sup>3</sup> ) <sup>3</sup>		
	RMS end volume (m <sup>3</sup> ) <sup>4</sup>		

1 Reclamation material type is as defined in approval conditions

2 Total volume of reclamation material stockpiled as of January 1 of the reporting year

3 Values in parentheses identify volumes removed from stockpiles

4 Total volume of reclamation material stockpiled as of December 31 of the reporting year. Standardization of this table is mandatory.

- 94) Provide a table (table 16) that shows the planned reclamation material balance progression for the MRP period.

**Table 16. Reclamation material balance progression**

Reclamation material type	YYYY	YYYY	YYYY
Reclamation material types (e.g., cover soil, subsoil, peat, mineral mix)	Disturbed area requiring reclamation (ha) <sup>1</sup>		
	Volume of reclamation material required (m <sup>3</sup> ) <sup>2</sup>		
	Volume available in stockpiles and from direct placement		
	Current reclamation material balance <sup>3</sup>		

<sup>1</sup> Includes all disturbance that is planned to be reclaimed to terrestrial ecosystem (excluding aquatic areas such as end pit lakes and permanent infrastructure that is planned to be left in place)

<sup>2</sup> This is the sum of all volumes estimated to be required, factoring in variable placement depths and reclamation cover design requirements,

<sup>3</sup> Represents estimated current reclamation material balance only to the end of the reporting year (i.e., what material is available to reclaim a current-state disturbance). This calculation does not account for future planned disturbances or potential reclamation material available for salvage. Current positive or negative material balance will not be used as a performance indicator by itself but will be used to track progress over time toward the LMCP balance.

Standardization of this table is mandatory.

95) Identify differences and changes from the previous MRP, and discuss the progression being made towards achieving the life of mine reclamation material balance targets. Discuss how the material balance target is aligned with what was predicted in the most recent LMCP.

#### 3.4.7.2 Salvage & Stockpiling of Reclamation Material

96) Discuss what predisturbance data from auger drilling programs, and soil surveys will be used , and discuss what field level protocols will be used to execute annual soil salvage programs. The AER requires operators to collect predisturbance soil survey data to guide soil salvage programs. Submission of predisturbance soil survey data to the AER is not a requirement. However, the approval holder may be required to make data available for AER inspections or audits upon request.

97) Provide maps that show annual reclamation material salvage by reclamation material type (including suitable overburden) and by salvage location. Show stockpile or direct placement locations for each salvage area by year. Identify areas where clearing and disturbance is planned but where salvage will not occur.

98) Provide reclamation salvage plans using table 17.

**Table 17. Reclamation material salvage volumes**

	YYYY	YYYY	YYYY
Area (ha)			
Reclamation material type <sup>1</sup> A			
Planned salvage depth <sup>2</sup> for A (m)			
Planned volume (m <sup>3</sup> )			
Reclamation material type B			
Planned salvage depth <sup>2</sup> for B (m)			
Planned volume (m <sup>3</sup> )			

<sup>1</sup> List all applicable reclamation material types as defined in EPEA approval.

<sup>2</sup> Planned salvage depth is an average salvage depth targeted for salvage in each salvage area.

Standardization of this table is mandatory.

- 99) Identify constraints on soil salvage (e.g., methods for salvaging cover soil, and different depths) in the MRP. Describe the impact of identified constraints and of plans for mitigation. Justify any areas where salvage will not occur.
- 100) For each reclamation material stockpile location, provide rationale for the location chosen and the planned placement destinations associated with each stockpile.
- 101) Identify reclamation material stockpile locations that will be relocated, the rationale for relocation, and the planned year of relocation.
- 102) Provide a table (table 18) that identifies stockpile locations for the salvaged reclamation material. Include stockpile identification, reclamation material type, volumes in and out, and starting and ending volumes for every year. Include only stockpile locations that are expected to change within the MRP period in the table.

**Table 18. Reclamation material stockpile plan**

Stockpile ID/ location	Reclamation material types	Volume in/out (m <sup>3</sup> )	YYYY	YYYY	YYYY	Total
e.g., RMS1	e.g., Peat mineral mix	Starting volume				
		In				
		Out				
		End volume				
	e.g., Subsoil	Starting volume				
		In				
		Out				
		End volume				

Standardization of this table is mandatory.

### 3.4.7.3 Reclamation Material Placement

- 103) Provide maps that show reclamation material placement locations, source locations and types of reclamation material, and cover design by year. Differentiate between direct placement and placement from stockpile locations.
- 104) Describe how direct placement has been maximized in the plan.
- 105) Provide an annual reclamation material placement plan (table 20).
- 106) Describe how the extent of surface requiring a cap is determined.

**Table 19. Capping material placement plan**

Year	Closure polygon / sub-polygon <sup>1</sup>	Area (ha)	Substrate type	Capping material type	Capping material thickness (cm)	Capping material volume (m <sup>3</sup> )	Capping material source	Purpose of cap (group 1 or 2)	Placement technique <sup>2</sup>
YYYY									
YYYY									
YYYY									

<sup>1</sup> There may be multiple polygons for each year of activity. All columns must be completed for each polygon.

<sup>2</sup> Placement technique examples: rough placement, texturing, free dumping, hydraulic placement, etc.

Standardization of this table is mandatory.

**Table 20. Reclamation material placement plan**

Year	Closure polygon / sub-polygon <sup>1</sup>	Area (ha)	Subsoil depth (cm)	Subsoil volume required (m <sup>3</sup> )	Reclamation cover design	Cover soil depth (cm)	Cover soil volume (m <sup>3</sup> )
YYYY							
YYYY							
YYYY							

<sup>1</sup> There may be multiple polygons for each year of activity. All columns must be completed for each polygon.

Standardization of this table is mandatory.

### 3.4.8 Vegetation

#### 3.4.8.1 Vegetation Clearing

- 107) Provide maps that show where vegetation clearing, including timber salvage and woody debris management, will occur annually. Provide an annual summary of timber salvage activity, including timber type, planned salvage area, and destination (e.g., forest management agreement holder).
- 108) Provide an annual summary of woody debris collection activities, including planned salvage area and planned year of use.

#### 3.4.8.2 Vegetation Conservation

- 109) Provide an annual summary of vegetation conservation activities that will take place in each area to ensure the conservation of rare plants and the sufficient, reliable, and timely supply of native plant propagules to meet the reclamation plan.

#### 3.4.8.3 Revegetation

- 110) Provide permanent revegetation area planting plan details (table 21). Differentiate between upland, wetland, and riparian areas. Revegetation species for wetlands must be specific to each wetland class. Plans must align with reclamation outcomes; if the revegetation plan for a specific targeted outcome is not the same as the guidelines (e.g., *Guidelines for Wetlands Establishment on Reclaimed Oil Sands Leases*, or other guidelines that the operator has chosen to use and that apply to the boreal forest region), describe improvements for each targeted outcome.

**Table 21. Permanent revegetation area planting plans**

Targeted ecosite / wetland class	Leading tree species	Tree species	Planting density (stems/ha)	Potential shrubs species list <sup>1</sup>	Combined planting density of all shrubs (stems/ha)	Target # of shrub species	Non-woody <sup>2</sup> species <sup>1</sup>

<sup>1</sup> Multiple species may be listed.

<sup>2</sup> Includes the forb, grass, moss, and lichen stratum to be introduced through a variety of means.

Standardization of this table is mandatory.

- 111) For each reclamation area planned for permanent reclamation, provide a map that shows the permanent revegetation areas based on end land use and, and identify the targeted ecosite or wetland class used to define the planting prescriptions in table 21. Include the permanently reclaimed upland polygons, targeting commercial forestry as the end land use.
- 112) Describe alignment of the permanent revegetation planting plan with the *Alberta Forest Genetic Resource Management and Conservation Standards*.
- 113) Identify factors that influenced the selection of the revegetation plan to target the selected ecosite relative to other possible ecosites within the site.

#### 3.4.9 Wildlife & Fish Habitat

- 114) List reclamation measures planned and implemented to support wildlife and aquatic habitat outcomes as identified in the LMCP (e.g., habitat connectivity to support the movement of wildlife and aquatic species). Identify the species that are targeted by the activities listed.
- 115) Discuss considerations for life history requirements of targeted aquatic species that will be incorporated into the MRP for reclaimed water courses and water bodies.

## 4 Annual Reclamation Progress Tracking Report

### 4.1 Context

The ARPTR standardizes the annual reporting of conservation and reclamation activities. This information helps the AER determine compliance with operating terms and conditions and plans.

The ARPTR is for reporting on the previous year and must be in alignment with outcomes of the LMCP and strategies of the MRP.

### 4.2 Submission of the Annual Reclamation Progress Tracking Report

ARPTRs are to be submitted electronically to [EPEA.Reports@ aer.ca](mailto:EPEA.Reports@ aer.ca), and they must follow *EPEA* operational information submission procedures.

- 116) The ARPTR must be submitted on or before April 15 every year. These reports must be submitted independent of any other submission (e.g., an amendment application or LMCP).

### 4.3 Annual Reclamation Progress Tracking Report Mapping Requirements

Several maps are required for the ARPTR. Table 22 is a summary of all required maps. The details of what should be on each map are throughout ARPTR content requirements.



**Table 22. ARPTR summary of mapping requirements**

<b>ARPTR maps</b>	<b>Purpose/context</b>	<b>Section</b>
Cumulative reclamation progression	Shows reclamation done in the previous year and cumulating with reclamation that has occurred in the past.	Cumulative Reclamation Progression
Landforms and water	Shows where closure drainage features were constructed in preparation for reclamation and shows integration with the surrounding area or with closure plans.	Landform Design and Reclamation Continuity
Reclamation material salvage	Shows where salvage occurred by material type.	Salvage & Conservation of Reclamation Material
Reclamation and capping material placement	Shows the types of reclamation and capping materials placed, the source of the material, and the method by which it was placed.	Reclamation Material Placement
Post reclamation inspection and sampling locations	Shows where post-placement reclamation material assessments were completed. May include colour coding where survey locations did not meet assessment criteria.	Reclamation Material Placement
Vegetation clearing	Shows where trees were cleared.	Vegetation Clearing

#### 4.4 Deviations from Plans

117) In cases in which the approval holder has deviated from its authorized MRP and in which the criteria identified in section 1.3.2, Regulatory Decisions, have not been met, identify, as part of reporting on the technical discipline that has been affected, where deviations have occurred.

#### 4.5 Annual Reclamation Progress Tracking Report Content Requirements

##### 4.5.1 Cumulative Reclamation Progression

- 118) Provide the cumulative land status at the end of the reporting year by completing table 23.
- 119) Provide maps that support table 23 and that illustrate cumulative reclamation progression; demonstrate progression by showing the cumulative total for the preceding year and progress during the reporting year.



**Table 23. Cumulative reclamation progression**

<b>Date</b>	<b>EPEA-approved footprint</b>	<b>Mine site footprint</b>	<b>Plant site footprint</b>	<b>Total active footprint</b>	<b>Cleared<sup>1</sup></b>	<b>Disturbed<sup>1</sup></b>	<b>Ready for reclamation<sup>1</sup></b>	<b>Soils placed (terrestrial and wetlands &amp; aquatics)<sup>1</sup></b>	<b>Permanent reclamation (terrestrial)<sup>1</sup></b>	<b>Permanent reclamation (wetlands &amp; aquatics)<sup>1</sup></b>	<b>Temporary reclamation (terrestrial)<sup>1</sup></b>	<b>Certified</b>
Dec. 31 of the previous year											-	
YYYY (reporting year)												

<sup>1</sup> The sum of these columns must equal the total active footprint.  
Standardization of this table is mandatory.



120) Provide a graph similar to figure 1 that shows the cumulative age of reclamation and that depicts the impact of reductions in reclamation. Highlight on the graph where the number of hectares changed since the previous reporting year.

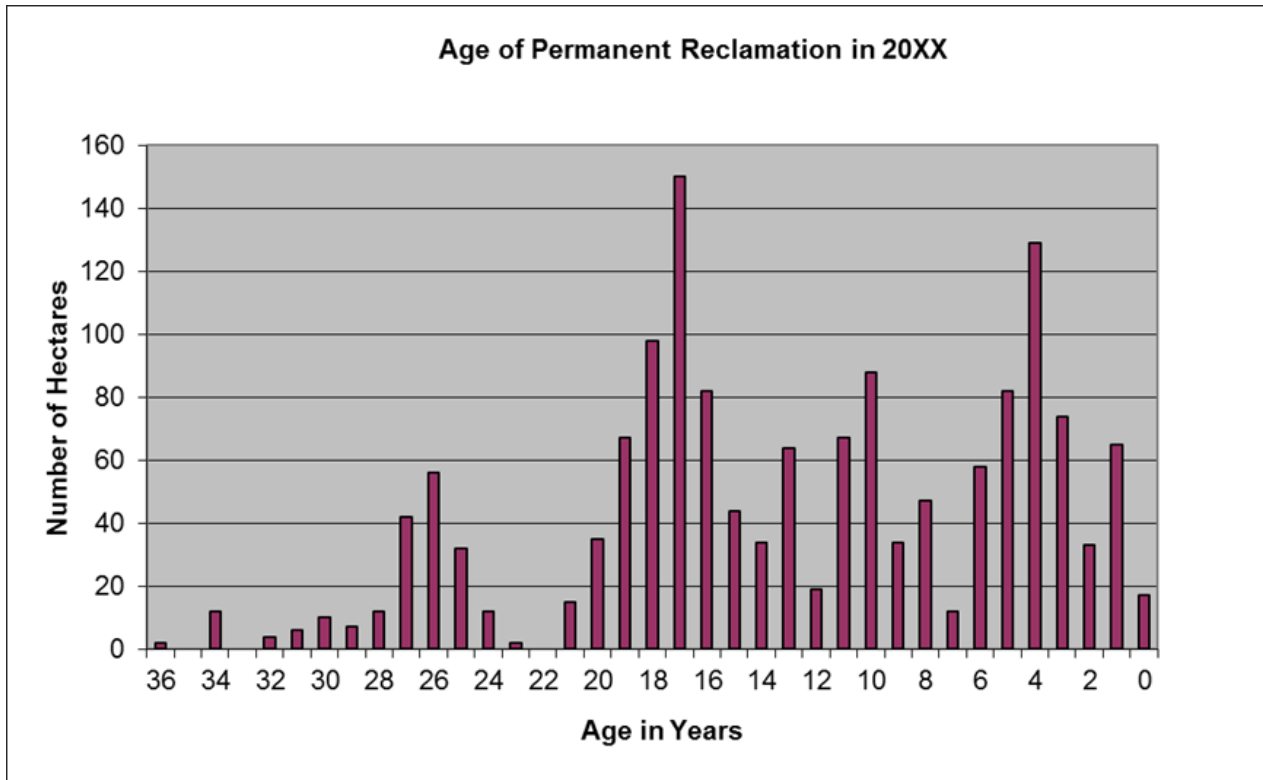


Figure 1. Age of permanent reclamation

4.5.2 Reporting Year Reclamation Progression

121) Summarize the reclamation activities completed during the reporting year and the change in land status categories. Describe the location and extent of clearing, disturbance, capping material placement, reclamation material placement, revegetation, temporary reclamation, and certification during the reporting year.

122) Complete table 24 detailing the reclamation activities completed during the reporting year.



**Table 24. YYYY reclamation progression summary**

Closure polygon	Sub-closure polygon	Total active footprint	Cleared	Disturbed	Ready for reclamation	TERRESTRIAL permanent reclamation activities							WETLANDS & AQUATICS permanent reclamation activities							TEMPORARY reclamation activities	YYYY certified		
						Recontouring		Soils placed	Revegetation			YYYY total permanent terrestrial reclamation	Capping material placed	Soils placed		Revegetation			YYYY total permanent wetlands reclamation	YYYY total temporary terrestrial reclamation			
						Capping material placed	Recontoured	Reclamation material placed	Non-woody species planted <sup>1</sup>	Trees planted	Shrubs planted			Reclamation material placed	Peatland propagule transfers <sup>2</sup>	Non-woody species planted <sup>1</sup>	Trees planted	Shrubs planted					
Totals																							

All requirements must be reported in hectares (ha) with the exception of Operational Area and closure polygon and sub-closure polygon.

Areas (ha) can be recorded in multiple columns (e.g., if recontouring, reclamation material placement and seeding all occurred within the same reporting year for an area, then number of hectares would be recorded in each of those respective columns).

<sup>1</sup> Includes the forb, grass, moss, and lichen stratum to be introduced through a variety of means.

<sup>2</sup> Living plants plus a layer of peat from donor sites.

Standardization of this table is mandatory.





4.5.2.1 Corrections to Previously Reported Data

- 123) Explain any changes to previously reported reclamation progression data. Include all corrections and adjustments to the previous year’s report as requested by an AER feedback letter.
- 124) If any reductions<sup>6</sup> in permanent reclamation occurred during the reporting year, describe all permanent reclamation reductions. Identify the closure polygons and the sub-closure polygons in which the reductions occurred, and explain the reason for the reductions.

4.5.3 Infrastructure Decommissioning

- 125) Complete table 25 with decommissioning or abandonment activities that were completed in the reporting year in order to prepare planned reclamation areas for recontouring.

**Table 25. Decommissioning and abandonment in the reporting year**

Infrastructure name	Description of decommissioning or abandonment activities <sup>2</sup>	Closure polygon	Start date (mm/dd/yyyy)	Completion date (mm/dd/yyyy)	Completed as proposed in the MRP	Meets requirements <sup>1</sup>

<sup>1</sup> Confirmation that the decommissioning or abandonment activities met the applicable requirements for the activity (e.g., dam decommissioning, well abandonment, etc.).

<sup>2</sup> Examples of decommissioning or abandonment activities: removal of surface infrastructure, such as buildings, roads, pipes, and culverts; and removal of underground infrastructure in preparation for reclamation activities.

Reference may be made to other documents that include the details of the activity.

Standardization of this table is optional.

4.5.4 Topography, Landform Design, and Water

4.5.4.1 Landform Design and Reclamation Continuity

- 126) Discuss any geotechnical changes or settlement that occurred in the reporting year that affect or might affect the reclamation outcomes. Indicate whether any mitigation action was required to reduce the risk to the reclamation outcomes.
- 127) Discuss any events (e.g., natural, hydrological) that occurred in the reporting year and that affected reclaimed landform design. Include mitigation action taken or proposed to be taken to reduce the risk to reclamation outcomes.
- 128) Provide a topographic map for each landform or for parts of landforms constructed in the past year. Show, on each map, the constructed reclamation drainage features and surface water inputs and outputs on each map that connect with the planned drainage design.

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<sup>6</sup> Must align with figure 1, age of permanent reclamation.

129) Identify any new, expanded, or deepened shallow wetlands that resulted from settlement.<sup>7</sup>

#### 4.5.4.2 Water Quality

130) Provide a summary of water quality results for reclaimed water features (excluding compensation lakes)<sup>8</sup> and wetlands that are exposed to expressed tailings water. Compare the results with the results of predictive models (current and historical) and explain any differences. Include the rationale if not sampling the same parameters as the predictive models. Approval holders must keep a detailed record of results for audit purposes.<sup>9</sup>

#### 4.5.5 Reclamation Material Management

##### 4.5.5.1 Salvage & Conservation of Reclamation Material

131) Provide maps that show, by reclamation material type, where reclamation material (including suitable overburden) was salvaged in the previous year. Show stockpiling or direct placement locations for each salvage area. Identify areas where clearing and disturbance occurred but where salvage did not.

132) Complete table 26 to confirm that contributions to the reclamation and capping material inventory are aligned with the MRP material balance and inventory.

**Table 26. Reclamation and capping material inventory contribution (year YYYY)**

	Year
Reclamation material types	RMS starting volume (m <sup>3</sup> )
	Salvaged (m <sup>3</sup> )
	Used for wetland reclamation (m <sup>3</sup> )
	Used for upland reclamation (m <sup>3</sup> )
	Sent to/from RMS (m <sup>3</sup> )
Capping material types	Source starting volume (m <sup>3</sup> )
	Salvaged (m <sup>3</sup> )
	Used for reclamation (group 1) (m <sup>3</sup> )
	Used for tailings management (group 2) (m <sup>3</sup> )
	Sent to/from RMS (m <sup>3</sup> )

Standardization of this table is mandatory.

133) Provide details about the reclamation material stockpiled (table 27). Volumes stockpiled should align with storage volumes planned and the overall material balance for the project. Only indicate reclamation material stockpile locations that changed within the reporting year.

<sup>7</sup> This requirement is in alignment with decisions resulting from the tailings management framework.

<sup>8</sup> Reference to a separate document is acceptable if data is reported in another submission.

<sup>9</sup> This requirement is in alignment with decisions resulting from the tailings management framework.

**Table 27. Reclamation material stockpiled**

Stockpile ID/location	Reclamation material types	Volume in/out (m <sup>3</sup> )	YYYY	
e.g., RMS1	e.g., Peat mineral mix	RMS start volume		
		In		
		Out		
		RMS end volume		
	e.g., Subsoil		RMS start volume	
			In	
		Out		
		RMS end volume		
		Total		

Standardization of this table is mandatory.

134) Identify and explain any deviations, from the MRP, of reclamation and capping material salvage and inventory.

4.5.5.2 Reclamation Material Placement

135) Provide maps that show where reclamation and capping material was placed in the reporting year, the source locations and type of reclamation material, and reclamation cover designs. Differentiate between direct placement and placement from stockpile locations.

136) Provide capping material placement data (table 28) for each location where capping material was placed.

**Table 28. Capping material YYYY placement**

Closure polygon / sub-closure polygon	Placement area (ha)	Substrate type	Capping material type placed	Capping material depth (m)	Capping material volume placed (m <sup>3</sup> )	Capping material source	Purpose of cap

Standardization of this table is mandatory.

137) Provide details about the reclamation material placed (table 29) for each location where reclamation material was placed.

**Table 29. Reclamation material placement YYYY**

Closure polygon and sub-closure polygon	Placement area (ha)	Volume of each reclamation material type (m <sup>3</sup> )	Material source	Cover design (including horizon depths) (m)	Placement technique (e.g., rough placement/texturing)

Standardization of this table is mandatory.

138) Provide the mean cover depth (in metres) calculation as directed by the AER and an explanation of input parameters to the calculation, as needed.

139) Provide the results of the assessments conducted following placement of reclamation material, including

- a map that shows all inspection and sampling locations and that aligns with sub-closure polygons;
- a summary of data collected at each inspection and sampling location;
- details of criteria placement assessed for placement depth, physical properties, and chemical properties;
- a table identifying all survey results that did not meet criteria for placement depth or quality;
- a map identifying all sampling locations where results of the survey did not meet criteria for physical or chemical properties; and
- an evaluation of whether results were satisfactory.

#### 4.5.6 Vegetation

##### 4.5.6.1 Vegetation Clearing

Approval holders must maintain records of merchantable timber salvage from the MSL (types and volumes) for audit purposes but are not required to report on them annually.

140) Provide maps that show where vegetation clearing activities occurred in the reporting year. Include where timber salvage and woody debris collection occurred. Provide the area associated with each activity. Activities must be aligned with the annual reclamation progression targets presented in the MRP.

##### 4.5.6.2 Revegetation

141) For each closure polygon where permanent reclamation occurred, complete table 30.

**Table 30. Permanent reclamation (revegetation) YYYY activity**

	Insert closure polygon name		Insert closure polygon name		Insert closure polygon name	
	Insert sub-closure polygon name	Insert sub-closure polygon name	Insert sub-closure polygon name	Insert sub-closure polygon name	Insert sub-closure polygon name	Insert sub-closure polygon name
<b>Tree species<sup>1</sup> planted</b>						
<b>Planting density of tree species<sup>1</sup> (stems/ha)</b>						
<b>Tree species<sup>2</sup> planted</b>						
<b>Planting density of tree species<sup>2</sup> (stems/ha)</b>						
<b>Shrub species planted<sup>1</sup></b>						
<b>Combined planting density of all shrubs (stems/ha)</b>						
<b>Non-woody<sup>2</sup> species planted<sup>1</sup></b>						

<sup>1</sup> Multiple species may be listed.

<sup>2</sup> Includes the forb, grass, moss, and lichen stratum to be introduced through a variety of means.

Standardization of this table is mandatory.

#### 4.5.7 Reclamation Maintenance

142) Provide reclamation maintenance activity (table 31) for each permanent reclamation polygon.

**Table 31. Permanent reclamation maintenance activity YYYY**

Closure polygon	Closure sub-polygon	Maintenance activity <sup>1</sup>	Application type <sup>2</sup>	Application method <sup>3</sup>	Application rate <sup>3</sup>

<sup>1</sup> Includes activities such as fertilization, weed/pest control, infill planting, erosion control, stand improvement, etc.

<sup>2</sup> For fertilizers, herbicides, and pesticides, indicate the type used. For fertilizers, include major macronutrients such as nitrogen, phosphorous, and potassium.

<sup>3</sup> For fertilizers, herbicides, and pesticides.

Standardization of this table is optional.

#### 4.5.8 Reclamation Monitoring

Reclamation monitoring data is not required as an annual submission; however, information is to be collected and made available to the regulator upon request, upon application for reclamation certification, or as required by *EPEA* approval conditions.

143) Results of the monitoring program must be used to adapt practices and plans and to show that the approval holder is tracking the progress towards achieving a self-sustaining, locally common boreal forest ecosystem that is integrated into the surrounding area.

144) Provide a summary of reclamation monitoring activities that occurred in the reporting year.

## Appendix 1 References

- Agriculture and Agri-Food Canada, Publication 1646, 1998, as amended. *The Canadian System of Soil Classification* (Third Edition).
- Alberta Government, 2010, *Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region*.
- Alberta Government, 2012, *Lower Athabasca Regional Plan*.
- Alberta Government, 2016, *Forest Genetic Resource Management and Conservation Standards*.
- Alberta Government, 2017, *The General Status of Alberta Wild Species*.
- Alberta Environment and Sustainable Resource Development (ESRD), 2015, *Alberta Wetland Classification System*. Water Policy Branch, Policy and Planning Division, Edmonton, AB.
- Beckingham, J.D. and J.H. Archibald, 1996, *Field Guide to Ecosites of Northern Alberta. Special Report 5*. Edmonton: Northern Forestry Centre, Forestry Canada, Northwest Region.
- Cumulative Environmental Management Association, 2014, *Guidelines for Wetlands Establishment on Reclaimed Oil Sands Leases*, Third Edition.

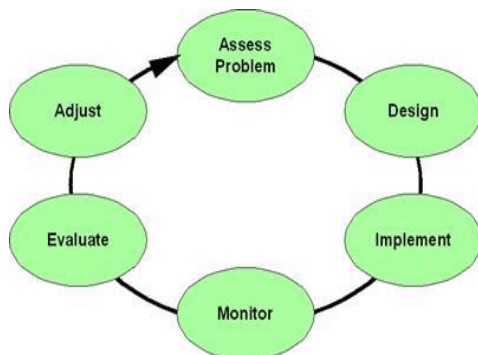




## Appendix 2 Glossary of Terms

Adaptive management

A management approach that involves the monitoring and evaluation of performance followed by any necessary actions to achieve the intended performance objectives. Adaptive management also allows information to be fed back into the planning and design process so that future performance will meet the intended outcomes.



Biodiversity and reclamation diversity

Biodiversity is the diversity of life, including plants, wildlife, and fish and the habitats or ecosystems they inhabit.

Reclamation diversity refers to the variety or diversity of reclaimed ecosystems (ecosites and wetland classes) that will constitute suitable habitat for a variety of wildlife and fish species and provide areas for recreation, hunting, and the harvest of plant species used by indigenous communities.

Capping material

Material used as an overlaying or covering stratum. Capping material is broken into two groups based on purpose:

- Group 1: reclamation:

Suitable overburden or tailings sand that meets the chemical criteria for suitable overburden and that is used to provide rooting-zone protection above unsuitable material in accordance with *EPEA* approval conditions.

- Group 2: tailings management:

Material that is used on a tailings deposit to help treated tailings reach ready-to-reclaim criteria and trajectory as approved in the tailings management plan, or that is placed to make the deposit accessible to reclamation equipment (e.g., landform development and stability, settlement management, expressing tailings pore water and controlling the expression of tailings pore water, water table control, landform contouring to facilitate the flushing of salts from the capping material, etc.). If the material used to cap for this purpose is considered unsuitable, another cap is needed for root-zone protection.

It is also possible for capping material to fall under both groups if the material is suitable. If this is the case, use group 1 for planning and reporting, but ensure that the volumes account for both purposes.

Certified

Areas that have received a reclamation certificate under the *Environmental Protection and Enhancement Act*. These areas are not counted in the total active footprint calculation because they are no longer active. (These lands are available to be returned to the Crown.)

Cleared	<p>Areas where vegetation has been removed to prepare the land for drainage, soil removal, overburden removal, mining, etc., but where soil has been left mostly intact and relatively undisturbed. May include tree removal, shrub removal, and grubbing (stump removal). For the purpose of annual reporting, it is possible that land can move directly to the “disturbed” category and bypass the “cleared” category if the activities occur within the same reporting period, or if the land did not require clearing.</p>
Closure polygon	<p>Geographic areas that are within the boundary of the LMCP and that are defined by reclaimed landform features or considerations related specifically to reclamation and closure planning and management. Closure polygons are used to track distinct parcels of land within the project boundary as they move through the project life cycle milestones (e.g., planning, clearing, salvage, operation, recontouring, placement, revegetation, reclaimed), and to show clear alignment between the LMCP and MRP.</p>
Construction	<p>Areas that are undergoing clearing or disturbance, including removing vegetation and salvaging reclamation material.</p>
Cover soil	<p>Any of the following:</p> <ul style="list-style-type: none"> <li>• Upland surface soil</li> <li>• Transitional soil</li> <li>• Organic horizons</li> <li>• Peat-mineral mix</li> </ul>
Decommissioning	<p>The permanent closure of all or part of the project, followed by</p> <ul style="list-style-type: none"> <li>• removal of equipment, buildings, and other structures (dismantling);</li> <li>• decontamination of the surface and subsurface.</li> </ul> <p>Defined in the <i>EPEA</i> approval as the dismantling and decontamination of a plant or any part of a plant undertaken after the termination or abandonment of any activity or any part of any activity regulated under the act. “Plant” refers to both the plant site footprint and the mine site footprint (i.e., the project).</p> <p>Depending on what is being decommissioned, there is a link between the <i>EPEA</i> reclamation requirements below that needs to be considered when developing and implementing the decommissioning plans;</p> <ul style="list-style-type: none"> <li>• abandonment under the <i>OSCA</i> (from section 1(2)(a.1) of the <i>Oil Sands Conservation Regulation</i>: “abandonment” means the permanent dismantlement of a mining operation, an in situ operation, a mine site, an in situ operation site or a processing plant and includes any measures required to ensure that the mining operation, in situ operation, mine site, in situ operation site or processing plant is left in a permanently safe and secure condition) and;</li> <li>• abandonment and decommissioning of dams or canals under the <i>Water Act</i> (as outlined in the plan for decommissioning of the dams required by section 32 of the <i>Water (Ministerial) Regulation</i>).</li> </ul> <p>Decommissioning includes activities such as remediation; decommissioning of dams; removal of surface infrastructure, such as buildings, roads, pipes, and culverts; removal of underground infrastructure, etc.</p>
Decontamination	<p>The treatment or removal of substances from the plant and disturbed lands.</p>

Direct placement	A combined salvage and placement operation wherein reclamation material is moved directly from the area of salvage to the area of placement.
Dismantling	The removal of buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling facilities, railways, roadways, pipelines, and any other installations that are being or have been used or held for or in connection with the project.
Disturbed	Land that is used for the project and on which soil for reclamation has been removed or covered by other materials. For the purposes of annual reporting, this category includes all areas where soil removal, overburden removal, active mining, discard placement, material storage, etc., has occurred.
Ecosite	An ecological unit that develops under specific environmental influences (climate, moisture, and nutrient regime) as defined in <i>Field Guide to Ecosites of Northern Alberta</i> , Beckingham and Archibald, 1996, as amended.
Ecosite phase	A subdivision of an ecosite based on the dominant tree species in the canopy, as defined in <i>Field Guide to Ecosites of Northern Alberta</i> , Beckingham and Archibald, 1996, as amended.
<i>EPEA</i> approved footprint	The total area that has been approved under the <i>EPEA</i> approval issued by the regulator and on which the project has had or will have direct land disturbance, temporary or permanent.
Forest ecosystem	The sum of the plants (predominantly trees and other woody vegetation), animals, environmental influences, and their interactions.
Infrastructure	<p>Any works, buildings, structures, facilities, equipment, apparatus, mechanism, instrument, or machinery belonging to or used in connection with an oil sands processing plant and mine. Includes the following:</p> <ul style="list-style-type: none"> <li>• Disposal sites or facilities (including buried waste locations)</li> <li>• Pipelines and other buried infrastructure (e.g., pilings, buried equipment, etc.)</li> <li>• Process and pollution-abatement equipment</li> <li>• Railways</li> <li>• Roadways (including access roads and haul roads)</li> <li>• Storage sites or facilities</li> <li>• Tailings ponds</li> <li>• Utilities and other installations</li> <li>• Vessels</li> <li>• Water, wastewater, and runoff handling facilities</li> <li>• Wells</li> </ul>
Landform design	<p>A process for conceiving and planning how to develop the various shapes of the reclaimed land surface to meet the desired reclamation outcomes.</p> <p>The design process for post-mining landforms and landscapes requires an integrated and multidisciplinary approach with iterations that will typically last several decades, and it must adopt adaptive management principles.</p>
Land reclamation	The stabilization, recontouring, maintenance, conditioning, reconstruction, and revegetation of the surface of the land to a state that permanently returns the project to an equivalent land capability.

LFH	The organic horizons developed primarily from accumulation of leaves, twigs, and woody material with or without a minor component of mosses. They are normally associated with upland forested soils that have imperfect drainage, or are drier, as defined in <i>The Canadian System of Soil Classification</i> (Third Edition), Agriculture and Agri-Food Canada, Publication 1646, 1998, as amended.
Macro, meso, and micro topography	<p>Macrotopography in the context of a mine site refers to the design of broad drainage/hydrologic features such as channels, lakes, and wetlands.</p> <p>Mesotopography means topography at the landform scale with spatial extents of 10 to 100+ metres. Includes surface drainage features such as hummocks and swales that require an engineered design.</p> <p>Microtopography means topography at the landform scale with spatial extents of 1 to 10 metres. Results from reclamation soil management and differential settlement.</p>
Mapping scale	Refers to the level of detail that an area is mapped in and must be large enough to show the detail of data being represented on the map. Mapping scale, including the amount of detail of features represented, depends on what must be adequately represented and how the maps will be used.
Mine site footprint	<p>All direct land disturbance (cleared, disturbed, or reclaimed), temporary or permanent, made by the mine (i.e., any opening in, excavation in, or working of the surface or subsurface for the purpose of working, recovering, opening up, or proving the presence of oil sands or an oil-sands-bearing substance). The footprint includes any associated infrastructure.</p> <p>For the purpose of planning and reporting, the mine-site footprint includes tailings ponds and tailings-related structures.</p>
Organic horizon	An organic horizon (L, F, H, or O horizon types) containing more than 17 per cent organic carbon by weight, as defined in <i>The Canadian System of Soil Classification</i> (Third Edition), Agriculture and Agri-Food Canada, Publication 1646, 1998, as amended.
Overburden	Material below the soil profile and above the bituminous sand.
Peat-mineral mix	<p>A mixture of an organic horizon (that may include peat) with one of the following:</p> <ul style="list-style-type: none"> <li>• Underlying mineral material</li> <li>• Subsoil from another location</li> <li>• Suitable overburden</li> </ul> <p>The peat-mineral mix is a reclamation material used to make up the volumes required for cover-soil placement when upland surface soil is limited. Adding mineral soil to peat improves the tilth and reduces the risk of losing organic matter.</p>
Permanently reclaimed	Land is considered permanently reclaimed when landform construction and recontouring, clean material placement (as required), reclamation material placement, and revegetation has taken place. For annual reporting purposes, land cannot be listed under permanent reclamation until revegetation has occurred as specified under the approved MRP.

Permanent reclamation activities	<p>Activities that support permanent reclamation, such as landform construction and recontouring, clean material placement (where necessary), reclamation material placement, and revegetation. They include the following:</p> <ul style="list-style-type: none"> <li>• Capping material placed—where a clean cap (group 1, capping material) of tailings sand, overburden, or subsoil is placed in accordance with <i>EPEA</i> approval conditions</li> <li>• Recontoured—where sloping/contouring in preparation for reclamation material placement</li> <li>• Reclamation material placed—where reclamation material has been placed in accordance with approved mine-reclamation plans</li> <li>• Peatland propagule transfers—where living plants plus a layer of peat from donor sites have been directly placed (not placed from stockpile) for wetland reclamation to act as a propagule source for revegetation as well as a (soil) reclamation material</li> <li>• Non-woody species planted—where forbs, grass, moss, or lichens have been introduced.</li> <li>• Trees planted—where trees have been planted in accordance with the approved mine-reclamation plan</li> <li>• Shrubs planted—where shrubs have been planted in accordance with the approved mine-reclamation plan</li> </ul>
Plant-site footprint	<p>All land directly disturbed (i.e., cleared, disturbed, or reclaimed) by an oil sands processing plant (i.e., all buildings, structures, process equipment, pipelines, vessels, storage and material handling facilities, roadways, and other installations used in and for the oil sands processing plant, including the land that is used in or for the plant).</p> <p>For planning and reporting purposes, it does not include tailings ponds and tailings-related structures.</p>
Rare plant	<p>Plant species that exist in low numbers, have a restricted range, or are of conservation concern due to population trends or threats (Kemper 2009) and are included on the current Alberta Conservation Information Management System list of all tracked and watched elements.</p>
Ready for reclamation	<p>Areas that are no longer required for mine or project purposes and are available for reclamation but where reclamation has not yet started.</p>
Reclamation-cover design	<p>The sequence and depth of successive layers of specific categories of reclamation material, beginning with cover soil and extending downward to the substrate on which it is placed.</p> <p>Reclamation-cover design can be defined by the approval holder as including substrate or not; however, the approval holder must ensure clear definitions and consistency throughout plans and reports.</p>
Reclamation material	<p>Any of the following:</p> <ul style="list-style-type: none"> <li>• Coarse woody debris</li> <li>• Cover soil</li> <li>• Subsoil</li> <li>• Suitable overburden</li> </ul>
Recontouring	<p>Any activity related to the movement of substrate and capping material during land reclamation for the purpose of creating a surface that supports the closure landscape.</p>

Remediation	Reducing, removing, or destroying substances in soil, water, or groundwater by applying physical, chemical, or biological processes.
Revegetation	Any activity related to growing vegetation in areas being reclaimed (including seeding, and planting trees and shrubs).
Self-sustaining	Able to support various land uses with no intervention (e.g., continual use of fertilizers, ongoing maintenance, or any other special management) after land conservation and reclamation is complete (following an operating and monitoring period). To meet regulatory requirements, the reclaimed ecosystem must be capable of meeting certain criteria in the absence of ongoing monitoring and maintenance.
Settlement	A lowering of the ground surface (gradual or sudden) due to a reduction in volume through settling or other means, or by subsurface movement of earth materials. Commonly referred to as subsidence during reclamation.
Shrubs planted	Shrubs that have been planted in accordance with the approved land reclamation and revegetation plans.
Soil	The naturally occurring, unconsolidated mineral or organic material that is at least 10 centimetres thick, occurs at the earth's surface, and can support plant growth, as defined in <i>The Canadian System of Soil Classification</i> (Third Edition), Agriculture and Agri-Food Canada, Publication 1646, 1998, as amended.
Soil placement	Any activity related to the placement of reclamation material onto the recontoured landscape in accordance with <i>EPEA</i> approval conditions and an approved mine reclamation plan.
Species at risk	Any species <ul style="list-style-type: none"> <li>• identified by the <i>Alberta Wildlife Act</i> as “endangered” or “threatened;” and</li> <li>• listed in <i>The General Status of Alberta Wild Species</i> as “at risk,” “may be at risk,” or “sensitive;” <ul style="list-style-type: none"> <li>– classified as “at risk” by the Committee on the Status of Endangered Wildlife in Canada; or</li> <li>– listed under schedule 1 of the <i>Canadian Species at Risk Act</i>.</li> </ul> </li> </ul>
Stockpile	Stockpile area for salvaged reclamation materials.
Subsoil	A stratum that includes one or more of the following: <ul style="list-style-type: none"> <li>• That portion of the B horizon left after salvage of upland surface soil</li> <li>• The C horizon of an upland soil</li> <li>• The C horizon of an organic soil (e.g., Terric layer)</li> </ul>
Substrate	The material at the surface of a landform before placement of reclamation material.
Suitable overburden	Overburden that has a pH less than or equal to 8.0, an electrical conductivity less than or equal to 5 dS m <sup>-1</sup> , and a sodium adsorption ratio less than or equal to 8.
Tailings	A by-product of the bitumen extraction process, such as water and sands, fines or residual bitumen, or other hydrocarbons or any combination of these.

Temporary reclamation	Areas being managed where topsoil has been placed and vegetation has been seeded, planted, or ingressed, and where future disturbance may occur in that location and in ditches along a road planned to be reclaimed. This does not include soil stockpiles that have a vegetative cover.
The project	A mineable oil sands site that includes an oil sands processing plant and mine being developed to extract oil sands deposits by surface mining and to produce oil sands products as applied for and approved under <i>EPEA</i> .
Total active footprint	The total active footprint includes the total area of land cleared, land disturbed, and land temporarily or permanently reclaimed, including land on which reclamation material has been placed but where the land does not yet meet the definition of permanent reclamation (e.g., is not yet revegetated).
Transitional soil	A soil developed on mineral parent material under forest in locations with imperfect drainage or wetter conditions, typically including organic horizons that are less than 40 cm deep over a mineral horizon.
Trees planted	Trees that have been planted in accordance with the approved conservation and reclamation and revegetation plans.
Wetland	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. Wetlands are separated into five classes: fen, bog, marsh, swamp, and shallow open-water wetlands (includes open-water areas < 2 m deep with wetland characteristics).
Wetland class	A classification of wetlands based on the <i>Alberta Wetland Classification System</i> , Alberta Environment and Sustainable Resource Development (ESRD), 2015, as amended. There are five broad wetland classes (bog, fen, marsh, shallow open water, and swamps).
Year	The calendar year, unless specified otherwise.





### Appendix 3 Integration of Conservation, Reclamation, and Closure Planning and Reporting Requirements

	<b>Project application, EIA, amendment application, renewal</b>	<b>EPEA renewal application</b>	<b>Life of mine closure plan</b>	<b>Mine reclamation plan</b>	<b>Annual reclamation progress tracking report</b>	<b>Reclamation certificate application</b>
Purpose	EIA decision and project approval.	EPEA renewal	Define conservation and reclamation outcomes that align with the <i>Lower Athabasca Regional Plan</i> , the project application, and the tailings management framework.	Alignment of site-specific conservation and reclamation activities with the project-level outcomes outlined in the LMCP. Alignment of reclamation outcomes with the Mine Financial Security Program.	Standardizes reporting of the conservation and reclamation information required to demonstrate compliance with terms and conditions of the EPEA approval, implementation of approved plans (MRP), and alignment with outcomes (LMCP).	Confirmation that reclamation outcomes have been met and equivalent capability has been achieved. Returns land to the Crown.
Frequency & duration	As required	10 years	Frequency: 10 years Duration: life of project	Frequency: 3 years Duration: 3+ years	Frequency: annual Duration: previous year's activity	As available
Content	Project-level conservation and reclamation outcomes and goals. Conceptual development and reclamation plans for life of project.	Project-level conservation and reclamation outcomes and goals. Conceptual development and reclamation plans for the life of the project. Assessment of the last 10 years of operations.	Proposed conservation and reclamation strategies Conceptual and integrated reclamation planning for the life of the project. Provides a project-level, long-term plan for achieving long-term, sustainable environmental outcomes after closure.	Site-specific, shorter term, detailed and integrated conservation and reclamation planning for the upcoming 3+ years. Targets set for compliance assurance. Use site-specific information collected through monitoring and research to develop plans for conservation and reclamation of the project. Provides reclamation targets for the MFSP.	Annual summary of disturbance and conservation and reclamation activity that occurred in the previous year. Validates MRP plans and LMCP outcomes. Confirms progression towards conservation and reclamation plans liability reduction.	Summary of activities and monitoring results to confirm that the reclaimed landscape is on a trajectory towards equivalent capability.
Predisturbance	Detailed assessment of information to support the development of the environmental impact assessment (not applicable to renewals).		Summary of relevant pre-approval environment to help determine whether planned outcomes are of equivalent land capability			
Compliance	Through EPEA approval conditions.	Through EPEA approval conditions.	Measured through MRP.	Must conduct all conservation and reclamation activities in accordance with the MRP authorized by the AER.	Approval holder is required to generate and submit the annual reclamation progress tracking report in accordance with the EPEA approval and this SED unless otherwise notified in writing by the AER.	



## Appendix 4 Landscape Design Checklist

The landscape designer (or evaluator) must address the following design issues so that the landscape will sustain proposed end-land uses and equivalent capability.

Design item	Action
<b>Planning</b>	
1. Regulations, agreements, and corporate objectives	1.1 Prepare a list of all applicable regulations and agreements being considered in the design. 1.2 Prepare a list of all specific corporate objectives. 1.3 Design the landscape to clearly meet these objectives.
2. Technology selection	2.1 Select technologies that produce materials that can be reclaimed to the desired end land use. 2.2 Evaluate all competing technologies using formal screening processes that consider life-cycle economics and environmental impacts.
3. Footprint – size/location	3.1 Design the footprint considering all relevant issues. 3.2 Resolve and document lease-boundary issues with adjacent users. 3.3 Resolve and document issues about mining up to or through rivers, lakes, wetland, and other natural features. 3.4 Integrate the footprint into closure landscape commitments and plans.
4. Mass balances	4.1 Design to accommodate material balances. 4.2 Ensure that plans and schedules meet operational and long-term goals and include the transition (and retrofitting) from an operational landform to a reclamation landform.
5. Preservation of by-product resources	5.1 Store any by-product that is considered a potential future resource in such a way that it can be recovered in a manner acceptable to the AER and AEP, and that the post-recovery landscape has the capability to meet environmental and end-land-use goals. 5.2 Design and manage by-product landforms to reduce the risk of combustion triggered by internal (e.g., spontaneous combustion) or external sources (e.g., lightning, wildfire).
6. Design for operations	6.1 Choose technologies that support the ongoing operation (e.g., that produce acceptable recycle water quality). 6.2 Design and schedule reclamation and closure activities to allow oil sands operations to continue. 6.3 Do not compromise operational safety to satisfy closure goals. 6.4 Design to promote timely and progressive reclamation.
7. Design for closure	7.1 Design landforms, including surrounding lands, to be consistent with the approved closure plan. 7.2 Plan all phases of construction and reclamation to achieve the closure landform. 7.3 Plan and schedule decommissioning of facilities and develop inventories of process-affected water, by-products, and wastes. 7.4 Integrate any long-term infrastructure into reclamation plans and landscape designs. 7.5 Design infrastructure with consideration of its future decommissioning and reclamation.
8. Closure management (pre-certification)	8.1 Design to avoid or limit the need for post-operational maintenance, and design for stable, self-sustaining landforms and to prevent redistribution of previously reclaimed lands.

Design item	Action
	<p>8.2 Identify areas requiring or at risk of needing post-operational monitoring and mitigation.</p> <p>8.3 Develop a monitoring and mitigation program for the period during and after construction and reclamation and until the landform is considered stable and suitable for reclamation certification.</p> <p>8.4 Explicitly consider monitoring and mitigation requirements where there is a potential for extreme events, and consider the impacts of targeted end-land use.</p> <p>8.5 Develop a conceptual plan for potential mitigation activities.</p>
9. Post certification	9.1 Design recognizing that no post-certification maintenance is envisioned under the <i>Environmental Protection and Enhancement Act</i> and the <i>Public Lands Act</i> .
Desired characteristics/goals	
10. End land use	<p>10.1 Design with human and wildlife health and safety as the highest priority.</p> <p>10.2 Design the landscape to meet the goals for targeted land use, including access and meeting equivalent capability targets on the whole lease.</p>
11. Soils	<p>11.1 Design and construct landform morphology and substrate to match the replaced soil's quality and to protect soils from loss and degradation.</p> <p>11.2 Design reclamation material layers to achieve the targeted soil capability.</p>
12. Vegetation	<p>12.1 Design topographic features, soils, and substrate to support vegetation to achieve end land uses.</p> <p>12.2 Create a vegetation plan that meets intended land uses over the entire a lease.</p> <p>12.3 Create a vegetation plan that meets intended land uses for landform.</p> <p>12.4 Design a vegetation plan to promote landform stability (erosion, water table, moisture).</p>
13. Wildlife	<p>13.1 Incorporate wildlife habitat and movement into the design of landform and landscape scales.</p> <p>13.2 Provide spatial attributes appropriate for wildlife and aquatic habitat goals.</p>
14. Aquatics	<p>14.1 Design drainage patterns, watercourses, and water bodies to be an appropriate combination of biological zones.</p> <p>14.2 Avoid pond/lake evapoconcentration that leads to unproductive water bodies.</p> <p>14.3 Indicate any water treatment wetlands that may be exempt from some aquatic ecology and influent water quality considerations.</p>
15 Geotechnical slope stability	<p>15.1 Design to protect slopes from instability.</p> <p>15.2 Design to protect downstream areas from effects of catastrophic release of mobile materials.</p> <p>15.3 Design to allow only acceptable consequences of potential flowslides.</p>
16. Trafficability / bearing capacity	<p>16.1 Plan construction techniques to enhance trafficability for reclamation.</p> <p>16.2 Design trafficability and bearing capacity to be compatible with the end land use.</p>
17. Natural appearance	17.1 Design topography to resemble natural landforms in the region.
18. Seepage and groundwater (quality and quantity)	<p>18.1 Design to protect groundwater from impacts that affect offsite or on-site end land use.</p> <p>18.2 Evaluate the reclamation water balance at all critical scales.</p> <p>18.3 Avoid reliance on seepage controls that require long-term maintenance.</p>

Design item	Action
	18.4 Evaluate landscape performance (geotechnical, soils, etc.) for long-term seepage conditions.
19. Surface water hydrology (quantity and quality)	19.1 Design an integrated landform, landscape and regional drainage system. 19.2 Design watercourses and water bodies to have the capacity to accommodate all ranges of hydrologic processes at acceptable rates of erosion. 19.3 Integrate operational and closure water balances to reduce the inventory of process-affected water at closure.
<b>Processes</b>	
20. Natural hazards and disturbing forces	20.1 Design landscapes to be acceptably stable under the target end land uses. 20.2 Design landscapes to be acceptably stable under a variety of natural hazards and extreme events, including fire, floods, drought, extreme precipitation, blight and disease, wind, earthquakes, and animal effects.
21. Erosion, transport, and sedimentation	21.1 Design operational wind and water erosion control measures where needed. 21.2 Design to accommodate all forms of erosion of (or depositing onto) landforms, including lakes and major drainages, at acceptable rates.
22. Settlement of fills	22.1 Design long-term properties and topography to accommodate settlement and to control any undesirable ponding. 22.2 Design a surface-water drainage system to accommodate settlement, including long-term saturation settlements and settlement of soft tailings.

Source: May 9, 2005, letter from Alberta Sustainable Resource Development, Alberta Environment, and the Alberta Energy and Utilities Board to the Cumulative Environmental Management Association