Guide to Variance Justifications for Reclamation Certification of Wellsites and Associated Facilities on Forested Land

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PREFACE

In 2018, the Petroleum Technology Alliance of Canada (PTAC) initiated a multi-stage project in response to challenges experienced by practitioners, regulators and industry stakeholders related to reclamation certification of sites that were constructed using imported mineral soil pads in peatlands, and upland sites that have had natural vegetation encroachment. These sites present one or more reclamation deficiencies according to the applicable wellsite criteria and cannot receive a reclamation certificate without additional scrutiny and justification under current regulatory criteria and policies. This document focuses on upland sites. The main question when dealing with these sites is whether to disturb existing vegetation on upland sites to modify soil and landscape features to meet reclamation criteria. The goals of this project are to assist industry and regulators in making decisions around appropriate management and certification of sites with reclamation deficiencies, and to ensure that functioning ecosystems are developed on these sites.

A main finding from the Stage 1 outreach program was that challenges related to certification of upland sites arise when vegetation parameters meet the Forested Land Criteria, but soil and landscape parameters do not. There has been inconsistency in how decisions about these sites have been made by practitioners and regulators, resulting in different levels of reclamation effort being applied/required, and in how reclamation criteria are interpreted and applied, creating ambiguity in terms of defining acceptable conditions for certification. Historically, industry and regulators have agreed that in certain site-specific circumstances, sites that have natural vegetation encroachment can be certified without removing existing vegetation and re-starting the traditional reclamation process. In these circumstances, reclamation can be certified if the Alberta Energy Regulator approves a variance request, which must be justified based on ecosystem function and include a comprehensive description of the site. However, limited guidance is available on what information is required for professional justification and there is a lack of clarity in the decision process to approve or reject variance requests. There is a need to identify site characteristics that industry and regulators can agree require no (or minimal) further disturbance on upland forested sites with reclamation deficiencies. The findings from Stage 1 are provided in *Evaluation of Reclamation Practices on Upland and Peatland Wellsites*.

This document was developed to provide guidance and consistency in applying for and approving variance requests for reclamation certification of upland sites from an ecological perspective. Specifically, this document is targeted at sites that meet equivalent land capability and are on a trajectory towards sustainable forest ecosystems but have one or more reclamation deficiencies and reclamation to correct these deficiencies would damage the developing forest ecosystem on the site (or its associated access road) to the extent that the impacts outweigh the reclamation benefits. This document is not intended to encourage or promote the use of variances to avoid doing reclamation, or to justify poor reclamation practices or lack of site history. Neglecting timely reclamation in favour of waiting for conditions to develop on-site that will justify deficiencies is not considered acceptable. Variances are to remain the exception and not the rule. The document will address common issues on upland sites but will not cover every single issue on every single site. The document will only apply to sites that can be certified through the *Alberta Framework for the Management of Contaminated Sites*.

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LIST OF TERMS AND ACRONYMS

Terms

Additional Review (OneStop)

Reclamation certificate applications submitted to the AER through OneStop may go through two levels of review: baseline review and additional review. Applications that have unresolved landowner or interest holder complaints, filed statements of concern, requests for variances from the standard criteria that have not been preapproved by the AER, or are more complex are sent for additional review. AER staff will undertake a more detailed review of the application, which may include conducting field inspections, before issuing a decision (Alberta Energy Regulator, 2019a). The Forested Land Criteria refers to applications in this stream as non-routine applications (Alberta Environment and Sustainable Resource Development, 2013a).

Baseline Review (OneStop)

Reclamation certificate applications submitted to the AER through OneStop may go through two levels of review: baseline review and additional review. The baseline review ensures that the application meet the validation rules (e.g., confirming the well has an abandoned status) and assessment rules (e.g., confirming that there are no outstanding landowner complaints). All applications go through the baseline review, and a notice of application is posted. If no statements of concern are received, then the certificate will be automatically issued. (Alberta Energy Regulator, 2019a). The Forested Land Criteria refers to applications in this stream as routine applications (Alberta Environment and Sustainable Resource Development, 2013a).

Compatible Species

Seeded species that were part of a seed mix that was appropriate to the time period in which the site was constructed/reclaimed or as outlined in historical agreements with the Land Manager (Alberta Environment and Sustainable Resource Development, 2013a).

Control

Refers to information collected off-site against which collected information from a reclaimed site will be compared. The control information is collected off-site from adjacent or representative land (Alberta Environment and Sustainable Resource Development, 2013a).

Desirable Species

Desirable species are native species that are appropriate to the representative off-site ecosite based on vegetation assessments at control locations and ecosite guides. Compatible species may be included in the definition of desirable species in some cases depending on the reclamation period of the site (Alberta Environment and Sustainable Resource Development, 2013a).

See also Compatible Species.

Deficiency (Reclamation Deficiency)

A feature or parameter that does not meet the Forested Land Criteria (Alberta Environment and Sustainable Resource Development, 2013a).

Ecosite

Ecological units that develop under similar environmental influences (climate, moisture and nutrient regime) […] It is not tied to specific landforms or plant communities […], but is based on the combined interaction of biophysical factors that dictate the availability of moisture and nutrients for plant growth. Thus, ecosites are different in their moisture regime and/or nutrient regime (Beckingham and Archibald, 1996).

Ecosystem Function

The interactions between organisms and the physical environment, such as nutrient cycling, soil development, water budgeting, and flammability (Alberta Environment and Sustainable Resource Development, 2013a). Conceptually, other forest functions also include providing wildlife habitat, temperature regulation and carbon sequestration.

Equivalent Land Capability

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 (Alberta Environment and Sustainable Resource Development, 2013a, Government of Alberta, 1993).

Evidence-based Approach

Approach requiring the collection and presentation of concrete evidence as a rationale to justify reclamation deficiencies.

Forested Land

Forested land includes any treed land, whether or not the forest vegetation is utilized for commercial purposes. Treed (bush) lands in the White Area (deedable land) that is to be maintained as 'treed' shall

meet the Forested Criteria. Land in the White Area where a land use has been changed to cultivation must meet the cultivated criteria. In the Green Area (crown land), native meadows or range improvement areas in grazing dispositions may be assessed using the grasslands or cultivated lands criteria, with approval from the Land Manager (Alberta Environment and Sustainable Resource Development, 2013a).

Forested Land Criteria

The *2010 Reclamation Criteria for Wellsites and Associated Facilities for Forested Lands (Updated July 2013)* (Alberta Environment and Sustainable Resource Development, 2013a).

Incompatible Species

Species that are neither desirable species nor compatible species

See also Desirable Species and Compatible Species.

Invasive Species

The "invasive species" term has not often been formally codified as its usage is broad and subjective and can be used to refer to any number of aggressively colonizing species, particularly those that "displace the original structure of the plant community" (Powter, 2002). The "invasive" label is strongly context-dependent.

See also Problem Introduced Species and Undesirable/Problem Weed.

Land Manager

For Public Lands, this includes the Forest Officer, Lands Officer, Land Management Specialist, and/or Lands Approval Team Lead in Alberta Environment and Parks for a specific Region. For Provincial Parks and Protected Areas, it is an Alberta Environment and Parks staff member from the Parks Division. For Private Lands, this includes the landowner, their designate, or occupant (Alberta Environment and Sustainable Resource Development, 2013a).

Macro-contours

In the context of operability conditions in the Forested Land landscape criteria, macro-contours are contours that occur on a 30 to 100 m width scale (Alberta Environment and Sustainable Resource Development, 2013a).

Merchantable Timber

Merchantable timber size standards are defined by the harvesting ground rules that apply to the timber disposition. The *Alberta Timber Harvest Planning and Operating Ground Rules Framework for Renewal* (Government of Alberta, 2016) defines several standard options; the minimum diameter is typically >15 cm at stump height (30 cm).

Meso-contours

In the context of operability conditions in the Forested Land landscape criteria, meso-contours are contours that occur on a 10 to 30 m width scale (Alberta Environment and Sustainable Resource Development, 2013a).

Micro-contours

In the context of operability conditions in the Forested Land landscape criteria, micro-contours are contours that occur on a <10 m width scale (Alberta Environment and Sustainable Resource Development, 2013a).

Native Species

Plant species that are indigenous to the ecosite (Alberta Environment and Sustainable Resource Development, 2013a).

A plant species that is part of an area's original flora (Powter, 2002).

Plant species that are listed as native in the *Flora of Alberta: A Manual of Flowering Plants, Conifers, Ferns and Fern Allies Found Growing without Cultivation in the Province of Alberta, Canada* (Moss, 1993).

Natural Recovery Site

Site using a natural recovery strategy for revegetation. Natural recovery is the long term re-establishment of diverse native ecosystems (e.g., prairie, forest) by establishment in the short-term of early successional species. This involves revegetation from soil seedbank and/or natural encroachment and no seeding of non-native agronomic species (Alberta Environment and Sustainable Resource Development, 2013a).

Non-native Species

Species that are not native to Alberta.

See also Native Species.

Noxious Weed

Plant species designated as noxious weeds in the *Weed Control Regulation* (Government of Alberta, 2010). The *Weed Control Regulation* also provides authority for a municipality to designate plants that are not listed as weeds in the *Weed Control Regulation* as noxious weeds. Noxious weeds are problematic to reclamation areas due to their highly aggressive colonization potential, ability to decrease biodiversity, and in some instances the potential to be allelopathic (i.e., inhibit other species from germinating or growing).

OneStop

The online tool used in Alberta to submit reclamation certificate applications for upstream oil and gas sites to the AER.

Operability

The Forested Land Criteria defines operability as the effort required to implement management decisions and practices in order to achieve a desired level of return (Alberta Environment and Sustainable Resource Development, 2013a). On forested lands, operability refers to equipment operation (especially for forestry) and land management.

Problem Introduced Species

Most often, this label encompasses agronomic species that mount considerable invasion pressure in forested areas. Alberta Environment (2003) defines problem introduced plants as forage plants that were introduced for crop or forage production purposes, and either invade or persist in native plant communities. Examples of plants that have been identified as problematic in the Central Parkland and Foothills regions include, timothy, smooth brome, and reed canary grass (although the latter is actually a native species, it is used as a forage species).

See also Invasive Species and Undesirable/Problem Weed.

Professional Justification

Explanation of why the site should be permitted to vary from the criteria and still receive certification (Alberta Energy Regulator, 2019a) submitted to the AER with a variance request either in advance of (pre-approved justification) or as part of a reclamation certificate application. Justifications should provide a strong rationale as to why the deficiency is not expected to have adverse environmental impacts and how the site will still achieve equivalent land capability and ecosystem function despite not meeting the Forested Land Criteria, accompanied by detailed and comprehensive site-specific supporting information.

Professional Judgment

The application of training, knowledge and experience in making appropriate decisions.

Site

An upstream oil and gas wellsite and/or associated facilities (e.g., log deck, access road) required to meet Alberta's reclamation criteria to achieve reclamation certification. In this document, the term site is used to refer to a site on forested land (whether in the Green Area or the White Area) on which the well has been properly and fully abandoned, and where contamination is absent or has been remediated (risk managed sites are also out of scope). Furthermore, a site in this document has one or more reclamation deficiencies as per the Forested Land Criteria, but reclamation to correct these deficiencies would damage the developing forest ecosystem on the site (or its associated access road) to the extent that the impacts outweigh the reclamation benefits.

Sites with a Low Risk of Safety Hazards

Sites can be considered to have a low risk of safety hazards if they meet both of the following:

- Sites with an access road that is blocked by an access deterrent which may include (but is not limited to): large trees and/or shrubs, boulders, large soil mounds or coarse woody debris.
- Sites that are not currently within a grazing lease.

Undesirable/Problem Weed

The "undesirable/problem weeds" category, as with other weed labels, is context-dependent and based on the reclamation area's location, the species in question, the native plant community, and historical management practices. In the context of reclaiming a forested ecosystem, if an invading species is not listed as a prohibited noxious or noxious weed and is not agronomic in nature then the species can be

considered “undesirable” or a problem weed. Specific counties or regions can consider species to be undesirable/problematic weeds, even if they are not listed as noxious or prohibited noxious in legislation. Relevant native plant community guides and local authorities can be consulted to understand if the species of concern is labeled as undesirable in a specific area.

See also Invasive Species and Problem Introduced Species.

Third-party Impacts

Third-party impacts are those that occur as a result of activities conducted on the site by someone other than the operator (or their contractors) or the Regulator, who may not be known to the operator. Examples include recreational or traditional users (e.g., ATV/UTV trails, camping), other industrial traffic (e.g., seismic construction), the Land Manager or the Landowner (e.g., livestock grazing, hay bale storage), wildlife and any other unauthorized access (Alberta Environment, 1997).

Topsoil

Undistured forested soil profiles are comprised of organic forest floor horizons (L, F, H and O) above mineral Ae, Ahe or Ah horizons followed by the subsoil (mineral B horizons) as defined in the *Canadian System of Soil Classification – Third Edition* (Soil Classification Working Group, 1998). The Forested Land Criteria (Alberta Environment and Sustainable Resource Development, 2013a) uses the terms topsoil and surface soil interchangeably and defines them as the “uppermost mineral material, valued as a growing medium” or the “uppermost mineral or organic material, valued as a growing medium” (these two definitions are found in different sections of the Forested Land Criteria). The Forested Land Criteria also specifically defines topsoil as the “A horizon, including the Ah, Ahe and Ae horizons.” It is this last definition of topsoil that is used in evaluating topsoil depth and distribution. The off-site average topsoil depth is assessed as the combined depth of Ah, Ahe and Ae horizons but does not include LFH. Depending on how the forest floor and topsoil horizons were salvaged during construction, the replaced layer of topsoil on-site after reclamation is often a combination of the LFH and A horizons.

Variance (Criteria Variance)

A deviation from the standard criteria or assessment process described in the relevant wellsite criteria document which must be approved by the AER. The term variance is used in SED 002 (Alberta Energy Regulator, 2019a) but not in the Forested Land Criteria (Alberta Environment and Sustainable Resource Development, 2013a). A variance request containing a professional justification must be submitted to the AER to obtain a variance.

Variance Request

A formal request submitted to the AER for a deviation from the standard criteria or assessment process described in the Forested Land Criteria. A variance request must contain a professional justification. For sites that require a variance request, the application process is termed a “non-routine application” or “additional review” (unless pre-approval is obtained).

See also Additional Review.

Vegetation Override

A specific type of variance to the wellsite certification criteria, where reasonable forest cover (i.e., amount, species and distribution) is present, and where additional activities required to meet the conditions described in the criteria pose a risk to existing ecosystem function (Alberta Environment and Sustainable Resource Development, 2013a). The term vegetation override is used in the Forested Land Criteria but not in the SED 002 (Alberta Energy Regulator, 2019a).

Weed

Refer to definitions of noxious weed, invasive species, problem introduced species, undesirable/problem weed.

Acronyms

The following acronyms are used in this report or the cited references.

AAF	Alberta Agriculture and Forestry
AER	Alberta Energy Regulator
ATV	All-terrain Vehicle
AUPRF	Alberta Upstream Petroleum Research Fund
EPEA	*Environmental Protection and Enhancement Act*
CAT	Combined Assessment Tool
DSA	Detailed Site Assessment
LFH	Litter, Fibric, Humic
LSD	Legal Subdivision
PTAC	Petroleum Technology Alliance Canada
OSE	Oil Sands Exploration (operation)
RoO	Record of Observations
SED	Specified Enactment Direction
UTV	Utility Vehicle

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1.0 INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This document has been developed to provide guidance and consistency in applying for and approving variance requests for reclamation certificate applications for forested upstream oil and gas wellsites (and associated facilities) that meet equivalent land capability and are on a trajectory towards sustainable forest ecosystems but have one or more reclamation deficiencies according to Alberta's Forested Land Criteria (Alberta Environment and Sustainable Resource Development, 2013a).[1] This document is not intended to encourage or promote the use of variances to avoid doing reclamation, or to justify poor reclamation practices or lack of site history. Neglecting timely reclamation in favour of waiting for conditions to develop on-site that will justify deficiencies is not considered acceptable. Variances are to remain the exception and not the rule. The purpose of this document is to inform decisions on whether additional reclamation is required to correct deficiencies on sites that have had vegetation establishment and ensure that the decision to forego additional reclamation are based on sound ecological principles. If a need for additional reclamation is identified, this document is not intended to prescribe specific reclamation practices to correct deficiencies. Professional judgement must still be used by all parties (practitioners, companies, and regulators) to decide what should be done at a particular site.

This document is applicable to sites where **reclamation to correct these deficiencies would damage the forest ecosystem** that is developing on the site (or its associated access road) to the extent that the impacts outweigh the reclamation benefits. The focus is on sites that have had woody vegetation establishment, whether through a planned natural recovery revegetation strategy or in combination with tree planting, but also includes sites with seeded grasses (pre-2007 sites only[2]) if the site has had natural recovery of woody vegetation on portions of the site and/or their access roads. Common reclamation deficiencies[3] on these sites include subsidence, hill cuts, variable topsoil depths or a lack of topsoil, admixing, woody debris that has not been rolled back, sparse desirable herbaceous vegetation cover and noxious weeds and other problem species.

The main question when dealing with these sites is whether to disturb existing vegetation to modify soil and landscape features (and/or to control weeds) to meet the Forested Land Criteria or whether to seek

[1] Citations for government documents will be provided the first time the document is referenced but will not be repeated each subsequent time the document is mentioned as they are cited frequently in this report.
[2] As per the Forested Land Criteria, sites reclaimed prior to 2007 are permitted to meet modified vegetation criteria if they were seeded: a minimum of 80% compatible vegetation cover based on the seed mix.
[3] The definition of this and other terms are provided in the glossary.

Alberta Energy Regulator (the Regulator; AER) approval for a variance[4]. There has been inconsistency in how decisions about these sites have been made by practitioners and regulators, resulting in different levels of reclamation effort being applied/required, and in how reclamation criteria are interpreted and applied, creating ambiguity in terms of defining acceptable conditions for certification. There is a need to identify site characteristics that industry and regulators can agree require no (or minimal) further disturbance on upland forested sites with reclamation deficiencies. The ultimate goal is to ensure that functioning ecosystems are developed on these sites while also considering the net environmental benefit. There must be a balance between the potential for adverse effects that may result from leaving the deficiency in place and the ecological damage that may be caused by correcting the deficiency.

Industry and regulators concur, based on current regulatory guidance (Forested Land Criteria and *Specified Enactment Direction (SED) 002: Application Submission Requirements and Guidance for Reclamation Certificates for Well Sites and Associated Facilities* (Alberta Energy Regulator, 2019a)), that sites that do not meet the Forested Land Criteria can still receive a reclamation certificate if the assessment is justified based on ecosystem function and if a comprehensive description of the site is presented to the Regulator. However, to date there has been limited guidance available on what information is required to support professional justifications for variance requests.

The purpose of this document is to provide guidance on variance requests from an ecological perspective to streamline the process of preparing and approving reclamation certificate applications under the Forested Land Criteria. More specifically, this document will provide guidance on:

- How to determine if a site with deficiencies is eligible for a variance (such that equivalent land capability can be achieved and there are minimal adverse effects on ecosystem function in the long term, considering the construction and reclamation date of the site).
    - Both the practitioner and the Regulator can use this guidance to understand and decide if a variance is warranted or whether further reclamation is required.
- How to prepare a professional justification for a variance request, i.e., what information and what level of detail to provide.
    - The practitioner can use this guidance to ensure that their justification is complete.
    - The Regulator can use this guidance to gauge whether the appropriate information has been provided in the submission to enable the Regulator to approve the variance.

1.2 SCOPE

In the context of this guidance document, the term ‘site’ will refer to an upland upstream oil and gas wellsite (and the associated facilities) requiring certification that has one or more reclamation deficiencies as per the Forested Land Criteria, but reclamation to correct these deficiencies would damage the developing forest ecosystem on the site (or its associated access road) to the extent that the impacts outweigh the reclamation benefits. The focus is on sites that have had woody vegetation establishment,

[4] Note that the Forested Land Criteria uses the term “vegetation override” rather than the term “variance”, as discussed in Section 2.2 and in the glossary.

whether through a planned natural recovery revegetation strategy or in combination with tree planting, but also includes sites with seeded grasses (pre-2007 sites only), if the site has had natural recovery of woody vegetation on portions of the site and/or on their access roads. Sites included in this document are restricted to those that are subject to the Forested Land Criteria (whether in the Green Area or the White Area) on which the well has been properly and fully abandoned (contaminated sites that cannot be certified through the *Alberta Framework for the Management of Contaminated Sites* (Government of Alberta, 2019) are out of scope).

This guide is not limited to sites constructed or reclaimed in any particular timeframe. The Forested Land Criteria considers the reclamation expectations of the day through Table 1, which provides criteria for specific ranges of construction and reclamation dates. Sites constructed and reclaimed after June 2007 are expected to meet all aspects of the Forested Land Criteria while sites constructed and/or reclaimed before June 2007 are given more flexibility with regard to some aspects of the criteria based on approved conservation and reclamation practices within that era. **Sites constructed/reclaimed during any timeframe can be eligible for a variance; however, the expectation is that the need for variances should be reduced for sites constructed and reclaimed after June 2007 as reclamation practices are expected to have improved with the updated Criteria.**

Importantly, this document is not meant to replace SED 002, which provides the current reclamation certificate application submission requirements and guidelines, but rather to supplement and provide additional information in support of variance requests.

2.0 RECLAMATION CERTIFICATE APPLICATION PROCESS OVERVIEW

2.1 RECLAMATION CERTIFICATE APPLICATION SUBMISSION

A site becomes eligible for a reclamation certificate when it meets all the Forested Land Criteria for reclamation. Reclamation certificate applications are submitted to the Alberta Energy Regulator (AER) for approval, following the application procedures described in SED 002.

Sites that do not meet all the Forested Land Criteria may still be eligible for a reclamation certificate. According to SED 002:

> *A reclamation certificate application that includes a variance request in response to assessment parameters failing to meet the applicable criteria or guidelines may still be submitted if the application is accompanied by professional justification.*

The AER is entirely responsible for making decisions regarding certification, including those sites which require professional justification for a variance request[5]. Variance requests can be submitted to the AER in two ways (Alberta Energy Regulator, 2019a). **Option 1**: the variance request can be submitted to the AER for pre-approval prior to submitting the reclamation certificate application – a signed document confirming pre-approval is then submitted with the reclamation certificate application. **Option 2**: the variance request can be submitted with the reclamation certificate application. The option selected to submit a variance request has implications for the review stream that the application is subject to within the AER's online application submission system (OneStop); submitted applications may be subject to two levels of review (review streams) (Alberta Energy Regulator, 2019a):

- Baseline review – certificates are automatically issued if the online tool verifies all validation and assessment rules have been met and no statements of concern have been received. Option 1 applications go through this stream. The Forested Land Criteria refers to applications in this stream as routine applications.
- Additional review – more detailed review of the application by AER staff before the certificate is issued. Option 2 applications go through this stream. The Forested Land Criteria refers to applications in this stream as non-routine applications.

Figure 1 presents a flow chart for proceeding through the application process for sites that require a variance.

[5] Sites that require a land use change (i.e., a change in the assessment criteria used) have additional approval requirements; these sites are beyond the scope of this document.

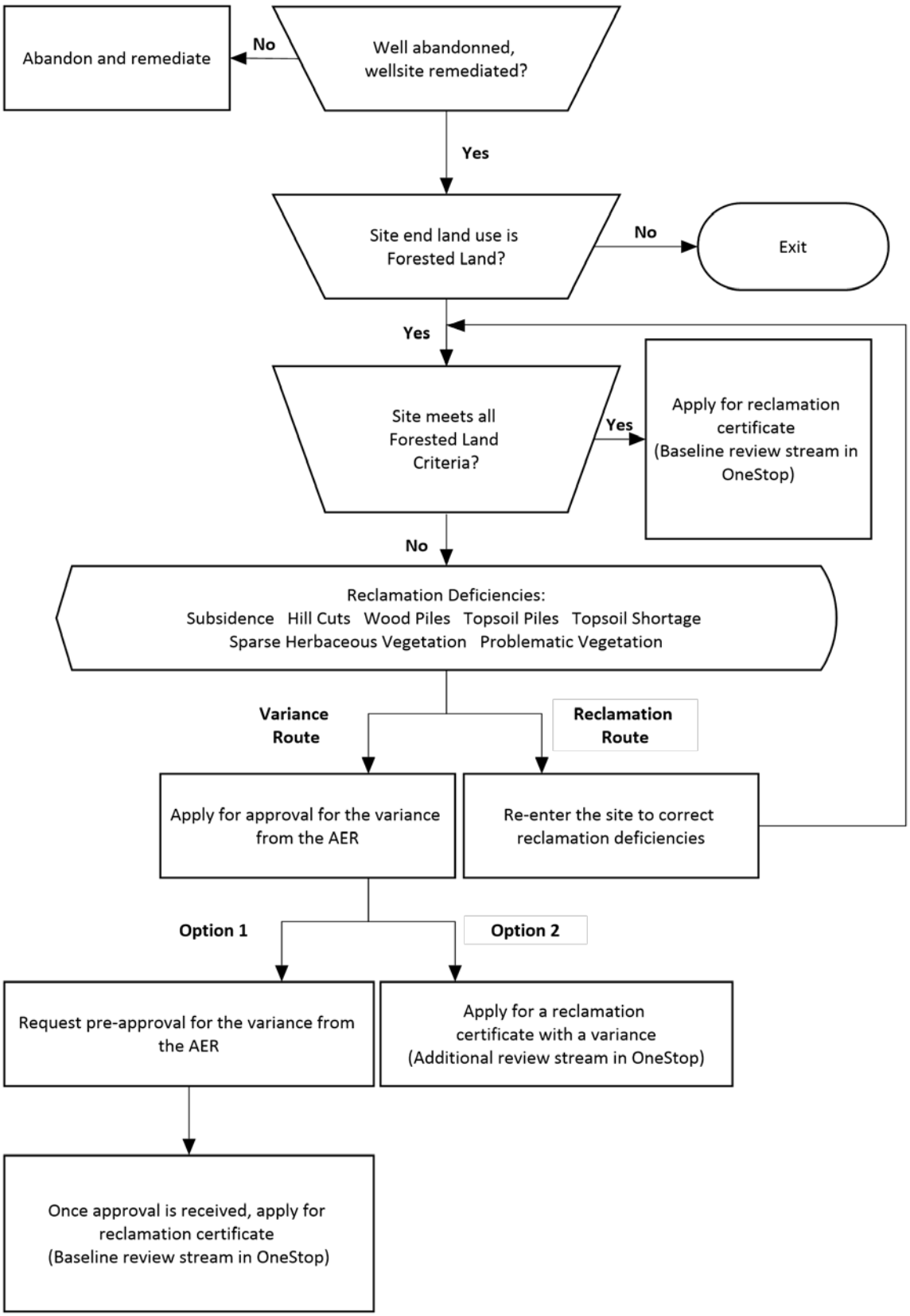

Figure 1. Reclamation certification application process.

2.2 PROFESSIONAL JUSTIFICATION FOR VARIANCE REQUESTS

Professional judgement is used to determine whether a site that does not meet the Forested Land Criteria is eligible for a variance, or whether additional reclamation work is required to correct reclamation deficiencies[6]. Section 3 of this document will discuss minimum requirements for a variance. Professional justifications submitted with a variance request must include a "rationale for [the] decision, supported by acceptable references" (Alberta Energy Regulator, 2019a)[7]. Section 4 will provide guidance on the content of professional justifications.

There are terminology differences between the Forested Land Criteria and SED 002 with regards to variances that create potential for confusion. In particular, SED 002 uses the term *variance* to refer to formal approval for deviations from the standard criteria, but this term is not used in the Forested Land Criteria. Instead, the Forested Land Criteria use the term *vegetation override* to describe a specific situation where the criteria may not be met, as follows; this term is not used in the SED 002:

> *Where reasonable forest cover (i.e., amount, species and distribution) is present, and where additional activities required to meet the conditions described in these criteria pose a risk to existing ecosystem function, a vegetation override may be appropriate. Equivalent capability for forested landscapes must be demonstrated.*

A vegetation override is just one type of variance. Several different types of variances can be selected for forested sites in OneStop (listed below; those that will be discussed in this document are highlighted in blue), including an option for vegetation override (AER, 2019b).

- Variance – Landscape
- Vegetation override – Forested
- Incompatible vegetation – Noxious weeds
- Incompatible vegetation – Invasive species
- Incompatible vegetation – Problem introduced species
- Incompatible vegetation – Undesirable/problem weeds
- Variance – Other
- Aerial Assessment – Forested; damage concerns
- Aerial Assessment – Forested; safety concerns
- Criteria waived due to development zoning
- Third party impact – Private lands
- Third party impact – Public lands

[6] Professional judgement is also used when adjacent lands cannot be used as representative controls for the assessment (e.g., in situations where access to off-site areas was restricted or representative controls were not available).

[7] SED 002 also recommends that "operators should first discuss options with the AER prior to conducting the detailed site assessment."

3.0 MINIMUM SITE REQUIREMENTS FOR VARIANCE APPROVAL

For a site that does not meet the Forested Land Criteria to be eligible for a variance, it must still achieve equivalent land capability, which has been defined in the Forested Land Criteria as:

> *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.*

Ultimately, what this means is re-creating a functional ecosystem that is on a trajectory towards a forested ecosystem able to support forested land uses that may include wildlife utilization and habitat, recreational and traditional uses, and/or commercial forestry[8].

> Ecosystem function is defined in the Forested Land Criteria as "the interactions between organisms and the physical environment, such as nutrient cycling, soil development, water budgeting, and flammability." Conceptually, other forest functions also include providing wildlife habitat, temperature regulation and carbon sequestration.
>
> Forest ecosystems are made up of several structural vegetation layers, most notably the overstory tree canopy and a variety of understory strata (e.g., shrubs, herbaceous plants, mosses, lichens). Biodiversity in these layers and the interactions between vegetation layers and the forest soils they are supported by allow forests to be self-sustaining and resilient to stressors and disturbance (Pyper et al., 2013), both of which are cornerstones of functional ecosystems.

Assessment of ecosystem function considers the site as a whole. The presence of reclamation deficiencies (i.e., features/parameters that do not meet the Forested Land Criteria) on a site does not necessarily preclude the site from supporting a functioning ecosystem. Depending on the specific nature and scale of the deficiency, the occurrence and severity of impacts associated with the deficiency, the natural variability of the surrounding off-site areas, and the ecological damage that may be caused by correcting the deficiency, it may be deemed acceptable to allow the deficiency to remain in place.

The recommended requirements that a site must meet to be eligible for a variance, instead of being subject to further reclamation are:

- Site has a functional ecosystem that is on a trajectory towards a forested ecosystem[9] and thus meets the objective of equivalent land capability.
- Landscape and soil conditions are stable, non-eroding and non-hazardous (i.e., present a low risk to the safety of land users).

[8] Ecosystem function is considered a component of equivalent land capability, but the concept of equivalent land capability is broader. Ecosystem function represents the current ecological state of the site while equivalent land capability incorporates current, future and alternate land uses.

[9] This includes sites with seeded grasses (pre-2007 sites only), if the site has had natural recovery of woody vegetation on portions of the site and/or their access roads.

- Deficiencies left in place do not cause site limitations or have long term adverse environmental impacts (on-site or off-site) that exceed the natural range of variability in the surrounding off-site areas. These impacts include, but are not limited to:
    - Erosion
    - Slumping
    - Drainage issues
    - Fire hazard
    - Soil rooting restrictions
    - Restricted wildlife movement on the landscape scale (with the exception of features created specifically for caribou protection; e.g., features described in Bentham and Coupal (2015) or approved access management/restrictions)
- Deficiencies left in place do not prevent the site from passing the Forested Land woody species cover and/or density criteria appropriate for the site's construction age and revegetation strategy.

Additionally, sites that are impacted by third-party activity may also be eligible for a variance if an evidence-based approach is used to document the activities and show that the wellsite is not the cause of the impacts (third-party impacts are outside of the scope of this document, with the exception of weed-related variance requests).

3.1 DEFICIENCY TYPES

Common deficiencies encountered at forested sites include the following:

- Landscape
    - Subsided areas
    - Hill cuts
    - Soil stockpiles
    - Woody debris piles
- Soil
    - Topsoil depth and distribution
- Vegetation
    - Desirable herbaceous species cover
    - Problematic species

Refer to the individual Information Sheets in Appendix A for in-depth information on each deficiency, including the current Forested Land Criteria, and the minimum requirements and additional considerations for the deficiency to be eligible for a variance, so it can be left in place without further reclamation to correct it (in addition to the requirements described above in Section 3). **These**

Information Sheets must be read in conjunction with the common factors for all deficiencies in Section 3.2 below.

3.2 COMMON FACTORS FOR ALL DEFICIENCIES: NET ENVIRONMENTAL BENEFIT

3.2.1 *Site Re-entry and Reclamation Implications*

For all deficiencies, an important consideration is the environmental impact of re-entering the site and conducting reclamation activities to correct the deficiency. In some cases, reclamation can set the site back in terms of ecological recovery. For example, in Figure 2, a site that had natural woody vegetation recovery was reclaimed to correct landscape deficiencies and the result was a site that was dominated by grass and clover species. Several more years of recovery will be required to achieve a functional forest ecosystem on this site.

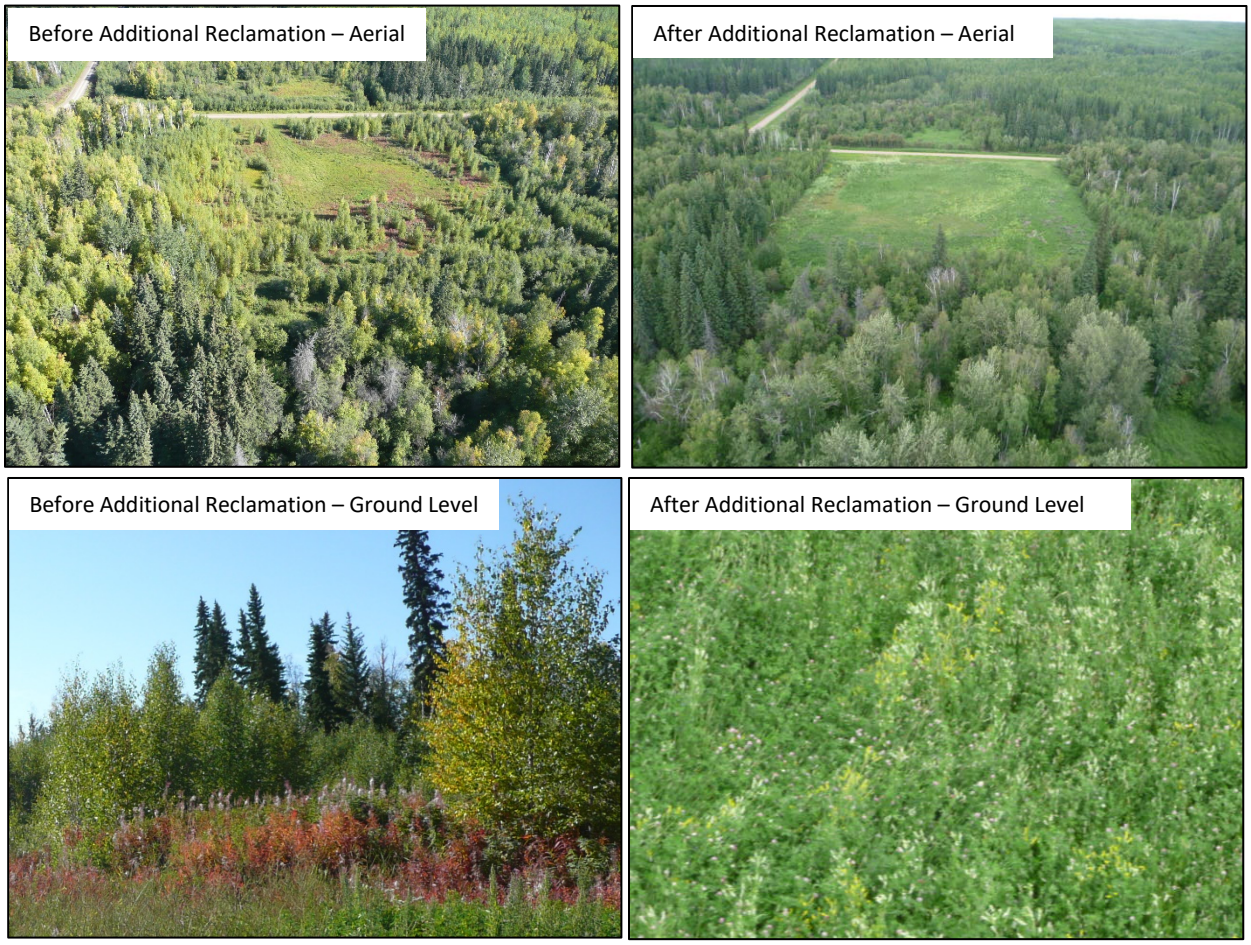

Figure 2. Implications of re-entering a site and conducting reclamation activities to correct deficiencies.
The photographs on the left show the site before addititional reclamation to correct deficiencies; site has woody vegetation infill. The photographs on the right show the same site after additional reclamation; site is now dominated by grass and clover species.

The environmental impacts of site re-entry and reclamation may include:

- Damage to existing vegetation on the access road, especially for sites that have:
  - Long access roads.
  - Access roads that cross through sensitive ecosystems (e.g., peatlands and wetlands).
  - Access roads that require creek crossings.
  - Access roads that have an established canopy of trees and shrubs.
- Damage/destruction of existing vegetation on-site and soil re-disturbance, resulting in delayed ecological recovery. The disturbance to correct deficiencies would represent the second disturbance that the site has undergone, the first being the original disturbance to construct and then reclaim site during which soils were salvaged, stockpiled and then replaced. Soil disturbance (and subsequent re-disturbance) degrades topsoil quality and vegetation propagule abundance. Recovery from a second disturbance may not be as rapid as the first (for further reading on this subject refer to Tokay et al., 2019). Sites that are more vulnerable to re-disturbance include:
  - Sites with lower total abundances of propagules.
  - Sites with more limiting site conditions (e.g., dry, nutrient poor sites).
  - Sites with a history of multiple disturbances.
  - Sites that require a larger disturbance area to correct the deficiency.

  Note that if topsoil had not been replaced during the original site reclamation (or if topsoil is not present on-site at all), soil re-disturbance is less of a deciding factor in the decision to leave a deficiency in place.

  Replacement of naturally recovered woody vegetation with planted ones can also be a factor in delayed ecological recovery, as planted trees are more subject to mortality.
- Rutting and compaction. Sites that are more impacted by this include:
  - Sites with wet soils.
  - Sites with fine-textured soils.
  - Sites that require a larger disturbance area to correct the deficiency.
- Re-opening of access to recreational users, resulting in increased frequency of disturbance and third-party impacts on the site.
- Use of imported topsoil material, resulting in introduction of weeds and diseases or a change in nutrient or moisture regime (e.g., if nutrient-rich agricultural soils are imported), in addition to creating further environmental disturbance at the donor site.

- Weed establishment and potential need for chemical weed control (i.e., noxious weeds and/or any weed that requires control to pass the Forested Land vegetation criteria). Sites that are more susceptible to weed establishment include:
    - Sites that are near active facilities, industrial traffic, agricultural areas or main roadways.
    - Sites with weeds or non-native species in the understory or that have a history of these species (i.e., these species are present in the seed bank).
    - Sites that require a larger disturbance area to correct the deficiency, as this will create a larger receptive seed bed for weeds to establish.
- Delayed certification
    - After re-disturbance, vegetation re-development to meet the Forested Land Criteria for vegetation can take several years.
    - Required one-year waiting period after herbicide application as per the Forested Land Criteria.
    - Required two-year waiting period after the addition of amendments[10] or fertilization as per the Forested Land Criteria.

3.2.2 *Potential for Low-impact Reclamation Work*

An additional factor to consider is the potential for the deficiency to be corrected with minor additional reclamation work, typically without the use of heavy equipment (i.e., by hand, or with small mobile equipment) or by working on a reduced area of the site (e.g., teardrop area). There is an expectation that opportunities to improve the site with minimal effort should be undertaken. Additionally, when heavy equipment is not required for reclamation, access to the site may be possible via helicopter, which results in less environmental damage.

[10] Note that amendments on forested lands do not include topsoil as per the Forested Land Criteria

4.0 PREPARING PROFESSIONAL JUSTIFICATIONS

Once the decision has been made to leave a deficiency in place and request a variance (as per the requirements and factors presented in Section 3 and the Information Sheets in Appendix A), a professional justification is then provided to the AER for approval. This section discusses the expected content of a professional justification and discusses additional data collection that may be required to develop an adequate and thorough professional justification.

4.1 HOW TO DEVELOP THE PROFESSIONAL JUSTIFICATION

According to SED 002:

> *an operator may provide justification as to why a site should be permitted to vary from the criteria and still receive certification.* […]*. If a variance is being requested, the operator must provide the rationale for its decision, supported by acceptable references.*

Professional justifications should provide a strong rationale as to why the deficiency is not expected to have adverse environmental impacts and how the site will still achieve equivalent land capability and ecosystem function despite not meeting the Forested Land Criteria. Justifications should be developed using an evidence-based approach and contain detailed and comprehensive site-specific supporting information.

As was discussed in Section 2.1, operators have the option to submit a justification for pre-approval prior to submitting a reclamation certificate application (Option 1), or they can submit the justification with the reclamation certificate application (Option 2). A justification form is available for use as part of the Combined Assessment Tool (CAT) and Record of Observations (RoO) (Alberta Energy Regulator, 2019c) used for a detailed site assessment (DSA); however, this form is not ideal for use as part of a pre-approval request for a variance because it does not include background site history and ecological information. The form presented in Appendix D is proposed as a standardized form for submitting variance requests.

The form details the comprehensive site information that may be required by the Regulator to make the decision to approve or reject the variance request including:

- Site overview, ecological and land use information and any overlapping dispositions
- Facility location and size
- Site history (dates and descriptions of activities and conditions)
- DSA information (if available)
- Justification rationale
- Site photographs (mandatory)

The justification portion of the form is divided into several sections:

- Deficiency type
- Current criteria requirements

- Description of the deficiency
    - The description of the deficiency should be as detailed as possible and include the dimensions and the location on the site (i.e., site diagram and coordinates).
        - For topsoil depth, the description should include the measured on-site and off-site topsoil depths (including both an average and the range).
        - For problematic species (e.g., weeds), the description should include the species, locations of patches or populations on-site, and number of plants or percent cover within the grid or site as a whole. Data from multiple years is encouraged to show trends over time.
    - All of the deficiencies that occur on the site must be described in this section, as the combined impacts of all deficiencies must be weighed together to determine if any one deficiency can receive a variance. Submission of a variance request for a site that has already received a variance for one deficiency is discouraged.
- Rationale for variance
    - The rationale for the variance must explain why the site still meets equivalent land capability and is on a trajectory towards a forested ecosystem even with the deficiency left in place; any current or potential impacts of the deficiency left in place must be explained and justified.
    - The rationale for the variance must include a discussion of whether the site has met all of the minimum requirements in Section 3 and the relevant Information Sheets and should also refer to any relevant additional considerations specified within the Information Sheets. Summary checklists of these factors for each deficiency type are provided in Appendix B.
    - The rationale should compare and contrast the impacts caused by the deficiency in comparison to those resulting from correcting the deficiency (i.e., environmental cost-benefits analysis).
    - The rationale should include a discussion of how the deficiency compares to off-site and/or regional conditions (if relevant). Comparable off-site conditions should be described in the same level of detail as the deficiency and locations should be provided on the site diagram (and/or as coordinates).
    - The rationale should include a discussion of why the deficiency occurred, why it was not corrected at the time of reclamation or why it was not identified in a more timely manner (e.g., through monitoring and maintenance of the site), and why these circumstances are not a regular occurrence (or are not going to become a regular occurrence).
    - Justifications related to third party activity should include all of the information and descriptions recommended by the *Conservation and Reclamation Information Letter: Third Party Impact on Reclamation* (Alberta Environment, 1997), including a description of the impact, details on actions taken to prevent the impact, a description of the operator's actions to mitigate any environmental damage that has occurred because of the third party and a description of the operator's efforts to deter any further impacts.

- Justifications can include data from the DSA to support explanations. For example, mentioning the woody and herbaceous cover and woody stem density in comparison to the criteria or referring to the specific vegetation species that are present on-site.
- When justifying multiple deficiencies, it is important not to provide contradictory evidence; a statement that supports one deficiency should not be disproven in the arguments for another deficiency. For example, a hill cut cannot be justified by a statement that it is well vegetated if the site is also failing for sparse desirable herbaceous cover throughout the site.
- Case studies and literature can be included as part of the rationale for the variance, if available (refer to Appendix C and Tokay et al., 2019).

The following information could be attached to the justification form to support the application:

- Site diagram (including overlapping dispositions)
- Survey plans
- DSA, including CAT and RoO datasheets and any supporting reports
- Aerial photos
- Construction records
- Pre-disturbance biophysical information
- Any other relevant information

4.2 ADDITIONAL DATA COLLECTION

When reclamation deficiencies are present on-site, additional data collection during site assessment is beneficial to develop more in-depth professional justifications for variance requests. Additional data collection helps to provide improved context for the reclamation goals than may be provided by the normal number of control points or other data requirements in the Criteria. Recommended data to collect beyond the data collected in the DSA could include the following, as applicable for the site:

- Dimensions (width, length and height), location and photographs of subsided areas, hill cuts, soil stockpiles and woody debris piles on-site and a description of any slumping, ponding and erosion.
- Evidence of depressions, windthrow or other natural analogs for subsided areas off-site, including dimensions, location (e.g., coordinates), photographs and a description of any slumping, ponding and erosion.
- Distance of woody debris piles from the edge of the site.
- On-site and off-site contour (i.e., slope class).
- Off-site vegetation measurements (i.e., herbaceous and woody species cover, leader length and height for trees and shrubs).
- On-site tree data to support mean annual increment assessment (as per the *Regeneration Standards of Alberta;* Alberta Agriculture and Forestry, 2018a).

- Off-site ecosite phase and photographs.
- Soil suitability data and samples for analysis (as per the *Soil Quality Relative to Disturbance and Reclamation*; Alberta Soils Advisory Committee, 1987).
- Topsoil pile samples for analysis of organic matter, nutrient and seed bank.
- Species, location, number of plants and patch size for each patch of noxious weeds, invasive species, problem introduced species and undesirable/problem weeds on-site and off-site.
- Percent cover of noxious weeds, invasive species, problem introduced species and undesirable/problem weeds by species (either in each grid or on the site as a whole).
- Evidence of ATV/UTV/snowmobile/light vehicle trails on-site and on the access road, including dimensions, location (e.g., sketch, coordinates) and photographs.
- Evidence of wildlife use of the site, including descriptions, locations (e.g., sketch, coordinates) and photographs.

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