CONSERVATION AND RECLAMATION DIRECTIVE FOR RENEWABLE ENERGY OPERATIONS

Alberta Environment and Parks

Alberta

ACKNOWLEDGEMENT

The Government of Alberta would like to thank those who participated in the stakeholder sessions completed June 6-7, 2018 in Calgary and June 21-22, 2018 in Lethbridge. These comments and feedback on the previous draft were taken into consideration in the final version of the Conservation and Reclamation Directive for Renewable Energy Operations.

Information on conservation and reclamation requirements for renewable energy operations may be obtained from http://aep.alberta.ca

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PREFACE

The Government of Alberta's (GOA's) principles of responsible resource management require the balancing of environmental, social, and economic benefits of Alberta's resources for the good of all Albertans. This includes the protection of the province's land resources by ensuring land used for industrial activities is reclaimed in an environmentally sound manner. Alberta Environment and Parks provides an environmental stewardship framework and regulates natural resource access, allocation, and use through planning, policy, and compliance assurance programs. This is directed through the *Environmental Protection and Enhancement Act* (EPEA) and the Conservation and Reclamation (C&R) Regulation. Under *EPEA*, after a specified land activity has been decommissioned, Operators must obtain a reclamation certificate. Reclamation certificates are managed through Alberta Environment and Parks (AEP) and the Alberta Energy Regulator (AER).

The Climate Leadership Plan's renewable electricity target, along with the rollout of the Renewable Electricity Program, has led to increased activity by renewable energy proponents to develop projects in Alberta. With the growth of renewable energy operations on private land, landowners and environmental organizations have expressed increasing concerns with respect to the reclamation of these projects in the long-term. Like other specified land activities in the province, the land used for renewable energy operations (REOs; i.e., wind, solar and geothermal) after reclamation is expected to support various land uses similar to those that existed prior to the REO. The development of conservation and reclamation standards for renewable energy operations is timely given the increased activity and the need to align with conservation and reclamation requirements for other specified land activities.

The C&R Regulation outlines an Operator's obligation to reclaim specified land to equivalent land capability. This Conservation and Reclamation Directive for Renewable Energy Operations (referred to as the Directive) provides information on the conservation and reclamation plan requirements for REOs (referred to as the REO C&R Plan) on private and public land in Alberta. The conservation and reclamation planning requirements outlined in this document are expected to help ensure REO Operators are poised to meet equivalent land capability. It includes the minimum regulatory requirements and addresses a number of stakeholder recommendations from engagement sessions in 2018. Submitted as part of a project application package to the Alberta Utilities Commission (AUC), the REO C&R Plan must include project-specific information related to:

- Land use planning: including proposed changes to end land use
- Footprint tracking: temporary and progressive reclamation
- Site assessments: pre-disturbance, interim monitoring, and final reclamation certification
- Reclamation criteria

Pre-disturbance data provides important baseline information on the land capability of a site prior to construction and operation of an activity. REOs can be active for many years, and over time the surrounding landscape can change and ***may not*** be an appropriate representation of the original site and equivalent land capability. The pre-disturbance data also shows the potential limitations of a proposed site. A clear understanding of the pre-disturbance conditions of the site will enable the development of site specific conservation and reclamation measures in the REO C&R Plan. For example, original soil conditions may show variability in topsoil depth in an area already affected by previous development.

Interim monitoring following construction and progressive reclamation improves final reclamation outcomes, decreases final reclamation costs, and reduces ongoing liability to the Operator and the province. The REO

C&R Plan will be able to evolve and adapt based on social, environmental and operational conditions. Adaptive management can help accommodate change, allowing for site specific and adaptive goals that are reflective of the scale of the REO.

For the purpose of conservation and reclamation planning, the 2010 Reclamation Criteria for Wellsites and Associated Facilities provides the framework for how final reclamation success will be determined at the time of reclamation certification. These criteria are designed to evaluate equivalent land capability for the approved end land use and include the key aspects of landscape, soil and vegetation. The intent is to provide the Operator, stakeholders and regulating bodies transparency and clarity on what will be the measures for reclamation certification. It is recognized that the criteria ***may*** evolve, so careful planning from the beginning of the project is essential.

The Conservation and Reclamation Directive for Renewable Energy Operations will be reviewed by the Department and updated as necessary.

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END OF SECTION

LIST OF UPDATES

Update	Version	Section	Description
June 5, 2018	0.1		Draft: Released for external comment and stakeholder sessions held June 6-7, 2018 and June 21-22, 2018.
September 14, 2018	1.0		Version 1.0: External public release.

END OF SECTION

LIST OF ACRONYMS

AAF – Alberta Agriculture and Forestry

ACIMS – Alberta Conservation Information Management System

ACO – Aboriginal Consultation Office

AEP – Alberta Environment and Parks

AER – Alberta Energy Regulator

AER/AGS – Alberta Energy Regulator/Alberta Geological Survey

AGRASID – Agricultural Regions of Alberta Soil Information Database

ANHIC – Alberta Natural Heritage Information Centre

ASIC – Alberta Soil Information Centre

ASRD – Alberta Sustainable Resource Development

AVI – Alberta Vegetation Inventory

BBCH - Biologische **B**undesanstalt, **B**undessortenamt und **CH**emische Industrie, a scale used to identify the phenological development stages of a plant.

BMP – Best Management Practice

C&R – Conservation and Reclamation

CANSIS – Canadian Soil Information System

cm – centimeter

CORMAP – Core Content Standard Metadata Applciation Profile

CWD – Coarse Woody Debris

DIDs – Digital Integrated Dispositions

DEM – Digital Elevation Model

DEP – Derived Ecosite Phase

DTM – Digital Terrain Model

DRA – Desktop review assessment

ECSS – Expert Committee on Soil Survey

EGS – Ecological/Ecosystem Goods and Services

ELC – Equivalent Land Capability

EPEA – Environmental Protection and Enhancement Act

ESAR – Environmental Site Assessment Repository

ESRD – Environment and Sustainable Resource Development

FAA – Field Assessment Area

FGDC – Federal Geographic Data Committee

FGRMS – Forest Genetic Resource Management and Conservation Standards

FLMF – Foothills Land Management Forum

FVA – Field Verification Area

GOA – Government of Alberta

GVI – Grassland Vegetation Inventory

ha – hectare

ILM – Integrated Land Management

IMSA – Interim Monitoring Site Assessment

ISO – International Standards Organization

LAT – Landscape Analysis Tool

LiDAR – Light Detection And Ranging

LSA – Local Study Area

LSD – Legal Subdivision

NDVI – Normalized Difference Vegetation Index

m – metre

MW – megawatt

MSWG – Mapping Systems Working Group

PLVI – Primary Land and Vegetation Inventory

PDSA – Pre-Disturbance Site Assessment

QEP – Qualified Environmental Professional

RCSA – Reclamation Certificate Site Assessment

REO – Renewable Energy Operation

ROW – Right of Way

RPAS – Remotely Piloted Aircraft Systems (also called Unmanned Aircraft Systems, or UAVs)

SCWG – Soil Classification Working Group

SIR – Supplemental Information Requests

UTM – Universal Transverse Mercator

END OF SECTION

GLOSSARY

REFERENCES

In addition to the definitions below, this Directive draws on others from the following documents:

- 2010 Reclamation Criteria for Wellsites and Associated Facilities for: Cultivated Lands (GOA: ESRD, 2013b); Forested Lands (GOA: ESRD, 2013c); Native Grasslands (GOA: ESRD, 2013d); and Peatlands. (GOA: AEP, 2015c).
- Alberta Public Lands Glossary of Terms (GOA: AEP, 2017e).
- Glossary of Reclamation and Remediation Terms Used in Alberta – 7th Edition. (Powter, 2002)
- Wildlife Directive for Alberta Wind Energy Projects (GOA: AEP, 2017c).
- Wildlife Directive for Alberta Solar Energy Projects (GOA: AEP, 2017d).

TERMS

Adaptive Management: means a type of adaptive system that follows a "plan-do-check" approach to setting, meeting and evaluating place-based outcomes. The foundations of this approach are knowledge and performance management. These include: having the best information possible to set outcomes, continuously assessing conditions, and if outcomes are being met determining when adjustments to management actions are required. Outcomes are meant to be measured and evaluated continuously and management actions are determined and adjusted throughout the system.

Brownfield Site: means a commercial or industrial property which is, or possibly is, contaminated; is vacant, derelict, or underutilized, and is suitable for development or redevelopment.

Conservation: means for the purposes of this document, the planning, management and implementation of an activity with the objective of protecting the essential physical, chemical and biological characteristics of the environment against degradation.

Commission: A project state after construction is complete, when all renewable energy operation (REO) infrastructure is in place and ready to produce electricity.

Criteria: A basis for judging adequacy. Environmental criteria are usually compilations or digests of scientific data that are used for establishing environmental quality guidelines and objectives. Generic numerical limits or narrative statements intended as a general guidance for the protection, maintenance, and improvement of specific uses of soil, water, or land.

Cumulative Effects: for the purposes of this document, means the combined effects of past, present, and reasonably foreseeable land-use activities, over time, on the environment.

Decommission (see also "reclamation"): means the permanent closure of all or part of a specified land activity followed by removal of equipment, buildings and other structures, and the decontamination of the surface and subsurface. For the purposes of this document, decommissioning is included as part of the process of reclamation.

Directive: an official or authoritative instruction.

Director: means for the purposes of this Directive, a person designated as a Director, under the *Environmental Protection and Enhancement Act* (*EPEA*) or, an "official" under the Specified Enactments (Jurisdiction) Regulation.

Disturbance: for the purposes of this document, means any alteration of the natural landscape by anthropogenic processes (e.g., clearing vegetation, clearing of topsoil, compaction).

Disturbed Areas: areas of the lease or access that have undergone stripping or longitudinal effects like ruts. In some cases (e.g., soils that were not frozen) even though soil stripping was not conducted traffic may have caused compaction, pulverized soil, rutting or clodding to the extent that the native vegetation community and soil structures have been altered or removed.

Footprint (see also "Planned Footprint"): means the extent of any direct land disturbance, temporary or permanent, made from a specified land activity. This also includes all associated or incidental disturbances (e.g., temporary workspace, temporary access).

Geothermal: means energy captured from the heat stored beneath the earth's surface (https://www.nrcan.gc.ca/energy/renewable-electricity/7295#geo).

Indigenous Peoples: For the purposes of the present document, "Indigenous Peoples" refers to "Aboriginal Peoples of Alberta" within the meaning of Section 35 of the Constitution, 1982. This includes First Nations, Inuit and Métis Peoples of Alberta.

Infrastructure: Any and all equipment, structures and roads that are developed for a Renewable Energy Operation (e.g., wind, solar, geothermal) energy project.

Land Manager: For the purposes of this document includes the following:

- Private Lands: Includes the registered owner of the land, their designate, or occupant;
- Provincial Public Land, Parks, and Protected Areas: Includes staff from Alberta Environment and Parks (AEP);
- Municipal Land: Includes staff from the local municipal authority; and,
- Special Areas: Includes the Special Areas Board.

Machine-readable: data formats that can be automatically ready and processed by a computer, including but not limited to file types such as: CSV, JSON, XML, and SHP.

Metadata: is data submitted in association with project reports and data that provides information about one or more aspects (e.g., project details, Operator, project area boundaries), including a summary that makes tracking and working with the specific data easier.

Mitigation: means the process of rectifying an impact by repairing, rehabilitating, or restoring the affected environment, or the process of compensating for the impact by replacing or providing substitute resources or environments. This includes actions that lessen the severity and or duration of the effects on the environment.

Operator: for the purposes of this document, means an 'Operator' as defined under the *Environmental Protection and Enhancement Act* (*EPEA*) as the following:

- (i) an approval or registration holder who carries on or has carried on an activity on or in respect of specified land pursuant to an approval or registration,
- (ii) any person who carries on or has carried on an activity on or in respect of specified land other than pursuant to an approval or registration,
- (iii) the holder of a licence, approval or permit issued by the Alberta Energy Regulator or the Alberta Utilities Commission for purposes related to the carrying on of an activity on or in respect of Specified Land,
- (v) the holder of a surface lease for purposes related to the carrying on of an activity on or in respect of Specified Land,
- (vi) a successor, assignee, executor, administrator, receiver, receiver-manager or trustee of a person referred to in any of sub-clauses (i) to (v), and
- (vii) a person who acts as principal or agent of a person referred to in any of sub-clauses (i) to (vi).

Planned Footprint (see also "Footprint"): means the footprint boundary prior to the direct land disturbance occurring, or for the purposes of delineating the footprint boundary for the approval application.

Progressive Reclamation (see also "Temporary Reclamation"): means concurrent reclamation undertaken in association/connection with construction, development and ongoing operations leading to closure of a specified land activity. For these areas, cover soils may have been placed and/or vegetation has been seeded, planted or ingressed to enable establishment of the final approved plant community. Further disturbance is not expected at that location as the intent is to move towards closure of the activity.

Public Lands: For the purposes of this document includes the following:

- Public Land: are lands that are administered by Alberta Environment and Parks under the Public Lands Act and the Public Lands Administration Regulation; but not,
- Public Land administered under other provincial legislation (such as the Provincial Parks Act, the Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act) or by other provincial departments such as Transportation or Municipal Affairs;
- Special Areas: see below for definition;
- Municipal Land: are lands administered by municipal authorities.

Solar: means energy from the sun (or sunlight) in the form of radiated heat and light ().

Special Areas: are lands administered by the Special Areas Board under Municipal Affairs, provisions of the *Public Lands Act* and regulations are made applicable by a Ministerial Order under the *Special Areas Act.*

Qualified Environmental Professional: means a person with the knowledge and expertise to provide professional services related to land conservation and reclamation or related fields. In addition, is registered in Alberta with one or more professional associations, acts under that professional association's code of ethics, and is subject to disciplinary action by that professional association. A Qualified Environmental Professional ***must*** be qualified and a member in good standing with one or more of the following regulated professional organizations:

- Alberta Institute of Agrologists;
- Alberta Society of Professional Biologists;
- Association of Professional Engineers and Geoscientists of Alberta;
- Association of the Chemical Profession of Alberta;
- Association of Alberta Forest Management Professionals, or the,
- Association of Science and Engineering Professional Technologists of Alberta.

Reclamation (see also "Decommission"): means, for the purposes of this document, the process of restoring disturbed land to its former or other productive uses through any or all of the following: (i) the removal of equipment or buildings or other structures or appurtenances; (ii) the decontamination of buildings or other structures or other appurtenances, or land or water; (iii) the stabilization, contouring, maintenance, conditioning or reconstruction of the surface of land; (iv) any other procedure, operation or requirement specified in the regulations.

Renewable Energy Resource: means an energy resource that occurs naturally and that can be replenished or renewed within a human lifespan, including, but not limited to, (i) moving water, (ii) wind, (iii) geothermal or heat from the earth, (iv) solar or sunlight, and (v) sustainable biomass

Renewable Electricity: means electricity that has been produced from a renewable energy resource.

Renewable Energy Operation (REO): means a site or plant generating renewable electricity from a renewable energy resource.

Specified Land: is defined under the C&R Regulation as: *land that is being or has been used or held for or in connection with* the activities listed under Section 1(t). This includes any supporting activities temporary or permanent used to support those activities such as temporary access roads, and/or workspaces.

Temporary Reclamation (see also Progressive Reclamation): means reclamation undertaken in association/connection with construction, development and ongoing operations of a specified land activity where vegetation has been seeded, planted, or ingressed/natural recovery, where there is an expectation of further disturbance at that location. The purpose is to stabilize, manage erosion, and prevent weeds and invasive species. On forested public lands this more often entails the utilization of natural recover, rollback, geotextiles, planting trees to maintain plant propagules and the seedbed of native forested species. Where approved, native herbaceous species may be utilized as well.

Wind Energy: means the kinetic energy in wind converted into useful forms of energy such as mechanical energy, or electricity (https://www.nrcan.gc.ca/energy/renewable-electricity/7295#geo).

END OF SECTION

1 HOW TO USE THIS DOCUMENT

1.1 Legislative Authority

The Government of Alberta (GOA) protects the province's land resources by ensuring land used for industrial activities is conserved and reclaimed in an environmentally sound and timely manner. This is directed through the *Environmental Protection and Enhancement Act* (*EPEA*; GOA 2017a) and the Conservation and Reclamation Regulation (C&R Regulation; GOA 2018a).

The development of the Conservation and Reclamation Directive for Renewable Energy Operations (referred as the Directive in this document) is enabled under the C&R Regulation.

1.2 Conservation and Reclamation

1.2.1 Objective

The objective of the conservation and reclamation of specified land is to return the specified land to an equivalent land capability (ELC).

1.2.2 Specified Land

Specified land is defined under the Conservation and Reclamation Regulation (GOA 2018a) as: *land that is being or has been used or held for or in connection with* activities listed under Section 1(t) of the Regulation. This includes any supporting activities, temporary or permanent, including, but not limited to, temporary access roads, or workspaces.

For Renewable Energy Operations (REOs), temporary activities such as temporary roads and workspaces would be included under the definition of specified land. As such, areas used for these activities during the construction, operation, or reclamation of the REO ***must*** be identified in a project application and the Operator ***must*** obtain a reclamation certificate for these areas once they are no longer required.

1.2.3 Equivalent Land Capability

Ecological health, function and land operability are indicators of reclamation success and equivalent land capability (ELC). The ELC outcome is legislated through the C&R Regulation and Public Lands Administration Regulation and means:

- Under the C&R Regulation (GOA 2018a), means that the ability of the land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but that the individual land uses will not necessarily be identical.
- Under the PLAR (GOA 2017b), except in Section 127, means, in respect of land that is the subject of a disposition, a condition in which the ecosystem processes on the land are capable of producing goods and services of a quality and in a quantity that is at least equivalent to that which existed before the disposition was issued to the holder.

Reclamation success is measured against the representative (e.g., adjacent, pre-disturbance or reference plant community) site conditions, to establish whether reclamation activities have resulted in the outcome of ELC being met. Where activities on specified land have resulted in changes to land use or plant community type from pre-disturbance conditions the Department ***must*** approve the changes as per Section 4.2 (Approval of End Land Use Plans and Land Use Changes) of this Directive.

1.3 Scope

The Directive sets out the requirements for renewable energy operations (REOs) generating renewable electricity from wind, solar (or sunlight), or heat from the ground (i.e., geothermal). The Directive applies to all REOs except these:

- Reclaimed prior to July 1, 2018;
- Where the renewable electricity generated or produced is less than or equal to that which is defined for large micro-generation in the Micro-generation Regulation (AR 27/2008) and the total footprint boundary is no greater than one (1) hectare (2.47 acres) in size; or,
- Located within the boundary of Federal Lands, including, but not limited to, the following: Indigenous Reserves, Military Bases, and National Parks, unless directed to by the applicable regulating body.

1.4 Intent

The intent of the Directive is to:

- Be a living document that would be reviewed periodically and updated, if necessary, as knowledge of ecosystem processes and operational practices associated with REOs improve.
- Provide a standard set of base requirements for the development (or update) of a REO C&R Plan and subsequent application for a reclamation certificate on private and public lands;
- Align the C&R requirements for REOs with those required by other specified land activities in Alberta by:
    - Utilizing pre-existing and established C&R requirements and assessment methodologies (e.g., criteria, guidelines, standards, directives, and best management practices) for different land uses; and,
    - Defining the minimum acceptable methods, level of detail, and requirements.
- Provide a standardized set of C&R requirements for REOs on public lands for formal disposition and all of their associated activities (e.g. access roads);
- Minimize duplication in data and information requirements by encouraging concurrent collection, or reuse where possible, of data and information required by other Directives. This includes, but is not limited to, those listed in Section 1.6.2 – Directives, Standards, and Criteria; and,
- Enable the integration of C&R commitments made under previous private contractual agreements.

1.5 Terminology

Within this document the terms:

- ***Shall*** and ***must*** indicate a mandatory requirement;
- ***Should*** and ***may*** indicate suggested or recommended practices; and,
- **Department** refers to Alberta Environment and Parks (AEP).

1.6 Policy Alignment

1.6.1 Regional Plans, Legislation, and Regulations

Alberta`s Land-use Framework (GOA 2008) sets out regional land-use plans to support land-use management and decision-making on the landscape. Operators ***must*** ensure they are aligned with regional and subregional planning when developing project applications by complying with any applicable:

- Approved regional or subregional plan covering the area in which the Operator is active, as amended from time to time;
- Legislation and regulations, as amended from time to time (e.g., *Water Act*; *Weed Control Act*); and,
- Regional and local planning requirements (e.g., municipal bylaws, municipal zoning), as amended from time to time.

1.6.2 Directives, Standards, and Criteria

Unless alternate requirements were previously approved by the Department, Operators ***must*** also follow applicable directives, standards, criteria, and best management practices (when directed), as amended from time to time, when planning and carrying out activities, These include, but are not limited to, the following:

- 2010 Reclamation Criteria for Wellsites and Associated Facilities for:
  - Cultivated Lands (GOA: ESRD, 2013b);
  - Forested Lands (GOA: ESRD, 2013c);
  - Native Grasslands (GOA: ESRD, 2013d); and,
  - Peatlands. (GOA: AEP, 2015c).
- Alberta Wetland Mitigation Directive (GOA: AEP, 2017a).
- Conservation Assessments in Native Grasslands: Strategic Siting and Pre-disturbance site assessment Methodology for Industrial Activities in Native Grasslands (GOA: AEP, 2018a).
- Principles for Minimizing Surface Disturbance in Native Grassland, Principles, Guidelines and Tools for all Industrial Activity in Native Grasslands in the Prairie and Parkland Landscapes of Alberta (GOA: AEP, 2016c).
- Wildlife Directive for Alberta Wind Energy Projects (GOA: AEP, 2017c).
- Wildlife Directive for Alberta Solar Energy Projects (GOA: AEP, 2017d).

1.6.2.1 Contamination

General guidance on site contamination is provided in the Remediation Regulation (GOA, 2018b). Specific criteria for the assessment and remediation of contaminants (e.g., salts, metals, sterilants, organic chemicals, etc.) are addressed by Alberta Environment and Parks Tier 1 (GOA: AEP, 2016a) and 2; (GOA: AEP, 2016b), Soil and Groundwater Remediation Guidelines, the Contaminated Sites Policy Framework (GOA: AEP, 2014c), and Alberta Environmental Site Assessment Standard (GOA: AEP, 2016e). Any contamination ***must*** be remediated prior to applying for a reclamation certificate.

1.6.3 Best Management Practices

For best management practices (BMPs) to be effective they need to be adaptive and evolve continually as additional learnings, monitoring and research are incorporated. Principles from the following BMPs, and others, ***should*** be used to aid in this process to reduce potential adverse impacts targeted towards site-specific concerns throughout the lifecycle of the REO. These include, but are not limited to, the following:

- Alberta Clubroot Management Plan
- Beneficial Management Practices for Renewable Energy Projects – Reducing the Footprint in Alberta's Native Grassland, Parkland and Wetland Ecosystems (Gramineae, 2017)
- Recovery Strategies for Industrial Development in Native Grassland/Prairie:
    - Dry Mixedgrass Natural Subregion (Gramineae, 2013).
    - Mixedgrass Natural Subregion (Neville et al. 2014).
    - Northern Fescue Natural Subregion (Lancaster et al. 2017).
    - Foothills Fescue, Foothills Parkland and Montane (Lancaster et al. 2018).
- Recommended Principles and Guidelines for Minimizing Disturbance of Native Prairie from Wind Energy Development (Bradley and Neville, 2011).
- Having a Qualified Environmental Professionals onsite during Conservation and Reclamation Activities (e.g. salvaging and placement of reclamation materials)

1.7 Indigenous Consultation and Private Contractual Agreements

The Directive outlines the minimum requirements for Operators for developing conservation and reclamation plans for renewable electricity operations (REO C&R plans), and for completing the various assessments discussed later in this document.

1.7.1 Indigenous Consultation Procedures

The Government of Alberta (GOA) respects that First Nations' Treaty rights are protected by Section 35 of the *Constitution Act, 1982,* and acknowledges that some Metis Settlement members may be members of a Metis community holding credibly asserted Aboriginal rights. The GOA understands the important roles these rights have in maintaining Indigenous cultures and traditions. The GOA is committed to implementing the principles of the United Nations Declaration on the Rights of Indigenous Peoples (2007) and the role of Indigenous peoples in supporting the management of Alberta's land resources. If applicable, the GOA encourages Operators of REOs to engage with Indigenous peoples as early in the project planning process as possible and throughout the lifecycle of the REO.

Note:

The Directive relies on public consultation processes already established and required by the AUC for REOs sited on private lands.

The Consultation and Land Claims division in Alberta Indigenous Relations (includes the Aboriginal Consultation Office, ACO) manages and oversees all substantive aspects of the First Nations and Metis Settlements consultation processes, including:

- Pre-consultation assessment
- Management and execution of the consultation process
- Assessment of consultation adequacy

Consultation is a process intended to help parties understand and consider the potential adverse impacts of anticipated Crown decisions on the continued exercise of First Nations Treaty rights or traditional uses, and Metis Settlement members' harvesting or traditional use activities. Operators and developers ***must*** adhere to the public and Indigenous consultation processes set out by Alberta Utilities Commission (AUC), Aboriginal Consultation Office (ACO) and/or the Department (i.e., on Public Lands). When considering proposals regarding land and resource management, the GOA ***may*** delegate procedural aspects of consultation to another party, such as the project proponent. Project proponents ***may*** include industry, municipal government, or any other organization or individual requiring a provincial approval. Consultation with First Nations and/or Metis Settlements is triggered when the GOA is contemplating a decision that has the potential to adversely impact the exercise of First Nations Treaty rights or traditional uses and/or Metis Settlement members' harvesting or traditional use activities. Proponents are encouraged to review the Government of Alberta's current First Nations and Metis Settlements consultation policies, corresponding guidelines, and associated Operator Guide to gain a deeper understanding of Alberta's consultation requirements and procedures.

Indigenous peoples may have significant and relevant local knowledge (e.g., Traditional Ecological Knowledge (TEK), Indigenous knowledge (IK), cultural values, traditional land uses, and other community-specific or culturally significant knowledge) of access, soil, vegetation, weed, and other issues that may be present on the landscape. Operators and developers are encouraged to respectfully ask, consider, and apply local knowledge to enhance/supplement conservation and reclamation activities. These perspectives can provide valuable information to include and enhance desktop and field level assessments.

Note:

Indigenous knowledge (IK) when provided and/or shared ***must*** be appropriately included in a REO C&R Plan with guidance from the Indigenous community and/or knowledge holder(s).

1.7.2 Private Contractual Agreements

The GOA respects the rights of land managers and their role in supporting the development of Alberta's land resources. The GOA encourages Operators of REOs to engage with land managers early and throughout the lifecycle of the REO. Land managers have local and relevant information that ***may*** augment and/or enhance desktop and field level assessments. Conservation and reclamation information that is collected from land managers ***must*** be incorporated into a REO C&R Plan. It is recognized that prior to the release of the Directive, REO surface lease agreements between Operators and land managers on private lands might contain clauses and/or commitments in respect of conservation and reclamation activities.

Note:

Where previous C&R commitments (e.g., higher standards, additional assessment requirements) have been negotiated between a land manager and a REO Operator and these commitments have not been documented in an approved REO C&R Plan it is the responsibility of the parties involved to uphold those agreements (e.g., benefit agreements, contracts) prior to applying for a reclamation certificate.

END OF SECTION

2 IMPLEMENTATION TIMELINES

This section outlines the implementation timelines and content requirements for Operators for their respective REO C&R plans and the roles and responsibilities of the regulatory organizations involved throughout the REO lifecycle. Section 2.1 Requirements for All REOs outlines the content requirements for REO C&R plans that will vary based on whether the Operator is at the application phase (Table 1, next page) or whether the Operator has received an approval from the AUC (Table 2). Figure 1 (next page) shows a conceptual process for a REO from the application phase through to closure (i.e., reclamation certification). Section 2.2 Regulatory Roles & Responsibilities outlines the roles and responsibilities of the regulatory organizations in **Error! Reference source not found.**.

Note:

The Directive is effective on public lands upon acceptance of applications for REOs in Alberta.

2.1 Requirements for All REOs

The content of REO C&R plans will vary slightly between REOs based on when the stage the Operator is at with respect to the application process and when the REO was commissioned. As of September 14, 2018, Operators of REOs, including those with commissioned REOs, or with pending applications will be required to:

- Complete interim monitoring site assessments (see Section 5.2.3 Interim Monitoring Site Assessments) following disturbances associated with the construction and/or operation (e.g., retrofitting, repowering) of the REO. Data and information acquired during the IMSAs ***must*** be included in subsequent REO C&R Plan submissions and/or updates.
- Develop or update a REO C&R Plan where:
    - The Operator has been directed to do so by the Alberta Utilities Commission (AUC);
    - The Operator has completed a pre-disturbance site assessment (PDSA) and/or an interim monitoring site assessment (IMSA);
    - A new approval, approval renewal, or approval amendment is required;
    - A formal disposition is being applied for, amended, or renewed on public lands; or
    - The Operator has requested, or been directed to, decommission all, or part, of a REO.
- Complete reclamation certificate site assessments (see Section 5.2.4 Reclamation Certificate Site Assessment) for the disturbed area, submit a reclamation certificate application, and obtain a reclamation certificate. If the RCSA is only for a portion of the REO, the data and information acquired during the RCSA ***must*** be included in subsequent REO C&R Plan submissions and/or updates.

Table 1. Implementation timelines for REO C&R Plan requirements for approval applications submitted to the Alberta Utilities Commission (AUC) before January 1, 2020 and on/after January 1, 2020.

	Project Application Received by AUC		
	[1]Before January 1/20	[2]On/after January 1/20	Section
Project Application			
REO C&R Plan	AUC – EE/EP	✓	6

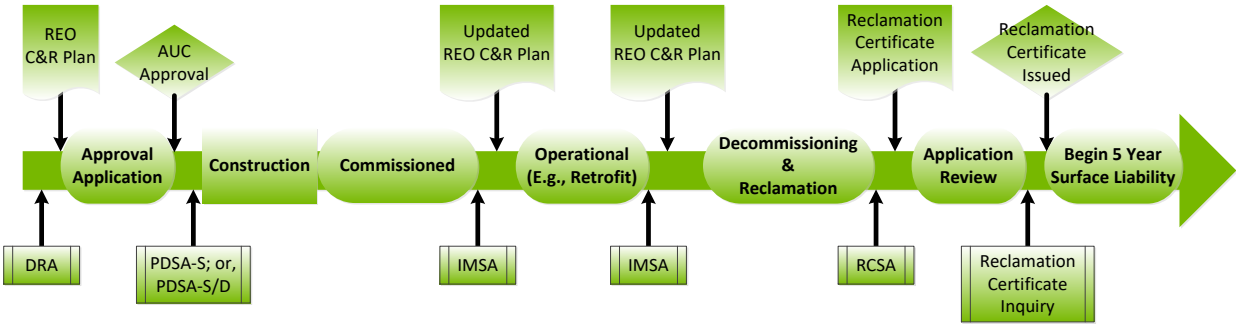
Footnotes:

Abbrev. AUC – Alberta Utilities Commission; EE/EP – Environmental Evaluation / Environmental Plan; n/a – Not Applicable

✔ Required to be completed under the Directive.

[1] REOs that submit an approval application to AUC before January 1, 2020 unless otherwise directed are considered to have met the initial REO C&R Plan requirements through the Environmental Evaluation / Environmental Plan (EE/EP; or, equivalent) submitted to the AUC.

[2] REOs that submit an approval application to AUC on/after January 1, 2020 ***must*** meet the requirements under the Directive that includes data and information from the desktop review assessment (DRA; see Section 5.2.1 Desktop Review Assessment) in the initial REO C&R Plan.



Abbrev. AUC: Alberta Utilities Commission; C&R: Conservation and Reclamation; DRA: Desktop Review Assessment; PDSA: Pre-disturbance site assessment; PDSA-S: PDSA using shallow soil assessment; and, PDSA-S/D: PDSA using shallow and deep soil assessment; IMSA: Interim monitoring site assessment; RCSA: Reclamation certificate site assessment; REO: Renewable Energy Operation.

Figure 1. Schematic showing conceptual process from application to closure for C&R plans (and updates), monitoring, assessment, and reporting requirements for REOs (timeframe is not to scale).

Table 2. C&R Plan, reporting and assessment requirements for REOs commissioned: Before September 14, 2018; Between September 14, 2018 and July 1, 2021; and, on/after July 1, 2021.

	Date Commissioned:			Section
	Before Sept 14/18	Between Sept 14/18 - Jun 30/21	On/After July 1/21	
Completed Prior to Construction				
[1]**Pre-Disturbance (PDSA)**				5.2.2
[2]**PDSA-S**	NR	✔	NR	
[3]**PDSA-S/D**	NR	NR	✔	
Completed After Construction (or Operational Disturbances)				
Interim Monitoring (IMSA)				5.2.3
Post Construction	NR	✔	✔	
Operational (e.g., repowering)	✔	✔	✔	
[4]**Updated REO C&R Plan**	✔	✔	✔	6
Due on/before:	July 1/26	July 1/26	5 Years	
Completed after Decommissioning and Reclamation				
Reclamation Certificate (RCSA)	✔	✔	✔	5.2.4
Rec-Certificate Application	✔	✔	✔	7

Footnotes:

Abbrev. AUC – Alberta Utilities Commission; EP – Environmental Plan; NR – Not Required; PDSA – Pre-disturbance site assessment; IMSA – Interim Monitoring Site Assessment; RCSA – Reclamation Certificate Site Assessment

✔ Required to be completed under the Directive.

1 PDSA requirements ***must*** be completed by a Qualified Environmental Professional as per Section 9 Appendix – B: Pre-Disturbance Site Assessment Methodology; PDSAs differ based on REO commissioning date[2, 3].

2 PDSA-S: require, at a minimum, PDSAs to be completed using shallow soil assessments (PDSA-S). This data and information ***must*** be submitted along with the data and information from the IMSA (post-construction) in the update to the REO C&R Plan.

3 PDSA-S/D: require, at a minimum, PDSAs to be completed using shallow (S) and deep (D) soil assessments (PDSA-S/D). This data and information ***must*** be submitted along with the data and information from the IMSA (post-construction) in the update to the REO C&R Plan.

4 All Operators ***must*** submit a REO C&R Plan or an updated C&R plan, as per Section 6 Conservation and Reclamation Planning; REO C&R plans ***must*** be submitted:

- On/before July 1/26 for REOs commissioned before July 1/21; or,
- Within five (5) years of commissioning for REOS commissioned on/after July 1/21.

2.2 Regulatory Roles & Responsibilities

For the purpose of this Directive, Table 3 outlines the roles and responsibilities of the regulatory organizations involved throughout the REO lifecycle. With the release of this Directive, AEP will:

- Continue to provide a support role to AUC for reviews associated with the Wildlife Directive for Alberta Wind Energy Projects (2017) and Wildlife Directive Alberta Solar Energy projects (2017);
- Accept reclamation certificate applications submitted for REOs; and,
- After January 1, 2020, provide support to AUC for reviews and assessments of C&R plans submitted in approval applications (Table 1) or as updated C&R plans following project approval (Table 2). This role would be done concurrently and in alignment with existing wildlife reviews and, when approved, the formal disposition application on public lands.

Until geothermal regulatory processes are established, the Department will provide a support role for compliance and enforcement issues related to C&R activities, and a lead role in the issuance of reclamation certificates. The role of the Alberta Energy Regulator (AER) will be clarified in relation to operational compliance and enforcement of issues, and the issuance of reclamation certificates for these operations at a later date.

Table 3. Roles and responsibilities of the regulatory organizations involved throughout the REO lifecycle.

Organization	Approval Phase	Construction and Operational Phase	Decommissioning, Reclamation and Certification Phase
Alberta Electric Systems Operator (AESO)	Under the Electric Utilities Act, AESO has the mandate to identify needs of the electric grid in Alberta. AESO does not have a role in the approval phase of a REO.	Under the Electric Utilities Act, AESO has the mandate to operate the electric grid in Alberta.	While the definition for reclamation under *EPEA* includes decommissioning, the notification process for decommissioning is not within the mandate of AEP. This process falls under the mandate of the AESO.
Alberta Environment and Parks (AEP)	AEP will provide support to the AUC in the form of reviews and assessments of REO C&R plans submitted to the AUC in applications or as updates.	AEP's role is to provide support to the AUC in the form of periodic reviews and assessment of updated REO C&R plans and compliance and enforcement issues related to the C&R activities.	AEP will be the lead agency with regard to reclamation certificate applications and will be responsible for issuing reclamation certificates to REOs and cancellation of formal dispositions on public lands once conditions are met.
Alberta Utilities Commission (AUC)	AUC is the lead agency with regard to issuing approvals to wind and solar generation facilities.	AUC is the lead regulatory agency during the operational phase of a REO.	AUC's involvement in this phase of a REO would be the cancellation of the approval once a reclamation certificate is issued and other regulatory obligations are met.
Municipal Authority	Municipal authorities may be involved if the REO is being developed within a municipal boundary (e.g., zoning, development permits) 9	Municipal authorities ***may*** be involved if the REO occurs on municipal land	Municipal authorities ***may*** be involved if there is a change in end land use requiring re-zoning, or if the REO occurs on municipal land.

END OF SECTION

3 QUALIFIED PROFESSIONALS

The REO C&R plans and reclamation certificate applications prepared and submitted to the Department ***must*** be prepared and signed off by one or more Qualified Environmental Professional(s). These professionals need competencies as outlined in the Professional Responsibilities in Completion and Assurance of Reclamation and Remediation Work in Alberta Joint Practice Standard, (PRO; 2012).

The Department recognizes the following seven professional regulatory organizations (PROs) whose scopes of practice include land reclamation and remediation:

- Alberta Institute of Agrologists;
- Alberta Society of Professional Biologists;
- Association of Professional Engineers and Geoscientists of Alberta;
- Association of the Chemical Profession of Alberta;
- Association of Alberta Forest Management Professionals, or the,
- Association of Science and Engineering Professional Technologists of Alberta.

Sign-off eligibility requires the signatory professional to be a member in good standing of one of the PROs; to have a minimum of five years of relevant experience in reclamation and to carry professional liability insurance (errors and omissions) unless they are undertaking work on behalf of their employer. The professional organizations are responsible for the development of competency measures for their members. Sign-off ***must*** include the professional's signature, and either:

- Registration/membership number, or
- Stamp/seal.

Competent practitioners with a coordinating qualified professional's sign-off can complete appropriate components of the work as directed in the Professional Responsibilities in Completion and Assurance of Reclamation and Remediation Work in Alberta Joint Practice Standard, 2012.

Poorly completed, uninformed and inaccurate desktop or field-level assessments can be recognized by skilled reviewers and regulators, resulting in delays, audits or failures of project applications.

END OF SECTION

4 LAND USE PLANNING AND OUTCOMES

A fundamental principle carried forward in the methodologies and approaches outlined in this document is that the success of land conservation and reclamation is measured against the pre-disturbance conditions and/or adjacent site conditions that are representative of the site's natural variability.

4.1 Land Types

For the purposes of this document, the following land types have been identified:

- **Cultivated Lands** include lands managed under conventional, minimum or zero till practices for agricultural purposes. Land use changed from peatland, forested land or grassland to cultivated land is included here. The cultivated land use category also applies to trees planted for agroforestry (e.g., tree farms), tame forages, tame pasture, hay lands or areas seeded to perennial agronomic species. For grasslands that have been cultivated/seeded to agronomic species and the land use goal is to be managed as tame forage for hay or pasture, they shall be treated as cultivated lands, within the context of this Directive.

- **Forested Lands** includes any treed land, with less than 40 cm of organic matter accumulation, whether or not the forest vegetation is utilized for commercial purposes, but does not include land with trees planted for agroforestry. Treed (bush) land in the White Area (deeded land) that is to be maintained as 'treed' are included in this definition. Land in the White Area where a land use has been changed to cultivation, falls under the cultivation definition. In the Green Area, native meadows or range improvement areas in grazing dispositions are categorized into grasslands or cultivated land use.

- **Native Grasslands** A landscape unit where the vegetation is dominated by grasses, grass like plants, and/or forbs (>50 per cent). For grasslands to be defined as "native", they ***must*** be comprised of greater than 30 per cent foliar cover of native grassland species.

- **Peatlands** include lands covered by peat to a minimal depth of 40 cm (Tarnocai, 1980).

- **Riparian Areas** (lands adjacent to streams, rivers, lakes and wetlands) are a minor portion of the overall landscape, but are a critical source of biodiversity, habitat, primary production, water storage, watershed health, etc. They are composed of wetland grasses, forbs, shrubs and trees.

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

4.2 Approval of End Land Use Plans and Land Use Changes

Effective advanced planning that addresses conservation and reclamation activities takes into consideration applicable regulatory information, BMPs and agreed upon end land use goals. The types of

land use(s) possible on a site are limited by a combination of biological, geological and climactic factors that are present on and adjacent to the site. End land uses are site-specific and will depend primarily on pre-disturbance conditions. Land use decisions will be made specific to a region and reflect local, regional and municipal planning for the area. The choice of an end land use will depend on regional landscape limitation(s) and final site characteristics such as: climate, soil salvaging, and surrounding land use. Conservation that occurs at the time of construction lays the framework for the feasibility of key reclamation outcomes.

Note:

Sites with a remediation certificate can be developed for REO without use restrictions. Some sites *may not* qualify for a remediation certificate; however they can be suitable for REO development with appropriate site management. REOs ***must not*** be sited in locations that prevent access to soil, subsoil or water being risk managed or remediated.

4.2.1 Pre-Disturbance Land Use and Plant Community

A fundamental principle carried forward in the methodologies and approaches outlined in this document is that the success of land conservation and reclamation is measured against the adjacent site conditions and/or pre-disturbance conditions that are representative of the site's natural variability. Ecological health, function and land operability are indicators of equivalent land capability and reclamation success. Land conservation and reclamation activities that preserve, or aim to restore pre-disturbance plant communities are preferred. Where one or more wetlands will be impacted by a REO, for the purpose of the **Alberta Wetland Policy** as outlined in the Alberta Wetland Mitigation Directive (GOA: AEP, 2017a), the explicit intent to reclaim a disturbed wetland area back to a wetland *must* be captured in the REO C&R Plan (i.e., Reclamation Plan – End Land Use Plan).

Note:

Any change in end land use from a wetland to land use other than a wetland, *must* follow the wetland replacement requirements of the **Alberta Wetland Policy**. These requirements *must* be met prior to approval of the REO C&R Plan and project approval and clearly indicated in the application for a reclamation certificate.

4.2.1.1 Previously Disturbed and Brownfield Sites

Alberta contains a number of sites that have been disturbed through previous commercial and/or industrial developments. This includes sites that ***may*** or ***may not*** be reclamation certified.

Where the REOs are being sited on brownfield sites or previously disturbed sites, Operators ***should*** understand the site history and engage in conversations early with the Department and where possible the original Operator. These conversations define the expectations for the transfer of liablity at decommissioning and reclamation at the end-of-project life. Brownfields or previously disturbed sites require a Phase 1 environmental site assessment and, if required, a Phase 2 site assessment to determine if there was a release of a substance that exceeds the Alberta Tier 1 or Alberta Tier 2 Soil and Groundwater Remediation Guidelines. For more information, see the Alberta Environmental Site Assessment Standard (AEP, 2016).

Note:

Wherever possible, Operators are encouraged to practice conservation by developing projects on brownfield and/or previously disturbed sites rather than developing on undeveloped areas.

Where a brownfield or previously disturbed sites are not remediated to Alberta Tier 1 or Tier 2 Soil and Groundwater Remediation Guidelines, the site requires a risk management and/or remedial action plan that is acceptable to the Director. If an Operator is seeking approval to develop a REO on a brownfield or

previously disturbed site, they ***must*** seek permission for amendments to the risk management and/or remedial action plan, per the Alberta Risk Management Guide (GOA: AEP, 2017f), the Alberta Exposure Control Plan Guide (GOA: AEP, 2016d) and the Alberta Environmental Site Assessment Standard (AEP, 2016). Project applications for a REO on these sites ***must*** include:

- Information on what contaminants and areas are being risk managed or remediated, how they are being remediated and/or risk managed, and, if applicable, when remediation is expected to be completed;
- A map (or maps) showing the boundaries of risk management and/or remediation, including any neighbouring sites; and
- Demonstration that the source of the substance release has been removed or remediated and that access to soil and subsoil under remediation and/or risk management is maintained.

4.2.2 Change in End Land Use

Reclaiming the site back to the pre-disturbance land use is prefered. Next in the heirarchy is a change in end land use, or alternate end land use. A change in land use refers to a change where the resulting end land use is different from the one that existed prior to the disturbance (Table 4, next page). Where an alternative, or change in end land use is being proposed, it is vital to identify soil, landscape and vegetation characteristics that will be developed through reclamation that are consistent with the end land use identified. The approval decision process takes into consideration a number of factors when considering a change in end land use and ***may*** also require approval by other decision making processes (e.g., rezoning decisions by municipal authority).

Where a land use change has occurred the vegetation assessed during the reclamation assessment ***may not*** be representative of the adjacent or nearby areas. In these circumstances, reclamation assessments relies on professional judgement and supporting rationale with respect to how equivalent land capability has been met (e.g., successional trajectory of the replanted area). For larger or more complex sites, requests to combine multiple reclamation outcomes ***may*** be considered.

An alternate end land use may be requested that does not reflect the native, or adjacent land use or plant community. Some innovative designs could also be incorporated into the site conditions, adding diversity to the landscape, and still complementing adjacent end land use. These changes and end land uses can include, but are not limited to:

- Municipal infrastructure
- Recreational areas
- Subsequent industrial uses

Department staff will play a key role under *EPEA* in determining whether reclamation planning will be effective to attain the desired end land use.

Table 4. Hierarchy of reclamation outcomes provides guidance on preferred reclamation outcomes for typical sites.

Examples Requiring a Change in Land Use		
Pre-Disturbance Land Use	**[1]Changed End Land Use of the Reclaimed Site**	**Alternate End Land Use of the Reclaimed Site**
[2]Native Grassland	Cultivated Land & Tame Pasture Upland Forest Peatlands & Mineral Wetlands	Recreational Use Municipal Use Industrial Use
Cultivated Land & Tame Pasture	Native Grassland Upland Forest Peatlands & Mineral Wetlands	Recreational Use Municipal Use Industrial Use
Upland Forest	Native Grassland Cultivated Land & Tame Pasture Peatlands & Mineral Wetlands	Recreational Use Municipal Use Industrial Use
Peatlands	Native Grassland Cultivated Land & Tame Pasture Upland Forest Mineral Wetland	Recreational Use Municipal Use Industrial Use
Mineral Wetlands	Native Grassland Cultivated Land & Tame Pasture Upland Forest Peatlands	

Footnotes:

1 Changes in land use requests to plant community types found within the local natural subregion are preferential, additional justification is required for land uses that are not present in the local natural subregion; forest seed zone requirements apply.

2 For Native grassland land use, any change from the pre-disturbance plant community could fail the reclamation criteria. Therefore, approval ***must*** be received from the Department prior to reclaiming to an alternate plant community, with a rationale and justification for the change provided as part of the REO C&R Plan.

4.3 Reclamation Outcomes

For the purpose of conservation and reclamation planning for REO C&R plans, the 2010 Reclamation Criteria (GOA: ESRD, 2013b-d; GOA: AEP, 2015c), as amended from time to time, are to be utilized. These criteria will provide the framework for how final reclamation success will be determined at the time of reclamation certification. These criteria are considered a start for transparency and consistency of reclamation expectations and are designed to evaluate equivalent land capability for the approved end land use. These criteria selected for the final reclamation certificate site assessment (see Section 5.2.4 Reclamation Certificate Site Assessment) ***must*** account for, and align with, the end land use while considering the scale and severity of the footprint. At the time of the reclamation inquiry, the Department will use these criteria and information submitted by the REO Operator in the

Note:

REOs ***must*** meet the 2010 Reclamation Criteria for Wellsites and Associated Facilities, as amended from time to time, that are in place at the time when the REO is decommissioned and reclaimed.

reclamation certificate application to form the basis of their decision on whether the site meets equivalent land capability (ELC). If alternative criteria are proposed, the criteria selected ***must*** be:

- **Relevant**: meaning they are applicable to the land use and include specific components (e.g., landscape, soils, vegetation); and,
- **Observable, Measurable and Repeatable**: meaning they are as quantitative as possible, while leaving room to account for some measure of site variability.

END OF SECTION

5 DESKTOP AND FIELD-LEVEL ASSESSMENTS

The GOA's principles of responsible resource management require the balancing of environmental, social, and economic benefits of Alberta's resources for the good of all Albertans. Given the intricacies and challenges of managing development across Alberta's landscape and multiple resource management objectives, there is a need to modernize the framework for reporting and submission of regulatory data and files.

To achieve this goal, the data and information reported throughout the lifecycle of a project ***should*** be done in a fashion to support:

- Alberta's approach to natural resource management through an Integrated Resource Management Systems (IRMS) approach that includes managing for cumulative impacts;
- Establishment of a system that informs, or is consistent with regional and sub-regional land use planning, media specific frameworks, and in consideration of cumulative effects; and,
- Development of an accessible, fair, and transparent process for submitting data and reports to enable sustainable land use in Alberta.

Desktop reviews and field-level assessments are foundational to supporting IRMS and informing cumulative effects, especially as they relate to C&R planning and activities. These assessments are designed to ensure sufficient detail and quality of data is collected to inform decisions and facilitate regulatory approvals. When conducting these assessments, attention ***should*** be given to identifying, mitigating and reducing adverse impacts that may occur during the following activities:

- Construction
- Operation
- Decommissioning
- Reclamation

The following sections are intended to provide REO Operators direction for the desktop and field assessments. The sections include additional guidance for data and information standards and use of technologies (e.g., earth obervation, remote sensing, planning tools) applicable to the reporting and submission of regulatory data, files, and reports. As with all regulatory based assessments, Qualified Environmental Professionals are best suited for this work.

5.1 Data and Technology

5.1.1 Existing Licensed and Commercial Datasets

When using these datasets, the metadata (e.g., data source, source year, image identifier) ***must*** accompany the submitted reports. Examples of these datasets include, but are not limited to the following:

- Industry owned: e.g., Alberta Vegetation Inventory (AVI)
- Urban and Rural Cadastral
- Fortis Utility Data

- Digital Integrated Dispositions (DIDs/DIDs+)
- Aerial/Satellite Imagery
- Light Detection And Ranging (LiDAR)

5.1.2 Publicly Available Local and Provincial Datasets

In addition to licensed and commercial data, there are a number of open datasets available within Alberta that cover broad areas of the province. These datasets include, but are not limited to, the following landcover and soil inventories, as amended from time to time:

Note:

Where C&R planning activities make use of previously completed soil and vegetation surveys, the collection date and survey method(s) ***must*** be included in REO C&R Plans provided to the Department.

- Agricultural Region of Alberta Soil Inventory Database (AGRASID) or other detailed soils maps (AGRASID; GOA: AAF 2015a)
- Alberta Conservation Information Management System (ACIMS)
- Alberta Merged Wetland Inventory
- Alberta Natural Heritage Information Centre (ANHIC)
- Alberta Vegetation Inventory (AVI) available for forested areas of the province
- Derived Ecosite Phase (DEP)
- Environmental Site Assessment Repository (ESAR)
- Grassland Vegetation Inventory (GVI) for the Grassland Natural Region of Alberta
- Primary Land Vegetation Inventory (PLVI) sporadically available for the Central Parkland Natural Subregion.

Where possible, planning activities are encouraged to make use of soil and vegetation surveys which may have been completed previously in the proposed area of development. These datasets may contain geospatial, or non-spatial information (i.e., data or information not related to a location). This also includes using data collected as part of other regulatory requirements associated with the project application (e.g., wetland assessments, required wildlife habitat surveys). Examples include, but are not limited to, the following:

- Previous Environmental Impact Assessment reports;
- Information from previous reclamation certificate applications; or,
- Surveys collected from one or more land managers.

5.1.3 Earth Observation and Remote Sensing Data and Technology

The GOA's principles of responsible resource management includes encouraging innovation and implementation of innovative tools and technologies. There may be opportunities for innovation and integrating the use of technologies like earth observation (EO) and remote sensing (RS) technologies for site characterization, assessment and monitoring of certain reclamation criteria selected for the REO. The

rapid advancement of this sector with respect to platforms (e.g., remotely piloted aircraft systems – RPAS; satellites, etc) and sensors (e.g., multispectral, Light Detection And Ranging – LiDAR) can provide opportunities to monitor sites remotely, as well as monitoring large areas over multiple years. Earth observation and remote sensing data also provide significant value for landscape analysis and interpretation. Examples include, but are not limited to:

- Ortho-rectified and/or stereo imagery (satellite or aerial); and,
- Light Detection and Ranging (LiDAR).

While there is no restriction on the platform (e.g., remotely piloted aircraft systems – RPAS; fixed or rotary wing aircraft; or, satellites) used, the spatial resolution of the sensors used ***must not*** have a spatial resolution that exceeds, or is greater than, ten (10) metres. Use of EO/RS data sources are encouraged, but Operators ***must*** also ensure when using licensed products that the applicable licensing agreements are followed.

Note:

Where the use of these tools and technologies are being proposed within an approval application, renewal, or update, the REO Operator ***should*** discuss these approaches with the Department early in the process to ensure their acceptability to avoid potential delays later in the process.

The following are examples of EO/RS derived metrics that could be used to support the desktop review assessment (see Section 5.2.1 Desktop Review Assessment) and/or one or more of the vegetation assessments described in Sections 5.2.2 (Pre-Disturbance Site Assessment – PDSA) to 5.2.4 (Reclamation Certificate Site Assessment – RCSA):

- **Topography**: use of a Digital Elevation Model (DEM) produced from high resolution photogrammetry or LiDAR can assess topography of the proposed site.
- Plant Heath & Productivity:
  - **Vegetation Indices**: use of one or more vegetation indices (e.g., Normalized Difference Vegetation Indices – NDVI) to compare plant health and productivity between disturbed and undisturbed areas.
  - **Multi-Temporal Imagery**: use of multiple images over multiple time periods to assess change over time. This includes, but is not limited to, comparisons within or between growing seasons to compare plant health and productivity between disturbed and undisturbed areas.
- Plant Height & Growth:
  - Use of multi-temporal LiDAR or stereo imagery to assess plant height and/or growth.

There are a number of planning tools available. One example is the Landscape Analysis Tool (LAT). In Alberta, LAT ***must*** be used when proposed siting occurs entirely, or in part, on public lands. The LAT is a web enabled geospatial mapping tool designed to assist with identification of base and sensitive features and how they interact with proposed land location and the activity being considered for development on public land.

5.1.4 Standards for New Data and Information

The Directive promotes the alignment of regulatory reporting requirements with the GOA Open Data and Open Information policies, with these terms being defined as:

- **Open Data:** data whose release is not subject to privacy, security or legislative restrictions and which is made available to the public in a structured, machine-readable format with minimal restrictions on its use or re-use. Open data is released proactively whenever possible.

- **Open Information:** information whose release is not subject to privacy, security or legislative restrictions and which is made available to the public with minimal restrictions on its use or re-use. This includes, but is not limited to, reports, studies, maps, legislation, etc. Open information is released proactively whenever possible.

For commissioned and approved projects, all newly acquired field level data and/or information (e.g., soil and/or vegetation assessment data/information/reports) submitted with any C&R reporting requirements ***must*** be provided with an Open Government License. This enables alignment with the GOA's Open Information and Open Data Policies.

5.1.4.1 Geospatial Data

This section describes the standards and formats that ***must*** be used for submitting georeferenced spatial data (e.g., footprint boundaries, soil data, vegetation data) and information associated with the desktop and field level assessments described in Section 5.2 Desktop and Field-Level Assessments.

5.1.4.1.1 Metadata Standard

Where geospatial data is being created and submitted, the associated metadata ***must*** also accompany the submission. REO Operators ***must*** use the GOA's Geospatial Metadata Standard (GOA 2017d) for submitting geospatial data and information associated with a Renewable Energy Operation (REO).

5.1.4.1.2 Data Formats

Georeferenced spatial data and/or information related to C&R activities (e.g., planned/constructed footprint boundaries, soil and vegetation survey locations, etc.) submitted at any stage (i.e., planning, construction, operation, decommissioning, and reclamation) ***must*** be provided in a machine readable tablular or GIS formats include, but not limited to those outlined under:

- Geo-Referencing Digital Plan Submissions (GOA 2011); and,

- Content Requirements for Survey Plans and Sketches (GOA: AEP 2018b)

Examples of tablular or GIS data include:

- **GIS Data**: planned footprint boundaries; location of turbines; location of collection lines; location of access roads; locations of temporary access and workspace locations; soil survey locations; vegetation assessment locations.

- **Tabular Data**: attributes of each feature type (e.g., turbine types; length/width/type of access roads); soil characteristics (e.g., topsoil depth); vegetation measurements (e.g., crop type; plant height).

5.1.4.1.3 Data Accuracy

The accuracy of geosptial data submitted as part of any reporting requirement associated with the lifecycle phases ***must*** meet the specifications in Table 5. Data provided in reports any reports submitted to the Department ***must*** be in UTM coordinates with NAD 83 datum.

Table 5. Minimum data specifications for positional accuracy, spatial accuracy, and minimum polygon sizes.

Descriptor	Example	Accuracy
Positional accuracy (x and y coordinates)	Sampling location	+/- 10 m
Spatial accuracy of features (area and position)	Lease Boundary	+/- 6 m
Minimum polygon sizes:		
Inside Approval area	Turbine & road; reclaimed areas	0.04 - 0.25 ha
Outside Approval area	Land cover polygon	2 ha
Minimum linear feature width (landcover features)	Right-of-ways: Access road	2 m
Minimum polyline length:		
Minimum linear feature length (polylines)	Collector lines	10 m

5.2 Desktop and Field-Level Assessments

5.2.1 Desktop Review Assessment

The purpose of a desktop review assessment (DRA) is to inventory and map the proposed field verification area (FVA) to identify potential siting locations and sensitive areas (e.g., soils, ecological/range sites, and component plant communities). The DRA ***must*** be completed and submitted as part of an AUC approval application (Table 1); DRAs submitted on/after January 1, 2020 as part of an AUC application ***must*** be completed or supervised by a Qualified Environmental Practioner. The FVA ***should*** be sized appropriately to include the planned footprint and surrounding area of sufficient size to allow for some movement of the footprint, if required. The DRA will define the area within which the field-based PDSA ***must*** be conducted after a REO receives an AUC approval. The development scope includes full development potential, including temporary and permanent access, utility corridors and the areas adjacent to the project footprint where effects to vegetation and soils can be anticipated. The DRA is designed to determine the placement of the projects' planned footprint to avoid and minimize associated surface disturbances that would impact sensitive communities such as native grasslands and wetlands. For example, the FVA reviewed as part of the DRA ***should*** be large enough to include the maximum allowable movement on the landscape of the planned footprint boundary (e.g., 50-m shift allowed under Rule 007; AUC, 2018) without being required to reapply for approval. This may result in a FVA much larger than the size of the planned footprint to incorporate a variety of vegetation types, land uses or existing disturbance corridors in order to assess options for strategic siting (GOA: AEP, 2018a). The planned footprint ***must*** include the extent of the direct land disturbances, temporary or permanent, including all associated or incidental disturbances as well.

Note:

Data and information from DRA when used in combination with those collected during the pre-disturbance site assessment (PDSA) are an integral part of the REO C&R planning process.

The FVA for the DRA ***must*** enable the REO Operator to uphold the principles of avoiding and minimizing disturbance including, but not limited to:

- Avoiding sensitive areas where possible, especially in native grasslands and wetlands, or sites identified as extremely difficult to reclaim;

- Reducing area and impacts of industrial disturbance to the best extent possible; and,
- Develop practical methods that facilitate eventual restoration of disturbed areas

5.2.1.1 Siting

REO Operators are strongly encouraged to site REOs on alternative placements within non-native landscapes, native vegetation types that are not grasslands, less sensitive native grasslands or modified grasslands, cultivated lands, or previously disturbed sites. The Principles for Minimizing Surface Disturbance in Native Grassland, Principles, Guidelines and Tools for all Industrial Activity in Native Grasslands in the Prairie and Parkland Landscapes of Alberta (GOA: AEP, 2016c) apply. For REOs proposed on sites with the potential to impact or disturb native grasslands, Operators ***must*** follow the methodologies for siting and pre-disturbance assessments in the Conservation Assessments in Native Grasslands: Strategic Siting and Pre-Disturbance Site Assessment Methodology for Industrial Activities in Native Grasslands (GOA: AEP, 2018a).

5.2.1.2 Preliminary Mapping for Soil and Vegetation

The delineation and assignment of preliminary mapping units or potential field assessment locations is completed during the DRA. The scale of preliminary maps used for field verification will depend upon quality and availability of existing spatial data in the FVA. Existing soil and vegetation inventories available from the Government of Alberta's website and are a starting point to anticipate soil units and vegetation communities within the FVA. These can assist in creating a preliminary map legend and identify potential field verification locations. Additional potential soil map units or plant community information ***may*** be identified and mapped using available information (e.g. imagery, ecological site mapping, etc.). Interpretation of imagery and other resources ***may*** allow the REO Operator to modify existing map polygons to improve the scale of preliminary maps for field survey stratification and soil/vegetation assessment. These scales are designed to display sufficient detail and accuracy within five (5) metres for uplands and two (2) metres for lentic and lotic wetlands. Since wetlands are assessed separately, as per the Wetland Policy, utilizing the Alberta Wetland Identification and Delineation Directive (GOA: AEP 2015d), data and information from this assessment ***may*** be used to support portions of the DRA where wetlands have been identified.

Based on soil and vegetation information reviewed during the DRA, the planned footprint area is stratified into potential map units as per the information collected. This approach ***should*** consider the following:

- Overlaying the most detailed map of expected soil units (e.g., Agricultural Region of Alberta Soil Information Database - AGRASID, Provincial soil survey maps); or if unavailable, updated based any new soils data or information for the site/area (MSWG 1981; GOA: AA 1987)
- Overlaying the most detailed map of expected vegetation units, including but not limited to:
    - Grassland Vegetation Inventory (GVI) for the Grassland Natural Region of Alberta.
    - Alberta Vegetation Inventory (AVI) available for forested areas of the province.
    - Alberta Natural Heritage Information Centre (ANHIC)
    - Primary Land Vegetation Inventory (PLVI) sporadically available for the Central Parkland Natural Subregion.
- Use and interpretation of earth observation data (e.g., satellite imagery, aerial imagery, stereo imagery, LiDAR) for the FVA for stratification of additional sampling areas, or improved delineation accuracy.
- The map prepared during the DRA ***should*** include the following elements including, but not limited to:

- Map scale
- Sources and symbols used for map development (e.g., associated symbols/patterns/colours, map units, and map unit descriptions.
- Township, ranges and section boundaries
- Key roadways
- Symbol descriptions and a legend which includes in a GIS or tabular formats that at a minimum contain the following: soil series and plant communities.

5.2.2 Pre-Disturbance Site Assessment

The pre-disturbance site assessment (PDSA) forms an integral part of the REO C&R Plan by providing field level validation and verification of the data and information identified during the DRA. Once a REO receives approval, the PDSA ***must*** be completed by a Qualified Environmental Progessional, or Competent Practioner, prior to construction to collect site-specific field level data and information (e.g., topsoil depth, soil classification, sensitive/problem soils, plant communties). It is the role of the Qualified Environmental Practioner to use their professional judgment when completing the PDSA to assess the variability of the site (e.g., topography, siting landscape position, color changes, physical properties) for determining appropriate sampling intensity to ensure all reclamation material is conserved. Data from PDSA is required to determine topsoil/subsoil salvage recommendations, storage (if necessary), replacement, and informing progressive and final reclamation planning (e.g., restoration risk in native grasslands for the specific pre-disturbance plant community; GOA: AEP, 2016c).

Note:

Data and information from PDSA provides field level validation of the data and information collected during the DRA and form an integral part of informing C&R activities associated with the REO.

The specific methodologies and minimum reporting requirements for PDSAs completed on private or public lands for undisturbed and disturbed (e.g., brownfield sites) areas can be found in Section 9 Appendix – B: Pre-Disturbance Site Assessment Methodology unless alternate requirements were previously approved by the Department. The PDSA:

- ***Should*** be completed in association with other field level assessments including, but not limited to, those identified in Section 1.6.2 Directives, Standards, and Criteria) and used to inform the C&R activities undertaken during construction;
- ***Must*** be completed by a Qualified Environmental Professional or Competent Practitioner and the data and information collected used to update the REO C&R Plan; and,
- ***Shall not*** replace soil sampling requirements of future assessments (e.g., reclamation certificate site assessment, RCSA) however, this data ***may*** augment the data and information collected during the RCSA.

The following sections outline PDSA requirements that apply to REOs that receive, or have received, approval from AUC.

5.2.2.1 REO Commissioned Before September 14, 2018

Operators of REOs commissioned before September 14, 2018 ***shall not*** be required to have a PDSA in the REO C&R Plan (Table 2). Operators ***must*** complete an interim monitoring site assessment (IMSA) following any further disturbances associated with operational activities (e.g., repowering). The data and information associated with the IMSA ***must*** be included in an updated REO C&R Plan. Operators ***must*** submit an updated REO C&R Plan due on/before July 1, 2026. A Qualified Environmental Professional ***should*** also be onsite during any activities related to C&R (e.g., salvaging and placement of reclamation materials).

5.2.2.2 REO Commissioned Between September 14, 2018 and June 30, 2021

Operators of REOs commissioned between September 14, 2018 and June 30, 2021 (Table 2) ***must*** complete a PDSA as per Section 9 Appendix – B: Pre-Disturbance Site Assessment Methodology prior to construction using a Qualified Environmental Professional. The soil assessment portion for these projects ***must***, at a minimum, follow the shallow inspection methodology (Section 9.1.1.3.1 Methodology/Requirements for Shallow Inspection Locations (PDSA – S)). The data and information for the PDSA ***must*** be submitted with the data and information collected as part of the post-construction IMSA in the updated REO C&R Plan due on/before July 1, 2026. A Qualified Environmental Professional ***should*** also be onsite during any activities related to C&R (e.g., salvaging and placement of reclamation materials).

5.2.2.3 REO Commissioned On/after July 1, 2021

Operators of REOs commissioned on/after July 1, 2021 (Table 2) ***must*** complete a PDSA as per Section 9 Appendix – B: Pre-Disturbance Site Assessment Methodology prior to construction using a Qualified Environmental Professional. The soil assessment portion for these projects ***must*** use both the shallow (PDSA-S; (Section 9.1.1.3.1 Methodology/Requirements for Shallow Inspection Locations (PDSA – S)) and deep inspection (Section 9.1.1.3.2 Methodology/Requirements Deep Inspection Locations (PDSA – D)) methods. The data and information for the PDSA ***must*** be submitted with the data and information collected as part of the post-construction IMSA in the updated REO C&R Plan due within five (5) years of the commissioning date for the REO. A Qualified Environmental Professional ***should*** also be onsite during any activities related to C&R (e.g., salvaging and placement of reclamation materials).

5.2.3 Interim Monitoring Site Assessments

Interim monitoring site assessments (IMSA) are intended to inform on the status of the REO footprint following construction, during operation at key milestones (e.g., retrofitting, repowering), and when any temporary/progressive reclamation activities occur. Site-specific data and information collected for the IMSA during or after these activities provides details around the activities that were undertaken resulting in the disturbance (e.g., soil salvage, erosion control, grading, revegetation). These assessments are focused only on providing updates on footprint boundaries and the status of vegetation following a disturbance and can prevent alternate trajectories and/or costly remedial reclamation work. Key categories for reporting include changes in the footprint boundary and/or status (see Section 10 Appendix – C: Footprint) and status of the vegetation. The IMSA:

> Note:
>
> The purpose of the IMSA is to provide post-construction monitoring for reclaimed areas that provide valuable information on the status of the REO footprint and informs the GOA's cumulative effects management system (CEMS).

- ***Should*** be completed in association with other field level assessments including, but not limited to, those identified in Section 1.6.2 Directives, Standards, and Criteria). The IMSA ***should*** be aligned with

the metrics, appropriate for the desired end land use, defined in the 2010 Reclamation Criteria for Wellsites, as amended from time to time.

- ***Must*** be completed by a Qualified Environmental Professional or Competent Practitioner following the construction and/or any disturbance (e.g., repowering) associated with the REO and the data and information collected used to update the REO C&R Plan. The REO C&R Plan ***must*** contain the data and information in GIS and/or tabular formats, with any georeferenced spatial files of the footprint, facilities, topsoil/subsoil stockpiles (i.e., as-built) meeting specifications outlined in Table 5. Any maps associated with these files ***must***:
    - Identify any changes to a planned footprint that occurred after project approval, this ***may*** include a requirement to obtain regulatory approval and/or conduct additional monitoring (e.g., wildlife, wetlands).
    - Identify all areas where construction and/or progressive reclamation activities have occurred.
- ***Must*** conduct vegetation assessments (e.g., plant community composition, establishment, productivity) beginning the next full growing season on progressively reclaimed areas (i.e., after completion of construction and/or any disturbance associated with the REO) for a minimum of **three (3)** growing seasons. The vegetation assessment conducted for the IMSA ***must*** follow the vegetation assessment methodologies outlined under the 2010 Reclamation Criteria for Wellsites and Associated Facilities, as amended from time to time. The assessments ***should*** be aligned with the reclamation outcomes of the desired end land use conducted during the prime assessment stage. For the IMSA, the pass/fail triggers outlined under the 2010 Criteria for pass/fail decisions ***shall not*** apply however, Operators should use these as an indication that there ***may*** be problems at the site that ***should*** be assessed further. As outlined under the 2010 Reclamation Criteria, where alternative methodologies are used Operators ***must*** provide a description of any alternative methodologies that have been used to assess the site, including but not limited to, why the method was used, what metric it assesses, and how it applies to the site.
- ***Must*** include a Management Plan where noxious weeds, prohibited noxious weeds, and invasive species have been identified. The Plan ***must*** include annual monitoring and management until the Operator has demonstrated the noxious weeds, prohibited noxious weeds, and invasive species have been removed, eradicated or controlled. Refer to the *Weed Control Act* (GOA 2017c), the enabling legislation for eradication and control of regulated weeds, and/or requirements of local authorities. Where possible the source of these species ***should*** be identified this ***may*** also include the identification of soil related constraints (e.g., bulk density, pH, salinity, sodicity, erosion). Where these constraints have been encountered or identified, a description of how these constraints will be managed during and/or after these activities have taken place ***must*** be included in the Management Plan.

5.2.4 Reclamation Certificate Site Assessment

The purpose of the reclamation certificate site assessment (RCSA) is to provide final reclamation data and information used to support the reclamation certificate application, and reclamation inquiry by the Department.

> Note:
>
> The RCSA provides the final assessment of reclaimed areas to assess whether the reclaimed area has met equivalent land capability (ELC).

5.2.4.1 Surface Liability Period

The surface liability period for the Operator of a REO is five (5) years after reclamation certification which is typical of most specified land activities, except conventional wellsites (which is 25 years).

5.2.4.2 RCSA Requirements

Data and information from the RCSA, when used in combination with those collected during the PDSA and IMSA(s), form an integral part of determining whether equivalent land capability has been met. The RCSA:

- ***Must*** be completed by a Qualified Environmental Professional or Competent Practitioner and the data and information collected submitted as part of the reclamation certificate application.

- ***Must***, at a minimum, use the assessment methodology set out under the 2010 Reclamation Criteria for Wellsites and Associated Facilities, as amended from time to time, for: Cultivated Lands (GOA: AEP, 2013b); Forested Lands (GOA: AEP, 2013c); Native Grasslands (GOA: AEP, 2013d); and, Peatlands (GOA: AEP, 2015c). Qualified Environmental Professionals completing the RCSA are not limited to the methods described/identified in the criteria. Where alternative methodologies are in the assessment, the alternative method(s) ***must*** be accompanied with a justification that includes, but not limited to the following information: description of the method(s) used to assess the site(s); reasoning for selecting the method(s); what metric(s) the method(s) assess; and how it applies to the site. The 2010 Reclamation Criteria for wellsites was developed within the context of the 25 year surface liability period. Therefore, since REOs are required to meet the appropriate 2010 Reclamation Criteria, the following modifications are outlined below.

    - **Forested Lands, Native Grasslands, Peatlands, and Wetlands:** The number of years of growth required to determine whether the site has been reclaimed to a sustainable plant community on the agreed upon trajectory may vary depending on the severity of the disturbance, site conditions, and plant community types. Prior to submitting the RCSA, a qualified professional ***must*** have enough growing seasons to verify the sustainability of the community under typical growing conditions for the area. Sites assessed with less than **five (5) growing seasons** between the completion of final reclamation and when the RCSA is conducted ***must*** be justified. For sites with poor soil quality, more growing seasons would be expected prior to a RCSA.

    - **Cultivated Lands**: conducting vegetation assessments for a minimum of **four (4) growing seasons** following the completion of reclamation and meeting, or exceeding, the reclamation criteria for each of those years. The reclamation certificate site assessments ***must,*** at a minimum, consist of the following:

        - **One (1) year**: where landscape, soils and vegetation assessments are **all** completed in-field;
        - **One (1) year**: where at a minimum the vegetation assessment is completed in-field; plus,
        - **Two (2) years**: where at a minimum the vegetation assessment is completed. The assessment ***may*** be completed in-field and/or ***may*** be completed using alternative methods (e.g., combine yield data, aerial/satellite imagery) that will provide, at a minimum, assessments of one or more of the vegetation metrics defined in the reclamation criteria.

END OF SECTION

6 CONSERVATION AND RECLAMATION PLANNING

The REO C&R Plan includes information and documentation associated with C&R activities occurring throughout the project lifecycle (i.e., construction through decommissioning to final reclamation). These plans are site-specific and based on current knowledge and best practices for planning and carrying out C&R activities. This information, if implemented, ***should*** help in achieving successful reclamation outcomes. It is recognized that the initial REO C&R Plan ***may*** undergo changes at key points througout the operation until final decommissioning and reclamation are undertaken. REO C&R plans are necessary to ensure conservation, contruction and reclamation outcomes are aligned. Using the data and information collected during the DRA and PDSA, this section ***must*** provide a site-specific overview of the conservation planning associated with each disturbance area, including all associated disturbances (e.g. roads, borrow pits, maintenance yards) and associated reclamation criteria. The REO C&R Plan ***must*** cover all components of the REO, including all infrastructure and associated facilitites (e.g. pads, temporary workspaces, access roads, laydown areas, borrow pits, maintenance yards, research sites), that will be (or were) used directly, or in support of the REO.

Note:

REO C&R Plans ***may*** require a degree of adaptive management and ***must*** be reviewed periodically and updated accordingly with any changes associated with the project footprint. It is strongly recommended that the REO C&R Plan be developed in close consultation with Qualified Environmental Professionals with experience in C&R activities.

REO C&R plans submitted in an application to AUC are considered conceptual and will require updating once an Operator receives approval from AUC. REO C&R plans submitted for review by the Department at any stage ***must*** provide enough detail to enable informed regulatory decisions. Plans and reports shall be considered for review by the Department when presented as complete, finalized documents. Draft REO C&R plans and/or reports shall not be considered for review. Prior to the Department commenting on, or completing a review of a REO C&R Plan, the Department ***may*** require additional relevant information. This is typically done through a Supplemental Information Request (SIR) to the Operator. The following sections provide direction on the specific content requirements of REO C&R plans.

6.1 Conservation Planning

This section of a REO C&R Plan ***should*** contain an executive summary that highlights the key considerations of the background and site conditions, pre-disturbance land uses, adjacent land uses, construction, operations, progressive reclamation and final reclamation phases for the proposed land disturbance. It provides an overview of the conservation activites planned and undertaken throughout the construction and operational (e.g., repowering, retrofitting) phases of the REO. When planned accordingly using project characteristics (e.g., size of disturbance, associated infrastructure, timing of the activities) the use of site-specific data and information can help minimize adverse effects (e.g., erosion, soil degradation) at the site. This section includes discussion of the following:

- **Regulatory Alignment**: Describe how the REO C&R Plan aligns with regional and local planning that ***may*** be associated with the development (e.g., regional/sub-regional plans, municipal authority zoning requirements, directives, regulations) and how potential constraints would be addressed.
- **Adaptive Management**: Describe how the REO will incorporate adaptive management approaches including, but not limited to:

- Causes, conditions, and other ecological factors that may be affecting the area within and around the project footprint and the ability to meet the targets and objectives (e.g., desired end land use, equivalent land capability (ELC), reclamation criteria);

- Description of monitoring programs (e.g., IMSA) used to assess if reclaimed areas are on trajectories to meet the measurable targets (e.g., equivalent land capability);

- Description of how assessment data (e.g., PDSA, IMSA) will be used in adaptive management for future reclaimed areas; and,

- Variances that occurred between the conceptual REO C&R Plan and activities that occurred during construction and plans to address variances. Where these occur, they ***must*** be documented and submitted and included in an updated REO C&R Plan.

- **Best Management Practices (BMPs)**: Describe the BMPs being proposed including, but not limited to those:

  - That minimize or shorten timelines between completion of construction activities and the start of clean-up and/or reclamation activities; or, the time that reclamation materials (e.g., topsoil, coarse woody debris) are stockpiled (if required).

  - That maximize the use of existing roads, power lines, fences and other infrastructure associated with REOs and/or minimize the area disturbed during construction, operation, and decommissioning activities.

  - Where new infrastructure is required, minimizing the number, length, and area of access roads, power lines, fences, and other infrastructure associated with REOs.

  - That decommission and reclaim infrastructure no longer needed to meet regulatory requirements and commitments. These may be site-specific and adjusted accordingly based on soil conditions, vegetation and adjacent habitat, and landowner requirements and commitments.

  - Supervised by a Qualified Environmental Professional on site during activities (e.g., salvage and placement of reclamation materials). Any variances (e.g., BMPs identified were not followed) ***must*** be included as part of an update (i.e., IMSA) to the REO C&R Plan.

- **Soil and Vegetation Management**: Describe the site characteristics and any specific environmental issues such as the avoidance of or mitigation of impacts to hydrology or environmentally sensitive sites within or adjacent to the planned area of disturbance (e.g., sites where rare plants, native grasslands, and/or wetlands were identified). This section ***must*** include, but is not limited to:

  - Identifying site suitability for soil conservation, construction, and establishing a baseline for determining reclamation success (i.e., ELC).

  - Identifying existing stockpile storage locations and describing the nature of any previous or existing disturbances when siting REOs on Brownfields and/or previously disturbed sites. This includes describing whether soils have been completely salvaged from the area, the presence of insufficient topsoil materials, or sites where topsoil and/or subsoil has been previously disturbed but improperly salvaged.

  - Identifying soil depths across the site to enable proper management of reclamation material including the salvaging of topsoil and where required a minimum of 30 cm of subsoil. Subsoil salvage is not typically required for activities that are not disturbing subsoil. Where disturbances require the excavation of subsoil Operators are required to salvage a minimum of 30 cm subsoil,

unless approved in writing by the Department. Salvaged subsoil ensures that during backfilling, unsuitable material is not brought up to the rooting zone (e.g. sulphate, stony material). Topsoil and subsoil ***must*** be stored separately (if required). Where storage is required and lasts longer than **six (6)** months the topsoil and subsoil stockpiles ***must*** be a minimum of **three (3)** metres apart, sloped, and seeded to prevent wind and/or water erosion. Stockpiles ***must*** have proper maintained signage.

- **Mitigation Measures**: Describe the use of any mitigation measures to address environmental issues, employed throughout the lifecycle of activities associated with the REO. This can include following local policies for invasive species prevention, containment, and control for weeds and invasive species. This can include, but is not limited to practices, such as:

  - Cleaning vehicles and equipment arriving/leaving from areas with known invasive species issues;
  - Using locally sourced topsoil; and,
  - Post-construction monitoring for and rapidly removing invasive species.

6.2 Reclamation Planning

The reclamation planning section of the REO C&R Plan ***should*** contain an executive summary that highlights the background and site conditions, pre-disturbance and adjacent land uses, various activities that may occur from construction through to reclamation for the REO. This section ***must*** align with the associated conservation activities that could occur throughout the project lifecycle (i.e., construction through decommissioning to final reclamation). Using the data and information collected during the DRA and PDSA, this section ***must*** provide a site-specific overview of the reclamation plan for each disturbance area, including all associated disturbances (e.g. roads, borrow pits, maintenance yards) and associated reclamation criteria. It also provides site-specific information with respect to reconstructed landforms, soil conditions, vegetation communities, and revegetation techniques. Methods and processes used ***may*** need to be site-specific and adjusted accordingly throughout the life-span of the REO. These ***should***, if implemented, reduce the risks to landowners on private lands, the Crown on public lands, and the liability to the Operator. Additionally, well planned progressive reclamation can result in decreased overall reclamation costs. If applied successfully throughout the lifecycle of the operation, and depending on the size and type of operation, final vegetation communities will be in the process of establishing at the end of a REO. This can enable important natural processes, such as the re-establishment of pre-disturbance surface and subsurface hydrology in order to begin developing ecosystem function within the reclaimed areas earlier, and shorten closure timeframes.

For this portion of the REO C&R Plan, like the conservation section, the reclamation section ***must*** factor in the site-specific information collected during the DRA and PDSA and activities to be conducted to describe:

- **Stakeholder Involvement**: identify who will be involved (e.g., Indigenous peoples; land managers), at what point(s), and in what manner. The section ***should*** also identify any potential questions or concerns that may be directed to the operation prior to and during reclamation activities.

- **End Land Use**: describe the end land-use proposed for the site, including how the site will be integrated into surrounding lands, and where applicable, the municipal zoning category. This includes, but not limited to:

  - Identifying and describing any proposed changes in, or alternative end land uses. If the proposed end land use is different from the pre-disturbance land use, the Operator ***must*** obtain written acceptance from the land manager and/or municipal authority (where required) and approval from

the Department. Where these changes are requested on private land, written acceptance from the land manager ***must*** accompany the application.

- Identification and description of any monitoring to be completed throughout the project.

- **Reclamation Criteria**: identify the applicable reclamation criteria based on proposed end land use.

- **Reclamation Activities**: This section describes the temporary, progressive, and final reclamation activities. It is recognized that reclamation plans will require a degree of adaptive management based on changes in best management practices, situations where overlapping activities are present (or occur), soil conditions, vegetation and adjacent habitat in order to meet future land manager requests/commitments and regulatory requirements. The updated footprint boundaries of sites or areas that were disturbed ***must*** be included along with a description in the IMSA, and ***must*** be used to update the REO C&R Plan. These activities ***must not*** include habitat enhancements or improvements (e.g., ponds, rock or brush piles for small mammals, bird nest boxes, nesting platforms, wildlife food plots, etc.) without consultation with and approval by AEP-Wildlife Staff. These habitat enhancements are often desirable but when added to REOs could result in increased wildlife use of the area which may result in increased levels of wildlife injury or mortality.

  - **Overlapping Specified Land Activities**: The *Environmental Protection and Enhancement Act* (*EPEA*) requires an Operator to reclaim specified land and obtain a reclamation certificate. The C&R Regulation defines which activities are subject to this requirement but, it also exempts an Operator from reclamation requirements if a second specified land activity is carried out on or in respect of the first Operator's specified land. The objective of this exemption is to ensure Operators are not prevented from fulfilling their regulatory obligations for reclamation and certification by the presence of another Operator's specified land activity. The exemption is not to be used to reduce an Operator's stated liability by exempting an activity with a relative high reclamation cost in favor of an overlapping, lower cost activity.

- **Infrastructure**: This section describes the activities (e.g., need for fill, grading, recontouring) associated with decommissioning and reclamation of the REO. This includes, but is not limited to, descriptions of how all the infrastructure (e.g., access roads, power lines, collector lines, turbine pads) associated with the REO will be decommissioned and reclaimed **and** identifies what (if any) infrastructure would be left in place (e.g., roads, cabling, concrete foundations). For any infrastructure being left in place:

  - **Below the final reclaimed surface:** the Operator ***must*** demonstrate that the remaining infrastructure will not result in an adverse effect (i.e., will not interfere with restoring the site to equivalent land capability) including, but not limited to, impacts to surface and/or subsurface drainage or crop growth; provide written confirmation of acceptance land manager(s) (e.g., original surface lease agreement); and, remove below the final reclaimed surface any:

    - Concrete infrastructure associated with the REO to a minimum depth of **1.2 metres**; and,
    - Any other remaining infrastructure (e.g., collector lines) associated with the REO to a minimum depth of **1 metre**.

  - **On the surface of the reclaimed area**: The Operator ***must*** provide justification for why the infrastructure is being left in in place (i.e., infrastructure ***must*** be an improvement); provide written confirmation of acceptance land manager(s) in the reclamation certificate application; and, demonstrate that the remaining infrastructure is stable, non-hazardous, non-erosive and will not result in an adverse effect (e.g., impacts to surface drainage).

- **Contamination**: This section describes any mitigation that ***may*** be required for dealing with potential contamination of buildings or other structures, appurtenances, land or water. If applicable, this will involve remediating contaminant releases to Alberta Tier 1 (GOA: AEP, 2016a) and/or Tier 2 (GOA: AEP, 2016b) Guidelines.

- **Landscape:** The development of the post-reclamation topography is important to the success of the reclamation outcomes. This section includes a description of the proposed reclamation of landform, drainage, and watercourse(s). Any stabilization, contouring, maintenance, conditioning or reconstruction required for the surface of land (e.g., restored to pre-disturbance conditions, removal of stream crossings, roads, and pads) ***should*** be included in this section. Describe post-reclamation goals and how the landscape will be integrated with adjacent land use or waterbodies.

- **Soils:** Topsoil and upper subsoil ***must*** be conserved and restored to assist in establishing and maintaining pre-construction plant communities to the greatest extent possible, consistent with landowner objectives. This section provides a plan for replacing reclaimed soil that is compatible with the end land use including, but not limited to:

    - Depth and volume of the salvaged and replaced topsoil and subsoil, including a soil/materials balance that is required to achieve reclamation goals.

    - Methods used for topsoil and subsoil salvaging and separate storage at the site that will occur during construction, operation, and reclamation. Where topsoil and subsoil storage occurs, a description of how the separate soil stockpiles will be stabilized and re-vegetated with plants appropriate for the soil conditions and adjacent habitat, including use of local seed sources where feasible and consistent with landowner objectives.

    - Soil conditions (e.g. steep slopes, sandy soils) that ***may*** require special consideration or handling techniques, as well as a proposed mitigation approach. Where subsoils are being excavated and replaced, description of how they will be replaced in the correct sequence/depth to ensure natural salinity is not brought to surface.

    - Explanation of how and where any soil related issues will be addressed (e.g., de-compaction).

    - Details on any potential topsoil additions (e.g., texture, detailed salinity, weed analysis, volume) and/or amendments (e.g., rates), prior to the application of topsoil additions. On private land Operators ***must*** provide written acceptance from the land manager. On public lands, these ***must*** be approved by the Department.

    - If present, describe the management of coarse woody debris (CWD) including, but not limited to: How CWD will be obtained or stored for clean-up, temporary or final reclamation of forested lands; and, site-specific plans for handling non-merchantable timber. CWD Plans ***must*** be provided, per the *Management of Wood Chips on Public Land Directive* (SD 2009-01; GOA: ASRD 2009).

- **Vegetation**: provide a plan for revegetating the site that is consistent with the end land use type proposed for the site including, but not limited to:

- Plans for revegetating the site based on land manager requirements and/or BMPs (see 1.6.3 Best Management Practices). Where required, use native species when seeding or planting during restoration. Operators ***must*** consult with the Department and/or local municipal authority regarding the appropriate native species to be used.

Note:

To meet the intent of the Alberta Wetland Policy, the area (ha) of wetland not being reclaimed to wetland *must* be clearly documented.

- Description of the corresponding hectares of sites for each land use; type of vegetation and species list; seed/seedling source and quality; seeding/stocking (reforestation ***must*** adhere to the Alberta Forest Genetic Resource Management and Conservation Standards for all tree/shrub stock); fertilization rates and methods; time to achieve revegetation; and, method for measuring revegetation success.

- Identification of the revegetation target community consistent with the proposed end land use (e.g., for peatlands and mineral wetlands the Alberta Wetland Classification, for native grassland sites the ecological range site, for forested sites the ecosite phases, and for cultivated end land use the agronomic community).

- **Weeds**: Description of weed management. Weeds are to be managed as per the *Weed Control Act* (GOA 2017c) and/or local authority requirements, with prohibited noxious weeds destroyed and noxious weeds controlled. Also refer to requirements of local authorities for direction on the eradication and control of invasive plants. Undesired plants (e.g., volunteer crop, incompatible species) ***must*** be controlled so that they do not impede land manager operability. Management ***must*** be submitted where this occurs, and a weed control plan ***must*** be included as part of the REO C&R Plan.

Note:

Eradication, removal and management of prohibited noxious and noxious weeds are set by the *Weed Control Act* (GOA 2017c). These are direct requirements of the *Weed Control Act* and alternatives *shall not* be accepted.

- **Wildlife**: For this description, Operators ***must*** follow applicable wildlife Directives.

6.3 Maps

The maps required as part of the REO C&R Plan application (and updates) ***must*** at a minimum include the following:

- Minimum scale of 1:5,000 or greater, (e.g., 1:2,500)
- Planned footprint boundaries and as-built footprint boundaries, if different from the planning phase;
    - Maps, or georeferenced digital files ***must*** contain all infrastructure (e.g., buildings, fences, ponds access roads, monitoring sites) associated with the REO.
- Topsoil depths, depths salvaged and placement location(s)
    - Where applicable, this ***should*** also include salvaged topsoil storage location(s).
- Subsoil depths salvaged and placement location(s)
    - Where applicable, this ***should*** also include salvaged subsoil storage location(s).

- Areas where soil conditions require special consideration, mitigation measures (e.g., erosion control), or handling techniques. The legend ***should*** provide a description of the mitigation approach undertaken. Maps ***should*** indicate, but are not limited to the following:
    - Areas associated with previously disturbed areas or brownfield sites where soil salvage has occurred; or,
    - Areas where mitigation measures or special soil handling procedures are required (e.g., weed issues) identified in the planned footprint areas.
- Vegetation: plant communities, or crop type within and around the REO footprint.

END OF SECTION

7 RECLAMATION CERTIFICATE APPLICATION

This section provides an overview of the content of the reclamation certificate application for a REO.

7.1 Decommissioning

While the definition for 'reclamation' under *EPEA* includes decommissioning, the process for decommissioning notification falls to the AESO. Operators of REOs that are intending to decommission part(s) or all of a project ***must*** submit a new/updated REO C&R Plan that contains:

- A description of decommissioning, reclamation, and monitoring activities; and,
- An estimate of the timelines required to complete those activities and submit a reclamation certificate application.

7.2 Reclamation Certificate Site Assessment

The purpose of a reclamation certificate site assessment (RCSA) is to assess landscape, soil and vegetation (e.g., soil characteristics, component plant communities) within and around the REO footprint to determine whether ELC has been met.

7.3 Reclamation Certificate Application

Operators ***must*** complete a RCSA and apply for a reclamation certificate for any and all areas (e.g., temporary workspace, temporary access) used to construct, operate and reclaim a REO. The application may be for all, or parts, of a REO but it ***must*** be specific with respect to the footprint area for which the application is being made. The application ***must*** contain the data and information in GIS and/or tabular formats, with any georeferenced spatial files of the footprint (i.e., as-built) meeting specifications outlined in Table 5. The reclamation certificate application ***must*** include, but is not limited to, the following:

Note:

Data and information during the PDSA and IMSA(s) when used in combination with those collected during the RCSA form an integral part of determining whether equivalent land capability has been met.

- Information about the footprint that describes any changes to a planned footprint that occurred after project approval and the cumulative construction, operation, remediation (if required), and reclamation activities that occurred for the area(s) associated with the application;
- Data collected during previous assessments (e.g., PDSAs (see Section 5.2.2) and/or IMSAs (see Section 5.2.3); and,
- Data and information collected during the RCSA (see Section 5.2.4) for the area(s)

The checklist in Section 11 Appendix – D: Checklist for a Reclamation Certificate Application describes the content requirements for the reclamation certificate application.

END OF SECTION

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END OF SECTION

9 APPENDIX – B: PRE-DISTURBANCE SITE ASSESSMENT METHODOLOGY

9.1 Pre-Disturbance Site Assessment for Previously Undisturbed Sites

The following pre-disturbance site assessment (PDSA) methodology has been adapted from existing policy and technical resources. For information on the desktop review assessment (DRA), which forms the basis of the PDSA, see Section 5.2.1 Desktop Review Assessment. The PDSA ***must*** be used to assess any or, all of the following:

- Temporary and permanent disturbance footprints;
- Associated or incidental facilities, access and utility corridors; and
- Area(s) where off-site effects to vegetation and soils are anticipated.

The intent of PDSA is to provide data, information and maps used to update the REO C&R Plan, this includes, but not limited to the following:

- Soil data and information for identifying and verifying pre-construction soil pro perties for C&R planning (e.g., topsoil depth; texture; rooting restrictions). The PDSA provides verification, to the soil series level, of soil classification done during the DRA to ensure soil type and parent material are correctly classified. Soil types and parent materials ***must*** be considered in determining reclamation outcomes. The commissioning date of the REO determines whether the Operator ***must*** assess soils using the:
    - Shallow soil assessment method (PDSA-S, see Section 9.1.1.3.1 Methodology/Requirements for Shallow Inspection Locations (PDSA – S)) only; or,
    - Shallow (PDSA-S) and deep (PDSA-D, see Section 9.1.1.3.2 Methodology/Requirements Deep Inspection Locations (PDSA – D)) soil assessment methods (i.e., PDSA-S/D).
- Vegetation data and information for verification of the vegetation map developed during the DRA. The vegetation map indicates the plant communities and documents pre-disturbance invasive species and weeds.
- Map products, such as pre-construction field-verified maps of:
    - Soils, to the soil series level, used to support C&R activities for conserving topsoil and subsoil; and,
    - Classified plant communities and/or agricultural crops.

Note:

For wetlands, the Alberta Wetland Identification and Delineation Directive (GOA: AEP 2015d) ***must*** be followed for the collection of pre-disturbance information.

9.1.1 Soil Data Collection and Reporting

The purpose of the pre-disturbance soil assessment (PDSA) is to identify soil types and characteristics to the soil series level. The finalized DRA soil map is the point for the field assessment to provide confirmation

and/or modification of potential soil map units and improve the scale (as required), accuracy and precision of the established soil unit stratification, classification, and delineation boundaries.

Soil data collected ***must*** be sufficient to classify soils to series level. The sections below outline the soil data collection used in the *Canadian System of Soil Classification* (SWCG 1998). Depending on the commissioning date of a REO there will be varying level of detail is required for soil inspections, for REOS commissioned:

- **Before June 30, 2021**: PDSAs ***must*** be completed using **Shallow Soil Inspections (PDSA-S).** These assessments allow inspectors to confirm classification, check topsoil depths and create more efficient delineation processes and material handling balance for both topsoil and subsoil salvage.
- **On/after July 1, 2021**: PDSAs ***must*** be completed using **Shallow Soil Inspections (PDSA-S)** and **Deep Soil Inspections (PDSA-D)** provide detailed soil description and data for classification, map unit and polygon descriptions, and identification of potential sensitive or limiting factors associated with the soil.

A list of characteristics to be recorded at each location is provided below. To streamline the assessment, what is outlined below provides data required for both deep and shallow points. Some soil attributes that are not used in the classification of the soil unit ***may not*** be required as indicated below.

The PDSA report ***must*** provide detailed information on soil types identified during the assessment, location of different soil units, and an indication of how the soil may be impacted by disturbance. The following are required:

- Summary of soil-related reconnaissance information collected during the desktop review and PDSA including figures and/or maps, including the following:
    - Digital files containing the data and information in GIS and/or tabular formats. These files ***should*** list and describe initial soil units and stratification based on field verification with labelled inspection locations, including: area (in hectares) of soil units in GIS and/or tabular formats;
    - Descriptions summarizing characteristics of each soil series (e.g., average and range of topsoil depths, topsoil and subsoil colour, topsoil and subsoil textures, salinity, structure, consistence, etc. and other series specific characteristics relevant to construction). These may be in GIS and/or tabular formats; and,
    - Detailed soil data collected for each inspection point, including classification, horizon properties (depth, thickness, texture, etc.), surface and internal drainage (class, mottles, gleying, etc.). These may be provided as GIS and/or tabular data. The detail of soil inspection data varies based on shallow (see Section 9.1.1.3.1 Methodology/Requirements for Shallow Inspection Locations) vs deep inspections (see Section 9.1.1.3.2 Methodology/Requirements Deep Inspection Locations).

9.1.1.1 Determination of Soil Inspection Sampling Intensity

The determination of the number of soil inspection locations (i.e., sampling density) ***should*** take into consideration factors such as land use and site variability. Table 6 can be used as a starting point to determine minimum sampling intensity required based on the cumulative disturbance footprint of the project (e.g., all turbines/wellsites/solar panels;substations and the associated infrastructure). For example, a project with a cumulative disturbance of 100 hectares (ha) would require a minimum of 100 soil assessment locations (i.e., 1 sample per hectare). The role of the Qualified Environmental Practioner is to use their professional judgment when completing the PDSA to assess the variability of the site (e.g., topography,

siting landscape position, color changes, physical properties) for determining appropriate sampling intensities to ensure all reclamation material is conserved.

The soil data and information collected during the PDSA ***may*** be used to augment future soil assessments (e.g., reclamation certificate site assessments) but, it ***shall not*** be considered as a replacement for any soil assessment requirements identified under the 2010 Reclamation Criteria, as amended from time to time. Operators of REOs ***must*** still meet onsite (i.e., disturbed area) and offsite (i.e., control) soil sampling requirements identified under the 2010 Reclamation Criteria, as amended from time to time, for the reclamation certificate site assessment (RCSA).

9.1.1.2 Location of Soil Inspections

Soil inspections conducted for map unit descriptions are placed in locations which define the range of soil characteristics of the associations across the landform, the soil units and inclusions, as applicable, using soil sampling densities found in Table 6. Map unit delineation inspections may be located throughout polygons and near polygon boundaries. Variable features within the area are also considered for assessment, including but not limited to, different topographic positions, aspect, moisture regime, and plant communities to capture potential changes in soil units across the landscape. These locations ***must*** be provided in GIS and/or tabular formats.

Table 6 Target sampling density (hectares per site) and minimum number of inspection sites required based on the size of the project footprint, or disturbance area (hectares, ha).

Project Size (ha)	Cultivated Lands		[1]Forested Lands and Native Grasslands	
	Target Density (ha/inspection site)	Minimum # of sites	Target Density (ha/inspection site)	Minimum # of sites
1–2	0.14	7	0.2	5
3–6	0.24	13	0.4	8
7–11	0.34	21	0.6	12
12–16	0.44	27	0.8	15
17–23	0.54	31	1.0	17
24–35	0.64	38	1.2	20
36–45	0.74	49	1.4	26
>45	1.00	Calculated at the Target Density	1.6	Calculated at the Target Density

Linear Disturbance (e.g., access road)		
<400 m	One (1) inspection site per 100 m	One (1) inspection site per 100 m
>400 m	One (1) inspection site per 100 m	A minimum of one (1) inspection site per map unit; or, minimum of one (1) assessment point per 800 m.

Footnotes:

Note: Adapted from Soil Mapping System for Canada (MSWG 1981); The Soil Survey Handbook (Agriculture Canada 1987); and, the 2010 Reclamation Criteria for Wellsites and Associated Facilities (ESRD 2010-2015).

[1] Adapted from Conservation Assessments in Native Grasslands (GOA: AEP 2018a)

9.1.1.3 Soil Inspection Methods and Requirements

A combination of deep and shallow inspections are required to effectively and efficiently delineate polygon and map unit boundaries within the PDSA area.

- **Shallow Soil Inspections (PDSA-S)** allow inspectors to confirm classification, check topsoil depths and create more efficient delineation processes and material handling balance for both topsoil and subsoil salvage.
- **Deep Soil Inspections (PDSA-D)** provide detailed soil description and data for classification, map unit and polygon descriptions, and identification of potential sensitive or limiting factors associated with the soil.

The exact number of deep versus shallow inspections conducted is determined by professional judgment and will depend on the type and scale of existing soil maps, soil and landscape variability, polygon complexity, and surveyor experience and/or familiarity with the area. A mininium of 1 deep inspection is required per mapping unit/polygon.

While each characteristic ***must*** be assessed at each inspection point, some ***may not*** be applicable. Standardized field assessment methods, definitions, and descriptions ***must*** be referenced for classification, soil data collection, and terminology (SCWG 1998; ECSS 1982). A list of characteristics and requirements to be recorded at each location is provided below.

9.1.1.3.1 Methodology/Requirements for Shallow Inspection Locations (PDSA – S)

Shallow inspection points are completed to the total thickness of the solum (topsoil and subsoil) or topsoil plus 0.3 meter of the subsoil, whichever is less. In cases where soils have veneers <1 m thick overlaying till, the inspection ***must*** be completed to the depth of the parent material. Additional depth may be required into the subsoil if professional judgement is required to confirm the soil classification/site type (i.e., PDSA – D). The following data and information ***must*** be assessed in each shallow soil inspection location and provided in GIS and/or tablular formats:

- Soil horizon characteristics designation, depth, texture, color, coarse fragment content, consistence, rooting restrictions;
- Soil classification according to the Canadian System of Soil Classification (SCWG 1998); and,
- Designation and depth of topsoil horizons. Where soil inspections are completed deeper than the topsoil to verify the soil classification or where a veneer of <1 m is identified, documentation to the total depth of the inspection point is required.

9.1.1.3.2 Methodology/Requirements Deep Inspection Locations (PDSA – D)

Deep inspection points are completed to one (1) meter in mineral soils (1.6 meter in organic soils if encountered) for the purposes of identifying, characterizing and classifying soil. If a soil compaction (or rooting restriction) layer is encountered prior to the required depth, documentation of the restriction and depth ***must*** be provided.

A minimum of 1 deep soil inspection point per mapping unit ***must*** be used to verify the preliminary soil map developed during the DRA. The following data and information ***must*** be assessed in each deep soil inspection and provided in GIS and/or tabular formats:

- Soil classification according to the Canadian System of Soil Classification (SWCG 1998)

- Soil series using Alberta Soil Names File (Generation 3) User's Handbook (ASIC, 2016) as a guide (and soil series variation as applicable)
- Organic horizons and thickness (L, F, H, and O layers if present)
- Mineral horizon properties for each horizon as applicable:
    - Designation (e.g., Ah, Bm, Bnt, etc.)
    - Depth or Thickness (cm)
    - Texture
    - Coarse fragment content (% volume – if relevant for classification include percent for gravel, cobbles, and stones)
    - Structure (kind is mandatory, grade and class ***must*** only be provided when it is a determining characteristic of the soil classification)
    - Consistence (moisture level and plasticity)
    - Effervescence (carbonates)
    - Matrix colour (using Munsell colour charts)
    - Mottling, when applicable (abundance, size, colour, and contrast)
    - Presence of rooting restrictions
    - Depth to water table (if applicable)
    - Parent material type (can be further described within the horizon comments)
    - Drainage characteristics (class, seepage depth and gleyed horizons)
    - Moisture and nutrient regimes (where required for ecological/range site classification)
    - Evidence of salinity (salt crystals, crusts, etc.)
    - Other observations for horizons and/or the general profile such as clay films, precipitates, iron, coal flecks, depth to bedrock, seepage, etc. as applicable.
    - Soil profile and site photographs (minimum one per soil series identified, include a consistent object in photos for scale, e.g. an extended tape measure)

9.1.2 Vegetation Data Collection and Reporting

A **plant community** is a grouping of vegetation identifiably different from other types in surrounding areas. They are functional units defined by the ecological characteristics of their ecological/ range site and normally respond to disturbance in similar fashions (Beckingham and Archibald 1996). The soil series identified within the PDSA area provides information to confirm the ecological/ range sites. The vegetation information collected and corresponding methodology is specific to the land use type:

- Cultivated lands (including tame pasture)
- Native grasslands;

- Forested lands;
- Wetlands and peatlands.

In addition to the data collected during the PDSA, the information collected ***must*** provide descriptions of all plant communities, their associated health, regulated weeds and invasive species in the PDSA area. This includes survey results from species at risk, rare plant surveys, or traditional ecological knowledge (TEK), as appropriate. Specific reporting requirements are outlined below.

9.1.2.1 Native Grasslands

For native grasslands, the soils and vegetation methodology for the above components is included in the Conservation Assessments for Native Grasslands – Strategic Siting and Pre-disturbance Site Assessment Methodology for Industrial Activities (GOA: AEP 2018). All components of this document apply for native grasslands on public lands including both the strategic siting assessment and the pre-disturbance site assessment. These ***must*** be attached the PDSA for the C&R plan. For native grasslands on private lands the PDSA is required as part of the C&R Plan and ***must*** be included with the C&R plan report.

9.1.2.2 Forested Lands

Vegetation assessments in **forested lands *must*** use the subregion specific Field Guide to Ecosites (Beckingham and Archibald 1996). They ***must*** include a minimum of three 10 x 10 m sample locations in each ecosite phase polygon. Where field observations are not consistent with the AVI polygon data, additional sampling is required to map the ecosite.

9.1.2.3 Wetlands

For **wetlands,** where impacted by any activities related to the REO these wetlands ***must*** assessed as per the Wetland Policy requirements including, but not limited to, the following:

- Alberta Guide for Assessing Permanence of Wetland Basins (GOA: AEP, 2014b)
- Alberta Wetland Assessment and Impact Report Directive (GOA: AEP, 2015b)
- Alberta Wetland Classification System (GOA: AEP, 2015c)
- Alberta Wetland Identification and Delineation Directive (GOA: AEP 2015d)
- Alberta Wetland Mitigation Directive (GOA: AEP, 2017a)

9.1.2.4 Cultivated Lands

For **cultivated** and tame pasture lands, the vegetation assessment ***must*** document the type(s) of crop. Areas of decreased production or under special management ***should*** be included.

9.1.2.5 Regulated Weeds and Invasive Species

The surveyor ***must*** confirm whether any non-native species identified in the PDSA area are considered invasive in the natural subregion and/or are regulated weeds (i.e., Prohibited Noxious and Noxious as defined in the *Weed Control Act*). More information on how to assess regulated weeds and invasive species can be found in Adams et al. (2016).

9.1.3 Maps

Maps ***must*** include at minimum:

- Minimum scale of 1:5,000 or greater, (e.g., 1:2,500)

- Township, ranges and section boundaries and key roadways;
- Symbol descriptions (e.g. roads, township and range lines, section lines, railways, etc.);
- Legend which includes at least: soil series/plant community map units and associated symbols, code descriptions, patterns and/or colours;
- Map unit descriptions may be provided as a separate table to prevent overcrowding the map; and
- Sources used for map development;
- Locations of where the data was collected;
- Interpretations of characteristics relevant to disturbance and reclamation planning ***must*** be provided, including:
    - Map showing sensitive soil/plant community units and areas; and,
    - Correlation of soil information and mapping with vegetation data
- List and provide descriptions of sensitive areas being avoided, such as:
    - Areas with solonetzic blowouts from which it is difficult to effectively salvage topsoil
    - Areas where reclamation and restoration is challenging
    - Drainage direction and contours

Note:

Prior to completing a PDSA on a brownfield or previously disturbed sites, a Phase 1 and, if required, a Phase 2 site assessment ***must*** be completed.

9.2 Pre-Disturbance Site Assessment for Brownfield and Previously Disturbed Sites

A key purpose of the PDSA is to identify the quanity and quality of the available reclamation materials (i.e., topsoil, subsoil, coarse woody debris for forested sites). A detailed material balance of the available reclamation material is required to inform the proposed end land use and reclamation plan.

The PDSA for brownfield or, previously disturbed areas includes any or, all of the following:

Note:

When assessing soils on Brownfield or previously disturbed sites Operators *should* assess soils using the both the shallow (PDSA-S) and deep (PDSA-D) assessment methodologies.

- Temporary and permanent disturbance footprints;
- Associated or incidental facilities, access and utility corridors; and
- Area(s) where off-site effects to vegetation and soils are anticipated.

The PDSA completed for brownfields or previously disturbed sites ***must*** use the approaches and methodologies described in Section 9.1 Pre-Disturbance Site Assessment for Previously Undisturbed Sites. A Qualified Environmental Professional can adjust the approach taken based on the site characteristics of the brownfield site or previously disturbed site, but any changes ***must*** be documented and an explanation provided in the REO C&R Plan.

Prior to commencing field work, a soil map of the planned footprint area ***must*** be developed. A preliminary soil map is an essential field tool and informs the final mapping product. For brownfields and previously disturbed sites, the preliminary soil maps will be necessary in order to understand potential end land use outcomes. Based on soil information reviewed during the desktop review (DRA), the planned footprint area is stratified into potential soil map units as per the information collected.

Field level sampling can help improve the scale (as required), accuracy and precision of the established soil unit stratification, classification, and delineation boundaries. For the PDSA, the following steps are provided for developing a map for the soil assessment:

- Obtain and provide background data and information where available on the brownfield or previously disturbed footprint,
- Overlay the most detailed map of existing soil maps, including locations of reclamation material stockpiles, and identify potential field verification locations. If existing soil maps are unavailable see the below note on soil map development methods.
- Assign preliminary naming for map units (if applicable) and identify potential soil assessment locations.

END OF SECTION

10 APPENDIX – C: FOOTPRINT

The purpose of tracking the REO footprint through as-builts is to track the status (e.g., pre-construction, post-construction, areas reclaimed, areas certified) of development through the lifecycle of the renewable energy operation (REO). This can include progress progressive and final reclamation activities or that have received reclamation certification.

Georeferenced data and information that summarizes landcover change and the status of the project footprint will help support a cumulative effects monitoring system that would include renewable energy facilities. The georeferenced files (e.g., GIS or tabular formats) ***must*** contain the following:

- Project metadata that at a minimum includes the following: Project Name; Operator Name(s); Project Location; Project Type (geothermal, solar, wind), and Project Size (MW)
- Pre- and post-construction footprint boundaries (as-built or finalized project locations). These ***should*** be capability of showing the project footprint relative to overall landscape and terrain, proximity to other developments, and overall area features (lakes, etc.)
- Identification of any changes to a project footprint that occurred after project approval. These changes ***may*** include a requirement to obtain regulatory approval and/or conduct additional monitoring (e.g., wildlife, wetlands).
- Identification of and, and all, areas where construction and/or progressive reclamation activities have occurred. This ***should*** include a summary of the cumulative construction, operation, remediation, and reclamation activities that have occurred to that point.

10.1 Footprint Boundary and Status: Before Disturbance

In the project application, the extent of the planned footprint that is in the application to AUC or, that has been approved (but construction has not yet been completed) ***must*** be included. This area includes, where appropriate, any of the planned footprint, temporary or permanent, that was approved for development under the regulatory approval issued to the REO Operator, or Operator. Where possible, the status ***should*** be further classified into one other following categories:

- **Native**: includes areas where native vegetation (e.g., native grasslands, forested areas) is intact, or where no vegetation removal has occurred;
- **Cultivated**: includes areas that are currently, or previously, under cultivation where native vegetation is intact, or where no vegetation removal has occurred; or,
- **Previously Disturbed**: includes all, or portions of the planned footprint, that were previously disturbed that have been revegetated.

10.2 Footprint Boundary and Status: Following Disturbance

For approved projects, this includes the planned footprint and extent of any footprint that has undergone disturbance, temporary or permanent, during the lifecycle of the REO. For this purpose, areas within the project ***must*** be classified based on the status of the activity on the land into one of the following categories:

- **Native**: includes areas where native vegetation (e.g., native grasslands, forested areas) is intact, or where no vegetation removal has occurred;
- **Cultivated**: includes areas that are currently, or previously, under cultivation where native vegetation is intact, or where no vegetation removal has occurred;
- **Previously Disturbed**: includes all, or portions of the planned footprint, that were previously disturbed that have been revegetated;
- **Progressive Reclamation (Terrestrial)**: see definition of Progressive and Temporary Reclamation; or,
- Permanent Reclamation (Terrestrial; Wetlands): see definition of Permanent Reclamation.
- **Certified**: these are areas of the REO that are "certified" and have received a reclamation certificate under the *Environmental Protection and Enhancement Act (EPEA)*.

END OF SECTION

11 APPENDIX – D: CHECKLIST FOR A RECLAMATION CERTIFICATE APPLICATION

The following section provides a set of checklists for the specific content requirements for a reclamation certificate application for a REO.

11.1 Maps

The reclamation certificate application ***must*** include maps that contain the footprint legal boundaries, area(s) for which the certificate is being requested, and the adjacent land use. These maps ***must***:

- [ ] Clearly define legal surveys of the parcel or footprint area to be certified, including boundaries conforming to the legal subdivision grid.
- [ ] Use aerial photography or satellite images in mapping.
- [ ] Clearly depict the surface lease and footprint boundaries along with adjacent third-party activities and land uses.
- [ ] Provide geospatial information (e.g., GPS coordinates for features and sample locations, boundaries).
- [ ] Identify target end land use.
- [ ] For larger disturbances that were reclaimed over time, provide maps that depict when each area was disturbed and when each area was reclaimed

11.2 Site Assessment Data and Information

The reclamation certificate application ***must*** include data and information from completed site assessments associated with the REO. This section includes data and information associated with the characteristics and properties of the conserved and reclaimed land, including landscape, soils and vegetation to inform whether the site has met equivalent land capability. This section ***must*** include the following:

11.2.1 Contact Information and Declarations

11.2.1.1 Land Manager(s)

- [ ] Include contact information (name, phone number, email address, and mailing address) for landowners and occupants and information related to current land uses, relevant concerns, and issues.
- [ ] Include relevant land-title information.
- [ ] Discuss how/when application content was provided to owners and occupants, where applicable

11.2.1.2 Operator(s)

- [ ] Include contact information (name, phone number, email address, and mailing address) for the developer and/or Operator of the renewable energy operation (REO).
- [ ] Include relevant title information.

11.2.1.3 Qualified Environmental Professional(s)

- [ ] Include contact information (name, phone number, email address, and mailing address) for all Qualified Environmental Professionals that have been involved and/or signed-off on the assessments required under this Directive.

[ ] Include relevant title information.

[ ] Include relevant professional declarations

11.2.2 Regulatory Information

[ ] Explain how the site meets any applicable standards, criteria, or guidelines relevant to the operation, especially those established under this Directive.

[ ] Soil and vegetation reclamation monitoring assessment points and summary information (e.g., GPS, tabular, or similar presentation).

[ ] Evaluate and assess wetland, wildlife, and fisheries habitat, with reference to information submitted separately under separate cover, if applicable.

[ ] Explain changes to approved reclamation plans that are relevant to the site.

[ ] Explain how the site meets the directions of an inspector or the director.

[ ] Explain how the site meets all terms and conditions of any applicable approval, code of practice, environmental protection order, or enforcement order.

11.2.3 Environmental Site Assessment (ESA) Information

The data and information collected as part of Phase 1 and Phase 2 (if applicable) using the Alberta Environmental Site Assessment Standard (GOA: AEP, 2016e), as amended from time to time, to support a reclamation certificate application.

[ ] Discuss the results of the Phase 1 Environmental Site Assessment (ESA) for the area for which the reclamation certificate application is being made.

[ ] Attach the Phase 1 ESA

[ ] If applicable, discuss the results of the Phase 2 Environmental Site Assessment (ESA) for the area for which the reclamation certificate application is being made.

[ ] Attach the Phase 2 ESA

11.2.4 Reclamation Certificate Site Assessment: Data and Information

The data and information collected as part of the RCSA ***should*** be integrated to inform and support decisions related to whether a site(s) has met equivalent land capability.

[ ] Discuss the capability of the reclaimed land with reference to the approved REO C&R Plan.

[ ] Discuss the achievement of equivalent land capability.

[ ] Discuss the distribution of land uses.

[ ] Compare the pre-disturbance ecosite distribution to the reclaimed ecosite distribution.

[ ] Compare the reclaimed ecosite distribution to the adjacent land ecosite distribution.

11.2.4.1 Landscape

Characteristics and properties of the conserved and reclaimed land, including information on final topography, drainage, and where required, water resources.

[ ] Provide details on topography in the reclaimed area relative to the surrounding area.

[ ] Confirm that decommissioning has been completed as per the applicable requirements (see approved C&R Plan).

[ ] Provide information on the geotechnical stability of reclaimed areas.

11.2.4.2 Soils

Characteristics and properties of the conserved and reclaimed land, including information on evidence of disturbance and topsoil depth replacement.

- [ ] Provide a soil assessment as outlined in the 2010 Reclamation Criteria
- [ ] Describe material placement. Describe soil sample locations with connection to data analysis.
- [ ] Describe reclamation cover materials and confirm that soil has been replaced as required under the approval conditions (see approved C&R Plan).
- [ ] Discuss site moisture regime, as it relates to targeted end land use outcomes (e.g., agriculture, range site, ecosite).

11.2.4.3 Vegetation

Characteristics and properties of the conserved and reclaimed land, including vegetation characteristics (e.g., agricultural cropping, ecosite type), trends and performance (e.g., agricultural productivity, planting densities, cover), as supported by data from monitoring programs.

- [ ] Describe vegetation planted (e.g., seed mixes, planting densities).
- [ ] Identify plant communities and approved seed mixes
- [ ] Based on plant communities identified, discuss applicable recovery, revegetation, and monitoring strategies
- [ ] Identify target ecosite trajectories.
- [ ] Compare to relevant forest regeneration standards (if applicable).
- [ ] Discuss wildlife habitat assessment and achievement of suitability targets (if applicable).
- [ ] Characterize weeds and management.
- [ ] Summarize vegetation monitoring programs.
- [ ] Provide information on agricultural productivity, fertilization, and cropping since reclamation.

11.2.5 Documentation of Site History: Conservation and Reclamation Activities

11.2.5.1 Conservation and Surface Disturbance Activities

- [ ] Describe the approach taken and relevant site history.
- [ ] Discuss when and how the surface disturbance occurred.
- [ ] Provide the conservation and reclamation requirements, including copies of the relevant approvals, at the time of surface disturbance.
- [ ] Describe the equipment utilized and the soil placement methods.
- [ ] Discuss the achievement of approval conditions

11.2.5.2 Operational Activities

A description of any substance present as a result of the Operator's activity on the land and a description of the nature and extent of the adverse effect caused by the presence of the substance.

- [ ] Summarize any historical contamination, spills, or releases.
- [ ] Remediate contaminants, as required and provide information on substances with potential adverse effects.
- [ ] Describe remedial measures taken with respect to substance release.

[ ] Include confirmatory results and supporting information on chemical analysis

[ ] Outline historical alternative mitigations and remedial approaches applied, as approved.

11.2.5.3 Reclamation Activities

Documentation of and justification for any surface improvements to be left on the conserved and reclaimed land. Written acceptance of the improvements by the registered owners of the land.

[ ] Summarize information relevant to the approved decommissioning plans.

[ ] Present overlapping surface leases and/or dispositions (e.g., pipelines, well sites).

[ ] Identify and justify land-use changes, with supporting release information (e.g., access roads) and with supporting land-title information with written acceptance, by the land manager, where applicable. Discuss when and how the surface disturbance occurred.

[ ] Discuss infrastructure proposed to be left-in place, or that would remain (e.g., turbine pads, foundations, access roads, power poles)

[ ] Written acceptance from the land manager for leaving infrastructure in-place.

END OF SECTION