Detailed Site Assessment Requirements

Directive PNG018

February 2026

Revision 2.0

Governing Legislation:

Act:	*The Oil and Gas Conservation Act*
Regulation:	*The Financial Security and Site Closure Regulations*
Order:	10-26

Record of Change

Revision	Date	Description
0.0	November 2013	Initial draft
1.0	November 2015	Updated to facilitate implementation.
2.0	February 2026	Clarifications and updates to align with FSSCR, the latest IRIS updates, and industry-requested changes.

Contents

1. Introduction

As per *The Financial Security and Site Closure Regulations* (FSSCR), upon abandonment of a well or decommissioning of a facility the licensee must undertake activities that will result in reclamation of the associated site.

Note that "reclamation" as defined in section 1-2 of the FSSCR, includes two objectives:

1) Decontaminating, excavating, removing, sequestrating, encapsulating, immobilizing, attenuating, degrading, processing or treating the contaminants in the soil or water in a manner so that, in the opinion of the minister, the contaminants no longer pose a threat or risk to human health, public safety, property or the environment; and
2) Re-contouring, landscaping, replacing or replenishing the topsoil and re-vegetating the surface of the soil so that it is compatible with its surroundings.

The focus of this document is with respect to the second part of the reclamation definition or the physical reclamation of the site once it has been decontaminated and remediated. This document establishes the Detailed Site Assessment (DSA) requirements, to be used by the third-party consultants, within Saskatchewan as set out by the Ministry of Energy and Resources (ER) under the Acknowledgement of Reclamation (AOR) Program. As part of the AOR application the third-party consultant is required to complete the DSA Form (available on saskatchewan.ca) to provide evidence that the site meets the criteria requirements in this Directive. An example of a completed DSA Form is provided in Appendix A.

1.1 Background

The reclamation of abandoned well sites and associated facilities in Saskatchewan is the responsibility of the licensee. The intent of this document is to provide the licensee with reclamation criteria that will ensure the consistent quality of reclamation throughout industry resulting in reclaimed sites which are stable and have little risk of impaired capability.

It is important to recognize that reclamation is impacted by construction practices, by operational management during the life cycle of the site and by practices used during the decommissioning, remediation and reclamation processes. Proper soil conservation, prevention of contamination and timely remediation of contamination issues during the life of the site will result in a more successful reclamation of the site at the end of its production life cycle.

Successful site reclamation will result in a site that is consistent in terms of land usage and vegetation with that of the surrounding area. Therefore, in the evaluation of the assessment criteria (landscape, soil, vegetation) the data and observations collected should be compared to suitably selected control points on adjacent or surrounding lands. In certain circumstances it is acceptable to find representative control land farther from the site, however, the reasons for doing this must be explained in the application.

Topsoil Salvage and Storage – Prior to site construction the topsoil should be stripped at the site and salvaged in a location that is away from potential disturbances (i.e. traffic routes, natural drainage, slopes, etc.). Topsoil stockpiles should be protected from wind and rain through the use of suitable seeding and other measures as necessary.

All contamination must be managed or removed prior to the completion of a DSA. Specific criteria for the assessment and remediation of contaminants (i.e. salts, metals, sterilants, petroleum hydrocarbons, organic chemicals, etc.) can be located within *Directive PNG033: Phase II Environmental Site Assessment* (Directive PNG033) available on saskatchewan.ca. NOTE: the DSA accompanying the AOR application should be conducted after the minimum required monitoring period has passed where soils were left in place at a site which had salinity and/or sodicity concentrations which triggered monitoring criteria as specified in Directive PNG033.

AOR applications will be denied if the DSA is incomplete and/or non-compliant. NOTE: If some parameters within the DSA fail to meet the requirements outlined in this document, the third-party consultant may still recommend the DSA passes, however, reasonable and detailed justification for doing so must be provided within the DSA.

The following sections describe the minimum acceptable assessment density and level of detail required within the DSA. On sites with a great deal of variability, or sites where justification for deviation from the criteria is submitted, more detail is required.

1.2 Governing Legislation

The requirements outlined in this Directive are based on *The Oil and Gas Conservation Act* (OGCA) and the FSSCR. Licensees should consult these documents in conjunction with this Directive.

It is the responsibility of all licensees, as specified in the legislation, to be aware of and to ensure compliance with these requirements through the life cycle of any well or facility licensed in Saskatchewan.

1.3 Definitions

Anomaly – an area outside the assessment point that does not appear representative of the assessment grid or control points being evaluated. If an anomaly is encountered, information such as measurements, photos, and applicable soil/vegetation parameter data, should be collected to compare to the conditions found in the controls.

Assessment Grid – an individual square or rectangle area that represents a portion of the lease, as detailed in Section 2.1.1.

Assessment Point – an individual point within a representative area of the assessment grid used to measure soil or vegetation parameters using a defined assessment method (linear metre, square metre, percent cover, etc.).

Disturbed Area – in relation to a minimal disturbance site, is the area of disturbance at well centre, typically consisting of the well head and tech fence, as well as any other areas of ground disturbance (sumps, excavations, reclamation areas, etc.), drilling rig placement, and/or driving areas within the lease boundaries used during oil and gas activities. For full disturbance sites it is assumed the entire lease has been disturbed.

Ecosite – a recurring site or stand level representation of ecosystems having a relatively homogeneous combination of soil, site, and vegetation characteristics.

Forage crops – Perennial agronomic species grown for the purpose of feed. Species include, but are not limited to, alfalfa, sweet clover, smooth brome, meadow brome, intermediate wheatgrass, crested wheatgrass, Russian wildrye grass, etc.

Justifications – Explanation of why a site should be approved for an AOR if some of the criteria have not been met. This information must be included in the DSA.

One Full Growing Season – Is the vegetation assessment timing, which includes an over-wintering period and a minimum of 12 months after initial seeding. For example, a lease was abandoned and reclaimed in October 2020, it was then seeded in May 2021, and the crop runs one full growing cycle in 2021 (i.e. seeding, growing months, harvested). Therefore, the earliest a DSA could be conducted for this lease would be within the growing season of 2022 (i.e. June). For minor touch ups after full reclamation has occurred (i.e. a load of additional topsoil, etc.) the site can be reassessed in the next annual crop.

Organic Matter (OM) – The organic fraction of the soil that includes plant and animal residues at various stages of decomposition, cells and tissues of soil organisms and substances synthesized by the soil population. Defined as soils that have been sieved through a 2.0-mm sieve. (Canada Department of Agriculture, 1976).

Peat – Unconsolidated soil material consisting largely of un-decomposed or only slightly decomposed organic matter; mainly derived from mosses or sedges. (Canada Department of Agriculture, 1976).

Public Lands – Land of the Crown in the Right of Saskatchewan or Right of Canada; includes provincial forests.

Site – means, when used in relation to a well, structure test hole, oil shale core hole or facility, the site of the well, structure test hole, oil shale core hole or facility and the area immediately adjacent to that site.

Step-Out Assessment – When a failed parameter is encountered at an assessment point, the third-party consultant may opt to conduct a step-out assessment to determine if it is representative of the assessment grid or not. A step-out consists of assessing a minimum of an additional three points. These additional points can be up to 10 m from the original point in a triangular shape around it.

Surface Soil – The uppermost mineral/organic material, commonly referred to as topsoil, valued as a growing medium. Surface soil is typically salvaged at the time of lease preparation to be used in the future reclamation of the site.

2. Reclamation Criteria - Cultivated Lands

Cultivated land includes any land that has been ploughed to prepare a seed bed at some point in time and has a well-defined ploughed surface including cultivated peat soils. The cultivated land criteria apply to lands under continuous and rotational cropping systems and hay land.

The following provides a summary of the criteria upon which the DSA is to be conducted:

- *Landscape:* drainage, erosion, contour, stability, gravel & rocks, debris.
- *Soil:* surface soil quantity, distribution and quality (% admixing/texture/strength/aggregate size), topsoil and subsoil profiles.
- *Vegetation:* plant (species/health/height/density/plant productivity rating/ head/pod/tuber length), bare areas, weeds (species/type[noxious/nuisance]/density).

DSA assessments should be completed on healthy, undamaged vegetation. Therefore, DSAs cannot be completed on cultivated lands during years experiencing severe weather events (such as drought, flooding, etc.) that deviate significantly from historical averages, where sufficient vegetation is not available to make a realistic comparison. In regions of Saskatchewan where drought conditions are common, ER will consider alternate assessment methods such as multiple years of vegetation data to demonstrate consistent crop growth and overall vegetation health.

2.1 Site Assessment Sampling Scheme

In general, sites are to be assessed by establishing a suitable assessment grid (as described in the following sections); followed by measuring/observing the various assessment criteria within each assessment grid. The results are compared to suitably selected controls located on lands surrounding or adjacent to the site.

NOTE: that the term “site” as defined in the FSSCR is not constrained to the lease boundaries but rather includes any areas beyond the lease boundaries that were impacted by the operations at the site. Therefore, grids should be designed to include these impacted areas beyond the lease boundaries, unless these areas have been previously reclaimed and approved by ER.

NOTE: An assessment is not required on areas of the lease or access that have received an Exemption from Reclamation issued by ER or have been authorized by the landowner(s) to remain in place as an “improvement” (i.e. access road, cement pad, etc.).

2.1.1 Lease

For a standard 100 m x 100 m lease, the lease assessment should be conducted using nine assessment grids (each approximately 33 m x 33 m) and the edge of the lease assessment area should match up to the lease boundary, as shown in Figure 1.

The assessment grid and grid size should be adjusted to evenly cover the entire lease and account for odd size leases, for example:

- If the lease is < 40 m x 40 m, then 3 grids should be used.
- If the lease is 40 m x 40 m, then 4 grids, each at 20 m x 20 m should be used.

- If the lease is 80 m x 80 m, then 4 grids, each at 40 m x 40 m should be used.
- If the lease is 110 m x 110 m, then 9 grids, each at 37 m x 37 m should be used.
- If the lease is ≤ 120 m x 120 m, then 9 grids, each at 40 m x 40 m should be used.
- If the lease is > 120 m x 120 m, then 16 grids, each at ≤ 40 m x ≤ 40 m should be used.
- Grids cannot be greater than 40 m x 40m.

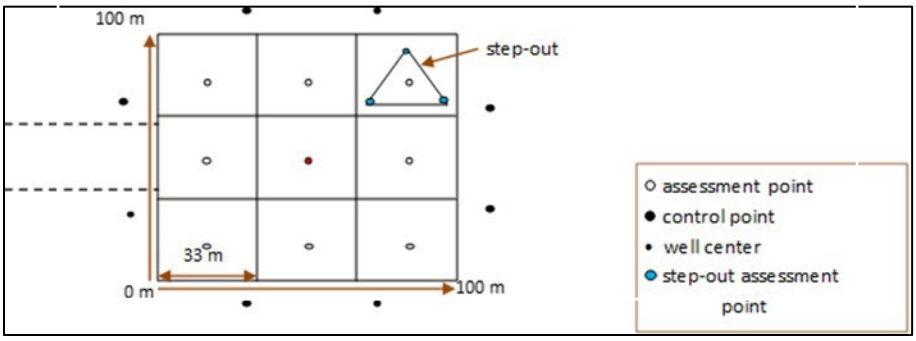


Figure 1. *Assessment points within an approximate 33 m x 33 m assessment grid on a 100 m x 100 m lease. Soil and vegetation data are collected at each assessment point.*

In general, the assessment point will be in the middle of each grid, however, additional assessment points should be completed when the following locations are known and outside of the middle of the grid: well centre, sump, flare pit, tank storage area, historical spill areas or areas of concern noted in the Phase I ESA which haven't been investigated during a Phase II ESA. When a failed parameter is encountered at a lease assessment point, the third-party consultant may opt to conduct a "step-out" assessment to determine if it is representative of the entire assessment grid. The step-out assessment process consists of assessing three additional points (for all parameters) which can be up to 10 m from the original point in a triangular shape around it, as shown in Figure 1. The data for the original assessment point, along with the individual step-out data must be reported on the step-out portion of the DSA form. The average of the step out data, denoted as SO #, should then be transferred into the lease assessment table in place of the original assessment point data and used when assessing the criteria requirements for that particular grid. Step-out assessments cannot be completed at well centre on minimal disturbance sites, should not be completed at well center on full disturbance sites, and a maximum of two step-out assessments can be performed on a site.

2.1.2 Controls

In the evaluation of the assessment criteria (landscape, soil, vegetation) the data and observations collected should be compared to suitably selected control points on adjacent or surrounding lands. Care should be taken when selecting these points to ensure that they are representative of the average conditions that exist on the surrounding lands with respect to the various evaluation criteria. In particular, the quantity and quality of vegetation may be used as a primary indicator for determining the suitability of control points. Controls are to be taken outside of lease boundaries and away from disturbed land.

A minimum of eight control points (two on each side of the disturbed area) must be assessed to provide comparisons for the disturbed area (100 m x 100 m lease situation). In some cases, eight

control points may not adequately represent the natural variability of the surrounding lands and the third-party consultant must use their professional judgement. Where control points characteristics vary significantly, the third-party consultant may use relevant controls to represent portions of the site. It must be clearly documented which controls represent which assessment points.

Minimum control requirements for different lease sizes:

- If the lease is < 40 m x 40 m, then 3 control points should be used.
- If the lease is 40 m x 40 m, then 3 control points should be used.
- If the lease is 80 m x 80 m, then 4 control points should be used.
- If the lease is 110 m x 110 m, then 8 control points should be used.
- If the lease is > 120 m x 120 m, then a minimum of 12 control points should be used.
- If the lease is > 150 m x 150 m, then a minimum of 16 control points should be used.

Controls can be averaged to determine the required replacement depth. If controls are variable, relevant controls can be compared to portions of the lease. Highlight the portion of the lease each control represents on the DSA Sketch (as shown in Figure 2). If controls are highly variable and the Minimum Replacement Depth (MRD) cannot be achieved, the third-party consultant may qualify results based on control variability. Figure 3 shows a generic control situation that is most common for upstream oil and gas sites in Saskatchewan.

NOTE: on sites that are different from the above standard, it is incumbent upon the consultant to explain their rationale of why the deviation in assessment has occurred. This information should include why the points taken are sufficient to prove comparability of the surrounding area and why the locations chosen are acceptable.

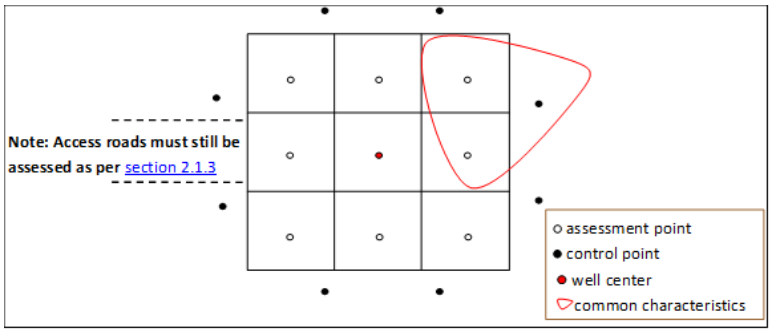


Figure 2. *Example of a site that has variability in topography, soils and land management. Two grid sampling points are represented by a specific control sample point. This must be documented in the DSA form. NOTE: High variability sites may require additional sample points and control sites to properly assess the site*

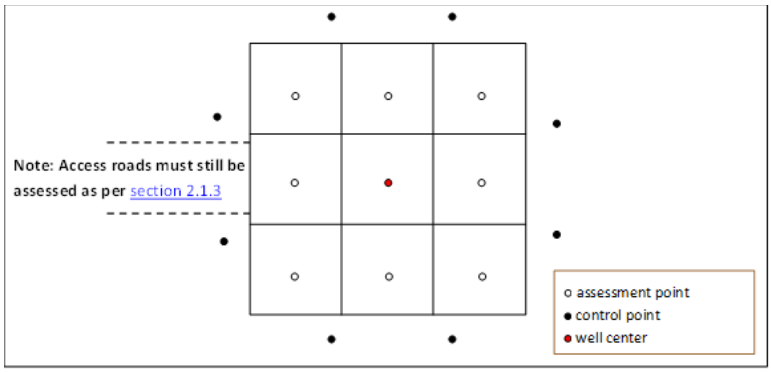


Figure 3. *This is a generic control sample situation where the topography, soil characteristics and land management are consistent throughout the entire site. This is typical of most sites encountered in Saskatchewan. In this situation the eight controls would be averaged together in the assessment.*

2.1.3 Access

For the access associated with the lease, the assessment shall be conducted on a paired assessment basis (one on the access and one in a control area). The assessment points should be adjusted so they are representative of disturbed and control areas but must also address variability. Assessment points should be adjusted so that the access approach areas are inspected.

At a minimum the access should be assessed as follows:

- For **access roads ≤100** m in length, examine a minimum of two paired assessment points. If the topography is variable, more assessment points shall be used.
- For **access roads >100** m in length, assessment points should be located at intervals no more than 100 m apart. For example, for a 500 m road, a minimum of five paired assessment points would be required but they may not necessarily be evenly spaced. If the topography is variable, more assessment points should be used.

2.2 Landscape

After a minimum of one full growing season has passed, landscape criteria will be assessed by comparing the site with adjacent land. Differences between the site and the adjacent land must not interfere with normal land use and not show a negative impact on or off-site. Vegetation on the site should not impede the ability to assess the landscape parameters.

Landscape criteria are assessed by looking at the site as a whole rather than individual assessment points. It is necessary to do this from several vantage points on the site. While evaluation of landscape criteria can be somewhat subjective, the DSA should contain a discussion of each landscape parameter defined in Table 1 to make it clear that each of these criteria were considered.

Table 1 – DSA landscape parameters for cultivated lands.

Drainage	Site drainage should be consistent with the original patterns, directions and capacity or be comparable with the surrounding landscape. Facilities or features left in place (i.e. clay pads) must not negatively impact drainage.
Erosion	No more soil erosion (i.e. rills, gullies or blowouts) than on adjacent land allowed.
Contour	Contour and roughness must conform and blend with adjacent contours or be consistent with present or intended land use.
Stability	No visible evidence of slope movement, slumping, subsidence, or tension cracks allowed greater than on adjacent landscape.
Gravel and Rocks	May not be piled, windrowed or concentrated in one area. Gravel (<10 cm): No more than an increase of 10% in surface cover is allowed. Rocks (>10 cm): No increase in surface cover is allowed.
Debris	No industrial or domestic debris allowed.

2.3 Surface Soil Quantity, Distribution and Quality

After a minimum of one full growing season has passed, soil quantity, soil quality and admixing percent are to be included in the DSA soils assessment for each assessment point.

2.3.1 Topsoil Additions

There may be situations where additional topsoil is required at a site. In these cases, topsoil from another source with similar chemical and physical properties to the site and surrounding lands can be used provided the landowner(s) is notified and in agreement. The addition of topsoil must be documented within the DSA (i.e. date of application, source, volume, etc.).

NOTE: Amendments (peat, manure, alfalfa pellets, organic material, etc.) are not considered a replacement for topsoil and must be documented in the DSA when applied as part of the remediation and reclamation of the site. A minimum waiting period of two years from the application date is required following the use of an amendment before conducting the DSA that will be submitted with the AOR application.

NOTE: Weed spraying is not considered an amendment and can be assessed the next growing season to determine successful control with the exception of Japanese brome, scentless chamomile, downy brome, and leafy spurge.

2.3.2 Quantity and Distribution of Replaced Surface Soil

The criteria regarding the quantity and distribution of surface soil will differ depending on whether the site was initiated before or after the implementation of the AOR process on June 19, 2007. The following sections provide the criteria requirements for both site situations.

2.3.2.1 Quantity and Distribution of Replaced Surface Soil for Sites After June 19, 2007

This section outlines the criteria required when the following conditions apply to the site:

- The well finished drill date is on or after June 19, 2007; or
- The facility licence date is on or after June 19, 2007; or
- The site prepared date (for built not drilled sites) is on or after June 19, 2007.

Surface Soil Quantity Criteria:

The *Average Replacement Depth (ARD)* is the overall average soil depth of the lease assessment points and must be equal to or greater than 85% of the average control soil depths associated with the lease.

- i.e. ARD or average lease depth (cm) ≥ average control depth (cm) x 0.85

Access road soil depths are assessed on a paired basis by comparing the soil depth at the access assessment point to the corresponding paired control soil depth. If the soil depth at the access assessment point is equal to or greater than 85% of the corresponding paired control, then the access assessment point passes.

- i.e. Each access depth (cm) ≥ corresponding paired control depth (cm) x 0.85

Lease Surface Soil Distribution Criteria:

While the average replacement soil depth over the entire lease must be at least 85% of the average control depth, at any individual lease assessment point, the Minimum Replacement Depth (MRD) may be as low as 68% of the average control depth for the lease assessment point to pass.

i.e. Each lease depth (cm) ≥ MRD or (average control depth (cm) x 0.68)

2.3.2.2 Quantity and Distribution of Replaced Surface Soil for Sites Predating June 19, 2007

This section outlines the criteria required when the following conditions apply to the site:

- The well finished drill date is before June 19, 2007; or
- The facility licence date is before June 19, 2007; or
- The site prepared date (for built not drilled sites) is before June 19, 2007.

Surface Soil Quantity Criteria:

The *Average Replacement Depth (ARD)* is the overall average soil depth of the lease assessment points and must be equal to or greater than 60% of the average control soil depths associated with the lease.

- i.e. ARD or average lease depth (cm) ≥ average control depth (cm) x 0.60

Access road soil depths are assessed on a paired basis by comparing the soil depth at the access assessment point to the corresponding paired control soil depth. If the soil depth at the access assessment point is equal to or greater than 60% of the corresponding paired control, then the access assessment point passes.

- i.e. Each access depth (cm) ≥ corresponding paired control depth (cm) x 0.60

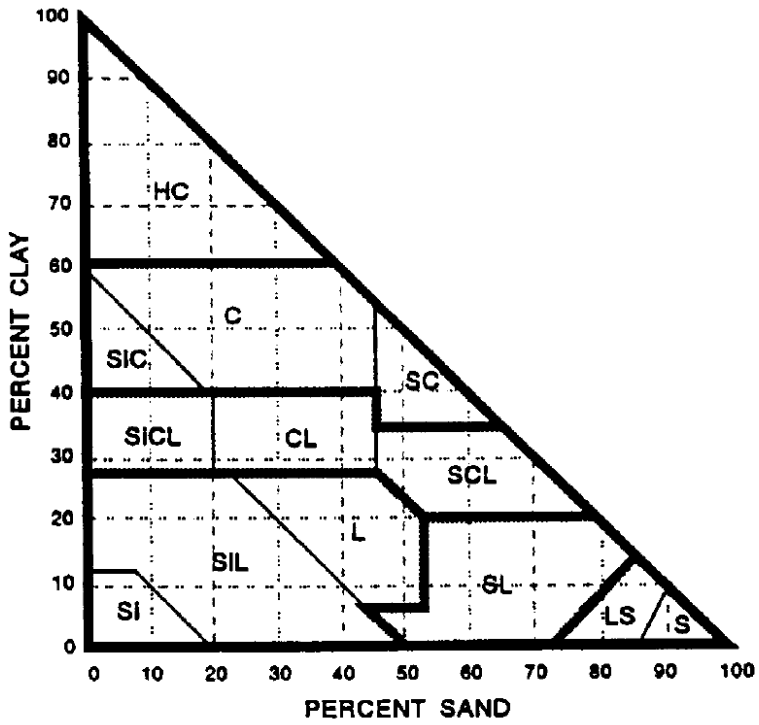
Lease Surface Soil Distribution Criteria:
While the average replacement soil depth over the entire lease must be at least 60% of the average control depth, at any individual lease assessment point, the Minimum Replacement Depth (MRD) may be as low as 50% of the average control depth for the lease assessment point to pass.
i.e. Each lease depth (cm) ≥ MRD or (average control depth (cm) x 0.50)

2.3.3 Quality of Replaced Surface Soil

At each assessment point, the third-party consultant will document the soil quality parameters (defined in Table 2) within the DSA. The soil quality parameters should be assessed after one full growing season.

When compared with representative controls (i.e. from similar depths with similar light and moisture conditions), the lease and access assessment points must meet the criteria defined in Table 2 for the assessment point to pass.

Table 2 – DSA Soil Quality Parameters for Cultivated Lands

Admixing %	Remain in the same class (0 to 30%, >30% to 60%, and >60%) or lower class of admixing when compared to controls.
Texture	Remain in the same texture class (within the dark lines) when compared to controls.  **Texture Class Triangle** The Soil Texture Classes Triangle was taken from Alberta Environment, 1995 *Reclamation Criteria for Wellsites and Associated Facilities – 1995 Update.*

Soil Strength	Remain in the same class (friable; firm; and hard) when compared to controls.
Soil Aggregate Size	Remain in the same class (<2 cm, 2 cm to 5 cm, and >5 cm to 10 cm) when compared to controls. No soil aggregates greater than 10 cm are allowed unless similar size soil aggregates are present in the control soil.
Soil Profile Assessment	NOTE: When more than one horizon is mixed to make up the minimum requirement for salvaged soil, the control for the quality comparison must be mixed across the same depth as the salvaged soil horizons. *Assessment Depth* Soils will be assessed to a depth of 50 cm (or to a soil restrictive layer) on a grid basis on-site, with appropriate off-site measurements (controls). If a soil restriction occurs before the required assessment depth of 50 cm is reached then the assessment is not required to advance any deeper into the soil, however, the assessment depth measurement must be reported in the DSA. *Restriction Assessment* The process restriction parameters are: • Water permeability. • Vertical root elongation. • Soil aeration. • Compaction. Document in the DSA the topsoil and subsoil process restriction parameters as either “restrictive” or “non-restrictive” as compared to the control. NOTE: a restrictive soil profile is a FAILED class parameter if the representative controls are non-restrictive. Gravel or rocks found in the soil profile must be comparable to conditions found in the controls. Any anomalies observed in the soil profile must be recorded on the DSA Form. Professional judgment should be used to determine whether parameters are restrictive to root growth and establishment. For more details on assessing process restrictions refer to Appendix B. NOTE: Since root elongation is being assessed, soil profile assessment should be done when fully developed roots are present. *Lease and Control Assessments* Soil profile assessments for cultivated lands will be conducted at every second assessment point on and off the lease. For example, a 100 m x 100 m lease would require a minimum of nine soil profile assessments (five on-site assessment points and four off-site control points).

	Access Roads and Paired Control Assessments Soil profile assessments are to be carried out at each paired assessment point. For example, a 500 m access road would require a minimum of ten soil profile assessments (five access assessment points and the five paired control points).

2.3.4 Soil Tolerance

A summary of the passing soil depth quantity and distribution criteria is provided below:

Table 3 – Soil Depth Quantity and Distribution Criteria

	Average Lease	**Each Access Point**	**Each Lease Point**
Sites After June 19, 2007	≥ 85% of average control	≥ 85% of paired control	≥ 68% of Average control
Sites Before June 19, 2007	≥ 60% of average control	≥ 60% of paired control	≥ 50% of average control
NOTE: The replacement depth of any individual lease or access assessment point should never be less than 30% of the control soil depth. If this situation exists on a site further reclamation of the site and subsequent passing DSA would be required.			

It is recognized that it may be difficult to meet the soil criteria (defined above) across the entire site; especially where salvage topsoil was minimal. Therefore, to account for this, it is acceptable that one of the grids may vary from the desired soil outcome. This means a single assessment point within the DSA can fail by soil depth, soil quality, or a combination of these for a maximum of one grid failure on the entire site (which is comprised of the lease and access road).

NOTE: Within a single point it is acceptable to fail in one or more of the soil quality parameters listed in Table 2.

NOTE: For smaller lease sizes (i.e. 40 m x 60 m) the tolerance criteria still apply even though fewer grids are assessed, and a single point failure would mean a greater percentage of the disturbed area is below the target criteria in comparison to a larger site. This is acceptable as it is recognized that there is less overall disturbance to the land by using the smaller lease size and credit is given to operators who attempt to minimize disturbance.

The following examples illustrate acceptable soil quantity, distribution and quality tolerances:

Example #1: If the average control soil depth is 18 cm for a lease with a finished drill date on or after June 19, 2007, and the 98m long access road paired controls are (AC1=20 cm and AC2=19 cm), then:

Surface Soil Quantity Criteria:
The Average Replacement Depth (ARD) of the lease must be ≥ 18 cm x 0.85 = 15.3 cm; for the lease to pass.

The replacement depth at the first access assessment point (A1) must be ≥ 20 cm x 0.85 = 17 and the replacement depth at the second access assessment point (A2) must be ≥ 19 cm x 0.85 = 16.2; for each access grid to pass. NOTE: If A1 < 20 cm x 0.30 = 6 cm or A2 <19 cm x 0.30 =5.7 cm, then further reclamation work is required.

Lease Surface Soil Distribution Criteria:
The replacement depth at each lease assessment point must be ≥ 18 cm x 0.68 = 12.2 cm; for each lease grid to pass. NOTE: If any lease assessment points is < 18 cm x 0.30 = 5.4 cm, then further reclamation work is required.

Soil Tolerance:
In the case where the soil quantity, distribution and quality are not found to pass for every assessment point within the lease and access only one the following variations would be acceptable for DSA submission:

- Only one lease point may fail soil depth (i.e. soil depth between 5.4 cm and 12.2 cm) and not fail any of the soil quality parameters; or
- Only one access point may fail soil depth (i.e. soil depth at A1 between 6 cm and 17 cm or soil depth at A2 between 5.7 cm and 16.2 cm) and not fail any of the soil quality parameters; or
- Only one lease or access point may fail soil depth, and the same point may also fail in one or more of the soil quality parameters (i.e., only one point in total is affected); or
- All lease and access points pass soil depth (i.e. lease points ≥ 12cm and A1 ≥ 17, A2 ≥16.2cm) and only one point within either the lease or access may fail in one or more of the soil quality parameters.

Example #2: If the average control soil depth is 18 cm for a lease with a finished drill before June 19, 2007, and the 98m long access road paired controls are (AC1=20 cm and AC2=19 cm), then:

Surface Soil Quantity Criteria:
The Average Replacement Depth (ARD) of the lease must be ≥ 18 cm x 0.60 = 10.8 cm; for the lease to pass.

The replacement depth at the first access assessment point (A1) must be ≥ 20 cm x 0.60 = 12 and the replacement depth at the second access assessment point (A2) must be ≥ 19 cm x 0.60 = 11.4; for each access point to pass. NOTE: If A1 < 20 cm x 0.30 = 6 cm or A2 <19 cm x 0.30 =5.7 cm, then further reclamation work is required.

Lease Surface Soil Distribution Criteria:
The replacement depth at each lease assessment point must be ≥ 18 cm x 0.50 = 9 cm; for each lease grid to pass. Note: If any lease assessment points is < 18 cm x 0.30 = 5.4 cm, then further reclamation work is required.

Soil Tolerance:

In the case where the soil quantity, distribution and quality are not found to pass for every point within the lease and access only one of the following variations would be acceptable for DSA submission:

- Only one lease point may fail soil depth (i.e. soil depth between 5.4 cm and 9 cm) and not fail any of the soil quality parameters; or
- Only one access point may fail soil depth (i.e. soil depth at A1 between 6 cm and 12 cm or soil depth at A2 between 5.7 cm and 11.4 cm) and not fail any of the soil quality parameters; or
- Only one lease or access point may fail soil depth, and the same point may also fail in one or more of the soil quality parameters (i.e., only one point in total is affected); or
- All lease and access points pass soil depth (i.e lease grids ≥ 9 cm and A1 ≥ 12, A2 ≥ 11.4cm) and only one point within either the lease or access may fail in one or more of the soil quality parameters.

2.4 Vegetation

Vegetation parameters, along with bare areas and weeds/undesirable plants, must be assessed at each assessment point and documented within the DSA.

Vegetation must be present at the time of the assessment. Special management practices that are inconsistent with those used on the control area are not allowed on the site as they may affect vegetation results. Fertilizer and/or amendment applications will be considered consistent with the control area if:

- the landowner(s) applied fertilizer and/or an amendment to the site as part of their normal management practice; or
- the licensee applied fertilizer and/or an amendment to the site to bring it up to the same nutrient levels as the control soils (based on lab fertility analyses).

NOTE: Fertilizer and/or amendment additions applied by the licensee must be documented within the DSA (i.e. type, application rate, quantity, etc.) if applied during remediation and/or reclamation of the site.

2.4.1 Use of Non-native Species

Non-native species can be used where their benefits to site properties are known and the species are part of a plan to improve a site. For example, the use of agronomic annuals can be used for erosion control on recently restored sites. However, these species cannot be persistent and must not contribute to the vegetation criteria. The overall objective of the DSA standard is to ensure well/facility sites have been reclaimed properly and are comparable with the surrounding area. Leaving non-native species on-site would not meet this objective.

2.4.2 Timing of Vegetation Assessments

The timing of the DSA vegetation assessment will vary depending on the type of cultivated crop (annual or perennial) at the site. Further clarification is provided in the following sections.

NOTE: Where fertilizer and/or an amendment has been applied by the licensee, as part of the remediation and reclamation of the site, a minimum waiting period of two years from the application date is required before conducting the DSA that will be submitted with the AOR application.

NOTE: Weed spraying is not considered an amendment and can be assessed the next growing season to determine successful control with the exception of Japanese brome, scentless chamomile, downy brome, and leafy spurge.

2.4.2.1 Annual Crops

For annual crops, without fertilizer or amendment addition, the vegetation assessment should be conducted when the crop is fully headed or podded out after a minimum of one full growing season. Please be advised that it is acceptable for the vegetation to be assessed on sites where the crop has been cut but not removed if and only if all measurements can be accurately measured and documented.

Please be advised that in the situation where fully headed or podded out crop data is not available due to annual harvest then stubble data may be assessed, however, it must be accompanied by a passing DSA soil assessment and the AOR application must include a filled out *Reclamation Feedback Form (RFF)* as referred to in the AOR Directive, to provide further proof that the site production is satisfactory and no vegetation issues are evident at the site. If a filled out RFF is not obtained, then the vegetation assessment portion of the DSA is required when the crop is fully headed or podded out to be considered a passing DSA for AOR submission.

2.4.2.2 Perennial Crops

For perennial crops, commonly referred to as forage crops, without fertilizer or amendment addition, the vegetation assessment should be conducted after a minimum of one full growing season.

2.4.3 Vegetation Assessment Criteria

At each assessment point, the third-party consultant will document the vegetation parameters (defined in Table 4) within the DSA. The vegetation assessments are based on a visual comparison between the site (lease and access) and the representative controls, therefore vegetation must be present at the time of assessment.

When compared with representative controls, the lease and access assessment points must meet the criteria defined in Table 4 for the assessment point to pass. NOTE: The lease and access must pass all of the criteria defined in Table 4 to be considered an acceptable DSA within an AOR application submission.

Table 4 – DSA Vegetation Parameters for Cultivated Lands

Plant Species Composition	Re-vegetation species and species composition should be comparable with control vegetation or meet reasonable land management objectives. NOTE: Weeds and undesirable plants cannot contribute to plant species composition.

<table>
<tr><td>Plant Health</td><td>Plant health must be equal to or better than that of the control vegetation.

Plant health should be documented within the DSA as either poor, fair, good or excellent. Ideally, plants should be healthy; characteristics to look for and note are vigour, colour (ripening stage), disease-free and vegetation quality. Plant maturity should be comparable to the surrounding site. Therefore, if the lease is maturing faster or slower than the surrounding area, the site is not comparable.

<table><tr><td>Excellent</td><td>Vigorous, healthy, no evidence of disease or stress</td></tr><tr><td>Good</td><td>Less then 25% evidence of stress/disease/discoloration</td></tr><tr><td>Fair</td><td>25%-50% evidence of stress/disease/discoloration</td></tr><tr><td>Poor</td><td>Greater than 50% evidence of stress/disease/discoloration, dead or not present</td></tr></table>
NOTE: Evidence of stressed vegetation should be documented within the DSA and must be comparable to the control vegetation. Where there is evidence of stressed vegetation, a description along with photographic evidence must be supplied in the DSA to demonstrate both on-site and off-site effects are comparable.</td></tr>
<tr><td>Plant Height</td><td>Plant height must be equal to or greater than 80% of the control vegetation.
• Each lease point ≥ (average control x 0.80); and
• Each access point ≥ (corresponding paired control x 0.80).

NOTE: At each assessment point the third-party consultant shall document the average crop height (expressed in cm) by measuring a minimum of 10 plants.</td></tr>
<tr><td>Plant Density</td><td>Plant density must be equal to or greater than 80% of the control vegetation.
• Each lease point ≥ (average control x 0.80); and
• Each access point ≥ (corresponding paired control x 0.80).

NOTE: At each assessment point the third-party consultant shall document the plant density of live/desirable/healthy plants.

NOTE: The crop species type, growth phase and other factors will affect the easiest method of measuring plant density; therefore, the results may be expressed in plants, stems per square metre or linear meter, or percentage cover for the representative area. The measurement methodology must be documented in the DSA and must be consistent across all assessment points and controls.</td></tr>
<tr><td>Plant Productivity Rating</td><td>The Plant Productivity Rating will be an average rating assigned to each assessment and control point that will be comprised of three different categories: seed/head/pod/tuber health, seed development, and pod density. Each of the three categories will get a rating on a scale of 1 to 4, and then an averaged assessment point rating will be calculated. Each assessment point’s Plant Productivity Rating, along with each of the three different category ratings, must be equal to or greater than the control average minus 1.
• Each lease assessment point ≥ (average control minus 1);
• The average onsite rating must be no less than 0.5 of the average rating offsite; and
• Each access assessment point ≥ corresponding paired control minus 1</td></tr>
</table>

	Table 5 provides the rating scale used to calculate the plant productivity rating for each category. Photos of the seed/head/pod/tubers should be taken at every other assessment point and included within the DSA photolog. **Seed/Head/Pod/Tuber Health** The health of the seeds/heads/pods/tubers at each assessment and control point will be assessed and rated based on the scale provided in Table 5. Ideally, the seeds/heads/pods/tubers should be healthy, full of seeds, with no signs of stress, disease or seed abortion, and should be comparable to the surrounding controls. **Seed Development** The seed development at each assessment point will be assessed and rated based on the scale provided in Table 5. Seeds should be comparable to the surrounding controls. Ideally, seeds should be full and evenly developed, and show no signs of stress, reduction, or lack of health. **Pod Density** The pod density at each assessment point will be assessed by looking at the plant as a whole and rated based on the scale provided in Table 5. The pod density will be visually assessed and rated as heavy, medium, light, or none, and should be comparable to the surrounding controls. NOTE: Cereal crops should be left blank for Pod Density.
Head/Pod/ Tuber Length	The head/pod/tuber length will be collected from the seed producing portion of the plant by collecting the average length of ten representative plant heads/pods/tubers at each assessment and control point. The assessment points must be equal to or greater than 80% of the control vegetation. • Each lease assessment point ≥ (average control x 0.80); and • Each access assessment point ≥ (corresponding paired control x 0.80). Photos of the head/pod measurements should be taken at every other assessment point and included within the DSA photo log. NOTE: The crop type, growth phase and other factors will affect the easiest method of measuring head/pod/tuber length; therefore, the following methods should be used for specified plant type: **Cereals** – Once heads are developed, ten representative heads will be measured and the average length calculated for each assessment and control location. **Canola** – Once pods are developed, ten representative plants will be measured on the portion of the stem with producing pods growing and the average length calculated for each assessment and control location. **Pulse Crops (peas, lentils, faba bean, dry beans, soybean, etc.)** – Once pods are developed, 10 representative pods will be measured and the average length calculated for each assessment and control location. **Perennial Crops** – Once/if heads are developed; 10 representative heads will be measured and the average length calculated for each assessment and control location.

	Specialty Crops – Once heads/pods/tubers/ears are developed, 10 representative heads/pods/tubers/ears will be measured and the average length calculated for each assessment and control location.
Bare Area	The bare area refers to the areas with exposed soil that are devoid of vegetation; areas between seed rows are not included in this definition. The assessment point must have a representative bare area when compared to the rest of the grid area. The bare area percent at assessment points should not be greater than 10% as compared to the control. • Each lease assessment point ≤ average control + 10%; and • Each access assessment point ≤ corresponding paired control + 10%. NOTE: Bare areas that are located outside the assessment point must be comparable to those found offsite. If an anomaly is encountered, the locations must be detailed on the DSA sketch and information such as measurements, photos, and applicable vegetation parameter data must be collected to compare to the conditions found in the controls.
Weeds & Undesirable Plants	Weeds are to be managed on all lands as per *The Weed Control Act* which is regulated by the Ministry of Agriculture. NOTE: Once a weed species has been identified at a site, please refer to the *Minister's Order Designating Prohibited, Noxious and Nuisance Weeds (Weed List)* to determine the type of weed and potential action required under *The Weed Control Act* and ER's criteria as defined below: *Weed & Undesirable Plant Species Composition* Weeds and undesirable plant species identified on-site must also be present in the off-site controls; otherwise, the on-site weed and/or undesirable plant species must be managed in accordance with typical agriculture practices. NOTE: The presence of weeds/undesirable plants may or may not have been directly influenced by well/facility activity. The third-party consultant must ensure that the control samples are representative of the surrounding area. If no weed species are present at an assessment point, enter "none" in the weed species column and "0" in the weed density column to indicate the weed assessment was conducted. *Weed & Undesirable Plant Species Type* Depending on the species type identified, ER's requirements differ as follows: • *Prohibited Weeds* – must be eradicated on-site to prevent their movement out of the area; • *Noxious Weeds* – must be contained and controlled on-site and any isolated infestations found on-site must be eradicated. • *Nuisance Weeds and Undesirable Plants* – must be controlled on-site. *Weed & Undesirable Plant Density* No prohibited weeds are allowed on-site. The density of noxious weeds, nuisance weeds, and undesirable plants on-site must be less than or equal to the same species found in the controls. • average lease ≤ average control; and

	• each access point ≤ corresponding paired control. NOTE: The density results may be expressed in weeds per square metre, linear metre, or percentage cover for the representative area. The measurement methodology must be documented in the DSA and must be consistent across all assessment points and controls.

Table 5 – Plant Productivity Rating Guide

Rating	Seed/Head/Pod/Tuber Health	Seed Development	Pod Density
4	Complete head, full healthy seeds, no seed abortion	Full and evenly developed	High Pod Density
3	80% full and healthy seeds, similar seed size, <20% seed abortion	Unevenly developed	Medium Pod Density
2	<80% full and healthy seeds, reduction in seed size, 25 to 50% diseased	Reduced and/or shriveled	Low Pod Density
1	>50% diseased seeds/no seed present	No seeds/Lack of Maturity	No Pods

3. Reclamation Criteria – Grasslands

Grasslands include lands that are permanently grassed that include a native component. Native grasslands commonly present a mixture of different native grass species, forbs (flowering/broad-leaved species), shrubs (woody species) and tree species, whereas tame grasslands produce agronomic seeded grass and legume species.

When constructing a grasslands site, minimal disturbance of native grassland is recommended. Where disturbance occurs, surface soil must be salvaged for replacement. At the time of reclamation, the salvaged soil should be replaced as evenly as possible across the site, and the use of native species is encouraged to re-vegetate native grassland.

Modified grasslands have a percentage of both native and tame species and are to be assessed under grassland criteria. For grasslands that have been cultivated/seeded to agronomic species, and the land use goal is to be managed as tame forage for hay; assessment should be conducted under the cultivated land criteria provided in section 2.

The following provides a summary of the criteria upon which the DSA is to be conducted:

- *Landscape:* drainage, erosion, contour, stability, gravel & rocks, debris.
- *Soil:* surface soil quantity, distribution and quality (% admixing/texture/strength/ aggregate size), topsoil and subsoil profiles.
- *Vegetation:* plant (species/health/density), bare areas, weeds

3.1 Site Assessment Sampling Scheme

In general, sites are to be assessed by establishing a suitable assessment grid followed by measuring/observing the various assessment criteria within each assessment grid. The results are compared to suitably selected controls located on lands surrounding or adjacent to the site.

NOTE: The term "site" as defined in the FSSCR is not constrained to the boundaries of the lease but rather includes any areas beyond the lease boundaries that were impacted by the operations at the site. Therefore, assessment grids should be designed to include these impacted areas beyond the lease boundaries; unless these areas were previously reclaimed and received the approval of the ministry.

NOTE: An assessment is not required on areas of the lease or access that have received an Exemption from Reclamation issued by ER or were authorized by the landowner(s) to be left in place as an "improvement" (i.e. access road, cement pad, etc.).

The sampling scheme for grasslands is the same as previously defined for cultivated land. Therefore, for grasslands assessments please refer to the lease (section 2.1.1), controls (section 2.1.2), and access (section 2.1.3) cultivated land schemes.

3.1.1 Minimal Disturbance Lease

Where it can be proven that construction practices have minimized the level of disturbance on a lease, a reduction in sampling intensity can be justified for grassland sites. On minimally disturbed sites within grasslands, the undisturbed and disturbed areas must be delineated on the provided sketch and a minimum of three samples from each area (disturbed, undisturbed and control) taken, as shown in Figure 4. Step-out assessments cannot be completed at well centre on minimal disturbance lease assessments. Minimum disturbance assessments cannot be completed on annually cultivated lands.

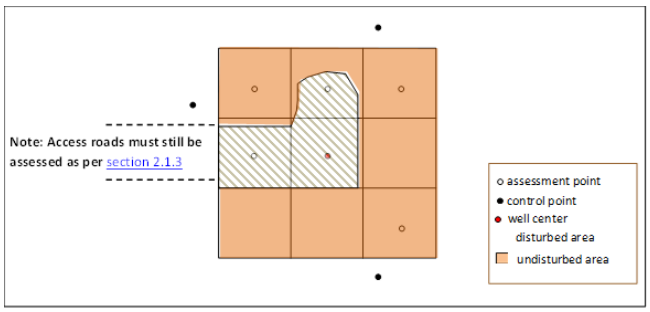


Figure 4. *Example of a minimally disturbed site. The minimum sampling requirement is three assessment points on the disturbed portion of the lease, three assessment points on the undisturbed portion of the lease and three control assessment points off-lease. Where the site does not follow the above scheme, it must be clearly explained why the assessment points were chosen and they must be sufficiently spaced throughout the disturbed area to ensure adequate assessment of the disturbed area as a whole (three assessment points around well centre is not sufficient). Additional assessment points can be completed for further proof of acceptable reclamation.*

3.2 Landscape

Landscape criteria will be assessed by comparing the site with adjacent land. Differences between the site and the adjacent land must not interfere with normal land use and not show a negative impact on or off-site.

Landscape criteria are assessed by looking at the site as a whole rather than individual assessment points. It is necessary to do this from several vantage points on the site. While evaluation of landscape criteria can be somewhat subjective, the DSA should contain a discussion of each landscape parameter defined in Table 6 to make it clear that each of these criteria were considered.

Table 6 – DSA Landscape Parameters for Grasslands

Drainage	Site drainage should be consistent with the original patterns, directions and capacity or be comparable with the surrounding landscape. Facilities or features left in place (i.e. clay pads) must not negatively impact drainage.
Erosion	No more soil erosion (i.e. rills, gullies or blowouts) than on adjacent land allowed.
Contour	Contour and roughness must conform and blend with adjacent contours or be consistent with present or intended land use.
Stability	No visible evidence of slope movement, slumping, subsidence, or tension cracks allowed greater than on adjacent landscape.
Gravel and Rocks	May not be piled, windrowed or concentrated in one area. Gravel (<10 cm) plus rock (>10 cm): No more than an increase of 20% in surface cover is allowed.
Debris	No industrial or domestic debris allowed. Woody debris (roots, slash, etc.) must not interfere with adjacent or normal land use. No large, woody debris and no woody debris (roots and slash) that could be removed with a brush rake is allowed.

3.3 Surface Soil Quantity, Distribution and Quality

After one full growing season, soil quantity, soil quality and admixing percent are to be included in the DSA soils assessment for each assessment point.

3.3.1 Topsoil Additions

Grasslands topsoil addition criteria are the same as previously defined for cultivated lands, therefore, please refer to section 2.3.1 of the cultivated land topsoil addition criteria.

NOTE: Amendments (peat, manure, alfalfa pellets, organic material, etc.) are not considered a replacement for topsoil and must be documented in the DSA when applied as part of the remediation and reclamation of the site. A minimum waiting period of two years from the application date is required following the use of an amendment before conducting the DSA that will be submitted with the AOR application.

NOTE: Weed spraying is not considered an amendment and can be assessed the next season to determine successful control with the exception of Japanese brome, scentless chamomile, downy brome, and leafy spurge.

3.3.2 Quantity and Distribution of Replaced Surface Soil

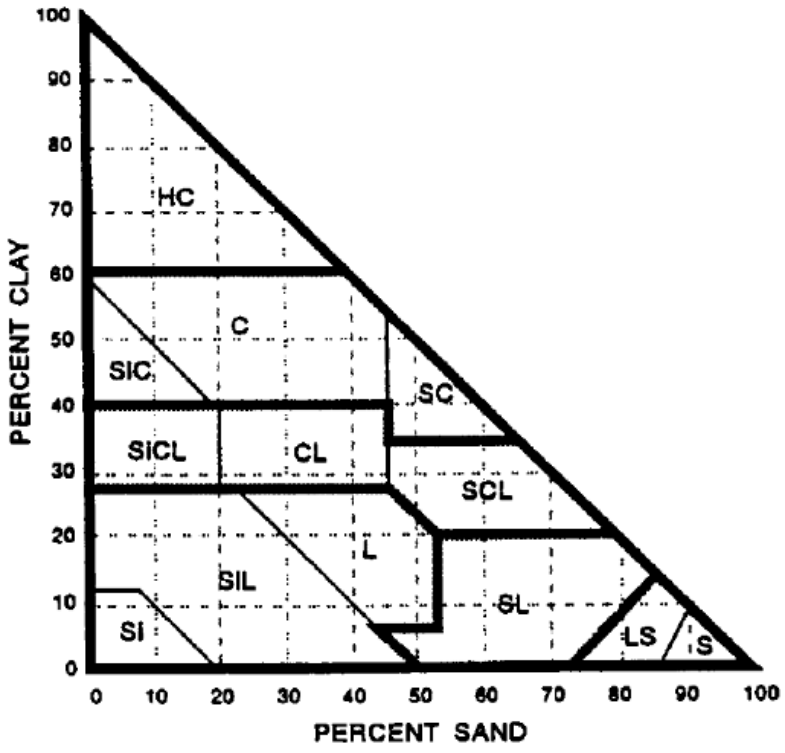
The criteria regarding the quantity and distribution of surface soil differs depending whether the site was initiated before or after the implementation of the AOR process on June 19, 2007. Grasslands quantity and distribution of surface soil criteria are the same as previously defined for cultivated lands, therefore, please refer to section 2.3.2.1 (for sites after June 19, 2007) and/or section 2.3.2.2 (for sites predating June 19, 2007).

3.3.3 Quality of Replaced Surface Soil

At each assessment point, with the exception of the soil profile assessment, the third-party consultant will document the soil quality parameters (defined in Table 7) within the DSA.

When compared with representative controls (i.e. from similar depths with similar light and moisture conditions), the lease and access assessment points must meet the criteria defined in Table 7 for the assessment point to pass.

Table 7 – DSA Soil Quality Parameters for Grasslands

Admixing %	Remain in the same class (0 to 30%, >30% to 60%, and >60%) or lower class of admixing when compared to controls.
Texture	Remain in the same texture class (within the dark lines) when compared to controls.  Texture Class Triangle

	The Soil Texture Classes Triangle was taken from Alberta Environment, 1995 - ***Reclamation Criteria for Wellsites and Associated Facilities – 1995 Update***.
Soil Strength	Remain in the same class (friable; firm; and hard) when compared to controls.
Soil Aggregate Size	Remain in the same class (<2 cm, 2 cm to 5 cm, and >5 cm to 10 cm) when compared to controls. No soil aggregates greater than 10 cm are allowed unless similar size soil aggregates are present in the control soil.
Soil Profile Assessment	NOTE: When more than one horizon is mixed to make up the minimum requirement for salvaged soil, the control for the quality comparison must be a mix of the salvaged soil horizons. *Assessment Depth* Soils will be assessed to a depth of 50 cm (or to a soil restrictive layer) on a grid basis on-site, with appropriate off-site measurements (controls). If a soil restriction (i.e. root restrictions) occurs before the required assessment depth of 50 cm is reached then the assessment is not required to advance any deeper into the soil, however, the assessment depth measurement must be reported in the DSA. *Restriction Assessment* The process restriction parameters are: • Water permeability. • Vertical root elongation. • Soil aeration. • Compaction For the points assessed, document in the DSA the topsoil and subsoil process restriction parameters as either “restrictive” or “non-restrictive” as compared to the control. NOTE: a restrictive soil profile is a FAILED class parameter if the representative controls are non-restrictive. Gravel or rocks found in the soil profile must be comparable to conditions found in the controls. Any anomalies observed in the soil profile must be recorded on the DSA Form. Professional judgment should be used to determine whether parameters are restrictive to root growth and establishment. For more details on assessing process restrictions refer to Appendix B. NOTE: Since root elongation is being assessed, soil profile assessment should be done when fully developed roots are present. *Lease and Control Assessments* Soil profile assessments for full disturbance grasslands sites will be conducted at every second assessment point on and off the lease. For example, a 100 m x 100 m lease would require a minimum of nine soil profile assessments (five on-site assessment points and four off-site control points).

	NOTE: If the following five locations (well centre, sump, flare pit, tank storage area and entrance to lease) on the lease are known, then lease soil profile assessments will be conducted at these five locations if they have not been investigated during a Phase II ESA. If these five locations are not known, then soil profile assessments will be conducted at every second assessment point on the lease as mentioned above. NOTE: If the site is being assessed using a minimal disturbance assessment, 2 soil profile assessments must be completed at each area (i.e. 2 disturbed points, 2 undisturbed points, and 2 control points). *Access Roads and Paired Control Assessments* Soil profile assessments are to be carried out on each paired assessment point. For example, a 500 m access road would require a minimum of ten soil profile assessments (five access assessment points and five paired control points).

3.3.4 Soil Tolerance

A summary of the passing soil depth quantity and distribution criteria is provided in Table 3, within Section 2.3.4.

It is recognized that it may be difficult to meet the soil criteria (defined above) across the entire site; especially where salvage topsoil was minimal. Therefore, to account for this, it is acceptable that one of the grids may vary from the desired soil outcome. This means a single assessment point within the DSA can fail by soil depth, soil quality, or a combination of these for a maximum of one grid failure on the entire site (which is comprised of the lease and access road).

NOTE: Within a single point it is acceptable to fail in one or more of the soil quality parameters listed in Table 7.

NOTE: For smaller lease sizes (i.e. 40 m x 60 m) the tolerance criteria still apply even though fewer grids are assessed, and a single point failure would mean a greater percentage of the disturbed area is below the target criteria in comparison to a larger site. This is acceptable as it is recognized that there is less overall disturbance to the land by using the smaller lease size and credit is given to operators who attempt to minimize disturbance.

Please refer to the examples provided in section 2.3.4 which illustrate acceptable soil quantity, distribution and quality tolerances.

3.4 Vegetation

Vegetation parameters, along with bare areas and weeds/undesirable plants, must be assessed at each assessment point and documented within the DSA.

Vegetation must be present at the time of the assessment. Special management practices that are inconsistent with those used on the control area are not allowed on the site as they may affect vegetation results. Fertilizer and/or amendment applications will be considered consistent with the control area if:

- the landowner(s) applied fertilizer and/or an amendment to the site as part of their normal management practice; or
- the licensee applied fertilizer and/or an amendment to the site to bring it up to the same nutrient levels as the control soils (based on lab fertility analyses).

NOTE: On public lands, it is expected that native species will not be fertilized unless approval from the appropriate governing body is received. Fertilizer and/or amendment additions must be documented within the DSA (i.e. type, application rate, quantity, etc.) if applied during remediation and/or reclamation of the site.

3.4.1 Use of Non-native Species

Non-native species can be used where their benefits to site properties are known and the species are part of a plan to improve a site. For example, the use of agronomic annuals can be used for erosion control on recently restored sites. However, these species cannot be persistent and must not contribute to the vegetation criteria. The overall objective of the DSA standard is to ensure well/facility sites have been reclaimed properly and are comparable with the surrounding area. Leaving non-native species on-site would not meet this objective.

3.4.2 Timing of Assessment

For grasslands, without fertilizer or amendment addition, the vegetation assessment should be conducted after a minimum of one full growing season. On sites where fertilizer and/or an amendment has been applied by the licensee, as part of the remediation and reclamation of the site, a minimum waiting period of two years from the application date is required before conducting the DSA that will be submitted with the AOR application. The assessment must occur prior to senescence.

NOTE: Weed spraying is not considered an amendment and can be assessed the next season to determine successful control with the exception of Japanese brome, scentless chamomile, downy brome, and leafy spurge.

3.4.3 Vegetation Assessment

At each assessment point, the third-party consultant will document the vegetation parameters (defined in Table 8) within the DSA. The vegetation assessments are based on a visual comparison between the site (lease and access) and the representative controls therefore vegetation must be present at the time of assessment.

When compared with representative controls, the lease and access assessment points must meet the criteria defined in Table 8 for the assessment point to pass. NOTE: The lease and access must pass <u>all</u> of the criteria defined in Table 8 to be considered an acceptable DSA within an AOR application submission.

Table 8 – DSA Vegetation Parameters for Grasslands

Plant Species Composition	Re-vegetation species and species composition should be comparable with control vegetation or meet reasonable land management objectives.

<table>
<tr><td></td><td>NOTE: Weeds and undesirable plants cannot contribute to the plant species composition.</td></tr>
<tr><td>Plant Health</td><td>Plant health must be equal to or better than the control vegetation.

Plant health should be documented within the DSA as either poor, fair, good or excellent. Ideally, plants should be healthy; characteristics to look for and note are vigour, colour (ripening stage), disease-free and vegetation quality.

<table><tr><td>Excellent</td><td>Vigorous, healthy, no evidence of disease or stress</td></tr><tr><td>Good</td><td>Less then 25% evidence of stress/disease/discoloration</td></tr><tr><td>Fair</td><td>25%-50% evidence of stress/disease/discoloration</td></tr><tr><td>Poor</td><td>Greater than 50% evidence of stress/disease/discoloration, dead or not present</td></tr></table>
NOTE: Evidence of stressed vegetation should be documented within the DSA and must be comparable to the control vegetation. Where there is evidence of stressed vegetation, a description along with photographic evidence must be supplied in the DSA to demonstrate both on-site and off-site effects are comparable.</td></tr>
<tr><td>Plant Density</td><td>Plant density must be equal to or greater than 80% of the control vegetation.
• each lease point ≥ (average control x 0.80); and
• each access point ≥ (corresponding paired control x 0.80).

NOTE: At each assessment point the third-party consultant shall document the plant density of live/desirable/healthy plants.

NOTE: The species type, growth phase and other factors will affect the easiest method of measuring plant density. Therefore, the results may be expressed as percentage cover for the representative area (lump all plant species together into a single density value and note any observable differences in species composition). The measurement methodology must be documented in the DSA and must be consistent across all assessment points and controls.</td></tr>
<tr><td>Bare Area</td><td>The bare area refers to the areas with exposed soil that are devoid of vegetation. The assessment point must have a representative bare area when compared to the rest of the grid area.

The bare area percent at assessment points should not be greater than 10% as compared to the control.
• each lease assessment point ≤ average control + 10%; and
• each access assessment point ≤ corresponding paired control + 10%.

NOTE: Bare areas that are located outside the assessment point must be comparable to those found offsite. If an anomaly is encountered, the locations must be detailed on the DSA sketch and information such as measurements, photos, and applicable vegetation parameter data must be collected to compare to the conditions found in the controls.</td></tr>
<tr><td>Weeds & Undesirable Plants</td><td>Weeds are to be managed on all lands as per The Weed Control Act which is regulated by the Ministry of Agriculture. NOTE: Once a weed species has been identified at a site, please refer to the Minister’s Order Designating Prohibited, Noxious and Nuisance Weeds (Weed List) to determine the type of weed and</td></tr>
</table>

	potential action required under *The Weed Control Act* and ER's criteria as defined below: *Weed & Undesirable Plant Species Composition* Weeds and undesirable plant species identified on-site must also be present in the off-site controls; otherwise, the on-site weed and/or undesirable plant species must be removed. NOTE: The presence of weeds/undesirable plants may or may not have been directly influenced by well/facility activity. The third-party consultant must ensure that the control samples are representative of the surrounding area. If no weed species are present at an assessment point enter "none" in the weed species column and "0" in the weed density column to indicate the weed assessment was conducted. *Weed & Undesirable Plant Species Type* Depending on the species type identified, ER's requirements differ as follows: • *Prohibited Weeds* – must be eradicated on-site to prevent their movement out of the area; • *Noxious Weeds* – must be contained and controlled on-site and any isolated infestations found on-site must be eradicated. • *Nuisance Weeds and Undesirable Plants* – must be controlled on-site. *Weed & Undesirable Plant Density* No prohibited weeds are allowed on-site. The density of noxious weeds, nuisance weeds, and undesirable plants on-site must be less than or equal to the same species found in the controls. • average lease ≤ average control; and • each access point ≤ corresponding paired control. NOTE: The density results may be expressed in weeds per square metre, linear metre, or percentage cover for the representative area. The measurement methodology must be documented in the DSA and must be consistent across all assessment points and controls.

4. Reclamation Criteria – Peatlands

Peatlands are areas of land with a naturally accumulated layer of peat. Peat is an unconsolidated soil material consisting largely of un-decomposed or only slightly decomposed organic matter; mainly derived from mosses or sedges. Peatlands also include functioning bogs or fens.

When constructing a site in peatlands, the requirements for salvaging surface soil and subsequent reclamation may differ as follows:

- **Deep Peat (>40 cm)** – surface soil salvage is not required as the pad will likely be constructed over the peat. If the land is potentially arable no salvage is required but pad removal may be required at the time of site reclamation.

- **Thin Peat (<40 cm)** – surface soil salvage required (minimum 15 cm depth to maximum depth of 40 cm or to the mineral soil contact). If surface soil has been salvaged, replace what is available as evenly as possible across the site at the time of reclamation.

Peatlands that have not been cultivated, and may or may not be treed, are to be assessed under the peatlands criteria.

NOTE: All cultivated peat soils shall be assessed under the cultivated land criteria provided in section 2.

The following provides a summary of the criteria upon which the DSA is to be conducted:

- Landscape: drainage, erosion, contour, stability, gravel & rocks, debris.
- Vegetation: plant (species/health/density), bare areas, weeds (species/type/density).

4.1 Site Assessment Sampling Scheme

Peatlands do not have a defined sampling scheme. In general, the landscape criteria are assessed by looking at the site (lease and access) as a whole. Both landscape and vegetation criteria are assessed from several vantage points on the site and compared to the lands surrounding or adjacent to the site.

NOTE: An assessment is not required on areas of the lease or access that have received an Exemption from Reclamation issued by ER or were authorized by the landowner(s) to be left in place as an "improvement" (i.e. access road, cement pad, etc.).

4.2 Landscape

Landscape criteria will be assessed by comparing the site with adjacent land. Differences between the site and the adjacent land must not interfere with normal land use and not show a negative impact on or off-site.

Landscape criteria are assessed by looking at the site as a whole rather than individual assessment points. It is necessary to do this from several vantage points on the site. While evaluation of landscape criteria can be somewhat subjective, the DSA should contain a discussion of each landscape parameter defined in Table 9 to make it clear that each of these criteria were considered.

Table 9 – DSA Landscape Criteria for Peatlands

Drainage	Site drainage should be consistent with the original patterns, directions and capacity or be comparable with the surrounding landscape. Facilities or features left in place (i.e. clay pads) must not negatively impact drainage or adjacent forest growth.
Erosion	No more soil erosion (i.e. rills, gullies or blowouts) than on adjacent land allowed.
Contour	Contour and roughness must conform and blend with adjacent contours or be consistent with present or intended land use.

Stability	No visible evidence of slope movement, slumping, subsidence, or tension cracks allowed greater than on adjacent landscape.
Gravel and Rocks	May not be piled, windrowed or concentrated in one area.
Debris	No industrial or domestic debris allowed. Woody debris (roots, slash, etc.) must not interfere with adjacent or normal land use.

4.3 Vegetation

Vegetation parameters, along with bare areas and weeds/undesirable plants, must be assessed at each assessment point and documented within the DSA.

Vegetation must be present at the time of the assessment. Special management practices that are inconsistent with those used on the control area are not allowed on the site as they may affect vegetation results. Fertilizer and/or amendment applications will be considered consistent with the control area if:

- the landowner(s) applied fertilizer and/or an amendment to the site as part of his/her normal management practice; or
- the licensee applied fertilizer and/or an amendment to the site to bring it up to the same nutrient levels as the control soils (based on lab fertility analyses).

NOTE: Fertilizer and/or amendment additions must be documented within the DSA (i.e. type, application rate, quantity, etc.) if applied during remediation and/or reclamation of the site.

4.3.1 Use of Non-native Species

Non-native species can be used where their benefits to site properties are known and the species are part of a plan to improve a site. For example, the use of agronomic annuals can be used for erosion control on recently restored sites. However, these species cannot be persistent and must not contribute to the vegetation criteria. The overall objective of the DSA standard is to ensure well/facility sites have been reclaimed properly and are comparable with the surrounding area. Leaving non-native species on-site would not meet this objective.

4.3.2 Timing of Vegetation Assessment

For peatlands, without fertilizer or amendment addition, the vegetation assessment should be conducted after a minimum of one full growing season. On sites where fertilizer and/or an amendment has been applied as part of the remediation and reclamation of the site, a minimum waiting period of two years from the application date is required before conducting the DSA that will be submitted with the AOR application.

NOTE: Weed spraying is not considered an amendment and can be assessed the next season to determine successful control with the exception of Japanese brome, scentless chamomile, downy brome, and leafy spurge.

4.3.3 Vegetation Assessment Criteria

At each assessment point, the third-party consultant will document the vegetation parameters (defined in Table 10) within the DSA. The vegetation assessments are based on a visual comparison between the site (lease and access) and the representative controls therefore vegetation must be present at the time of assessment.

When compared with representative controls, the lease and access assessment points must meet the criteria defined in Table 10 for the assessment point to pass.

NOTE: The lease and access must pass all of the criteria defined in Table 10 to be considered an acceptable DSA within an AOR application submission.

Table 10 – DSA Vegetation Parameter for Peatlands

<table>
<tr><td>Plant Species Composition</td><td>Re-vegetation species and species composition should be comparable with control vegetation or meet reasonable land management objectives.

NOTE: Weeds and undesirable plants cannot contribute to the plant species composition.</td></tr>
<tr><td>Plant Health</td><td>Plant health must be equal to or better than the control vegetation.

Plant health should be documented within the DSA as either poor, fair, good or excellent. Ideally, plants should be healthy; characteristics to look for and note are vigour, colour (ripening stage), disease-free and vegetation quality. Plant maturity should be comparable to the surrounding site, as such if the lease is maturing faster or slower than the surrounding area, the site is not comparable.

<table><tr><td>Excellent</td><td>Vigorous, healthy, no evidence of disease or stress</td></tr><tr><td>Good</td><td>Less then 25% evidence of stress/disease/discoloration</td></tr><tr><td>Fair</td><td>25%-50% evidence of stress/disease/discoloration</td></tr><tr><td>Poor</td><td>Greater than 50% evidence of stress/disease/discoloration, dead or not present</td></tr></table>
NOTE: Evidence of stressed vegetation should be documented within the DSA and must be comparable to the control vegetation. Where there is evidence of stressed vegetation, a description along with photographic evidence must be supplied in the DSA to demonstrate both on-site and off-site effects are comparable.</td></tr>
<tr><td>Plant Density</td><td>Plant density must be equal to or greater than 80% of the control vegetation.
• each lease point ≥ (average control x 0.80); and
• each access point ≥ (corresponding paired control x 0.80).

NOTE: At each assessment point the third-party consultant shall document the plant density of live/desirable/healthy plants.

NOTE: The species type, growth phase and other factors will affect the easiest method of measuring plant density; therefore, the results may be expressed in plants, stems per square metre or linear metre, or percentage cover for the representative area (lump all plant species together into a single density value and note any observable differences in species composition). The measurement methodology must be documented in the DSA and must be consistent across all assessment points and controls.</td></tr>
</table>

Bare Area	The bare area refers to the areas with exposed soil that are devoid of vegetation. The assessment point must have a representative bare area when compared to the rest of the grid area. The bare area percent at assessment points should not be greater than 10% as compared to the control. • each lease assessment point ≤ average control + 10%; and • each access assessment point ≤ corresponding paired control + 10%. NOTE: Bare areas that are located outside the assessment point must be comparable to those found offsite. If an anomaly is encountered, the locations must be detailed on the DSA sketch and information such as measurements, photos, and applicable vegetation parameter data must be collected to compare to the conditions found in the controls.
Weeds & Undesirable Plants	Weeds are to be managed on all lands as per *The Weed Control Act* which is regulated by the Ministry of Agriculture. NOTE: Once a weed species has been identified at a site, please refer to the *Minister's Order Designating Prohibited, Noxious and Nuisance Weeds (Weed List)* to determine the type of weed and potential action required under *The Weed Control Act* and ER's criteria as defined below: *Weed & Undesirable Plant Species Composition* Weeds and undesirable plant species identified on-site must also be present in the off-site controls; otherwise, the on-site weed and/or undesirable plant species must be removed. NOTE: The presence of weeds/undesirable plants may or may not have been directly influenced by well/facility activity. The third-party consultant must ensure that the control samples are representative of the surrounding area. If no weed species are present at an assessment point enter "none" in the weed species column and "0" in the weed density column to indicate the weed assessment was conducted. *Weed & Undesirable Plant Species Type* Depending on the species type identified, ER's requirements differ as follows: • *Prohibited Weeds* – must be eradicated on-site to prevent their movement out of the area; • *Noxious Weeds* – must be contained and controlled on-site and any isolated infestations found on-site must be eradicated. • *Nuisance Weeds and Undesirable Plants* – must be controlled on-site. *Weed & Undesirable Plant Density* No prohibited weeds are allowed on-site. The density of noxious weeds, nuisance weeds, and undesirable plants on-site must be less than or equal to the same species found in the controls. • average lease ≤ average control; and • each access point ≤ corresponding paired control. NOTE: The density results may be expressed in weeds per square metre, linear metre, or percentage cover for the representative area. The measurement methodology must be documented in the DSA and must be consistent across all assessment points and controls.

5. Reclamation Criteria – Forested Lands

Public Lands (Provincial Forests)

Any leases located on provincial forested lands are required to follow the reclamation criteria of the provincial governing entity that manages the land(s), such as the Ministry of Environment (ENV) or the Ministry of Agriculture (AGR). Once reclamation is completed, all that is required by ER is a submission of the release/approval verifying that the forested lands have been reclaimed to the satisfaction of ENV or AGR. There is no DSA component within the AOR application for these sites.

Private lands

For leases located on private lands the reclamation and DSA will be handled on a site-by-site basis. The licensee is required to submit a reclamation site plan prepared by a third-party consultant for approval by ER before commencing any reclamation activity on the site. Once approved, the licensee will complete the reclamation as outlined in the submitted plan and will complete a DSA after a timeframe specified by ER. As the DSA criteria are site specific for private forested lands ER will prescribe the DSA criteria when necessary.

6. Changes to Land Use and Applicability of Assessment Criteria

In some cases, it may be acceptable that the endpoint land use for a reclaimed site may differ from that of the surrounding area. For example, a reclaimed site located within a forested area may be reclaimed to a pond or may be cultivated for grazing or crops or may be reclaimed to provide for other future industrial/commercial land uses.

In these situations, the applicable endpoint land use criteria should be used for the reclamation assessment. However, it is recognized that representative controls may not be available for proper evaluation of a successful reclamation. In these instances, professional judgement with supporting rationale should be supplied in the DSA along with written landowner approval.

NOTE: For provincial forested lands, preapproval from the Ministry of Environment is required before any changes to land are completed.

NOTE: On sites where, proposed development is requested (i.e. residential/commercial) as a change in land use, approval will be required from the registered landowner, ER and the Rural Municipality (RM) who governs the area before proceeding.

7. Mandatory Photographs

To ensure adequate photographic evidence of the conditions at the site, the following photographs are required:

- At each corner of the lease, photos should be taken along the lease boundary line in each direction and towards the centre of the lease to show the surrounding area off the lease compared to on the lease.
- At well centre, photos should be taken standing 5 to 10 metres back of well centre in each cardinal direction towards well centre showing what is occurring at well centre and the surrounding area of the lease. These photos should not be taken standing on well centre.

- At all soil assessment points, photos must be taken of the soil in-situ showing the depth of the topsoil, the total dig depth, soil profile, root restrictions, etc. to ensure all necessary information is captured.
- At every other vegetation assessment point, photos should be taken of the bare areas, plant density, and plant height with measurement equipment. Multiple photos of different plant heads up close must be provided to show the health of the plants.
- At anomaly areas onsite and offsite, photos should be taken to show the onsite issues and comparable offsite issues, as well as the appropriate measurements and illustrated on a site sketch where each is occurring.

Unmanned Aerial Vehicle (UAV) photos of the site providing an overhead view of the lease and surrounding area to demonstrate comparability are recommended. A well centre marker should be included on the UAV photos to allow for proper review.

While all of the photos listed above are not required to be included in the DSA Form, they should be retained on file and made available upon request by ER. Examples of these photos are included in Appendix C: Mandatory Photographs. Consultants should include enough photos from the bullets listed above to show that the site is comparable to the surrounding area.

NOTE: In situations where the photos described above could not be collected (i.e. due to weather conditions preventing UAV flights, etc.), the reason must be discussed within the SSCR why they could not be collected.

8. References

Glossary of Terms in Soil Science. Research Branch, revised 1976. Canada Department of Agriculture, Ottawa. Publication 1459.

Alberta Environment, 2010. *2010 Reclamation Criteria for Wellsites and Associated Facilities for Cultivated Lands*, Alberta Environment, Edmonton, Alberta. 2011.

Alberta Environment, 1995. *Reclamation Criteria for Wellsites and Associated Facilities – 1995 Update*, Alberta Environment, Edmonton, Alberta. 1995.

Appendix A: Example of Detailed Site Assessment

Government of Saskatchewan

Detailed Site Assessment

A passing DSA is a mandatory component of the AOR application. For further details on DSA requirements, assessment criteria and timing for conducting the assessment please refer to *Directive PNG018*.

Prepared By (Consultant Company Name): Environmental Services Org.

Contact Person: John Doe Position: Senior Environmental Consultant, P.Eng

Phone #: (306) 555-5555 ext: 203 Email: john.doe@eso.sk.ca

Prepared For (Licensee Name): Rndo Oil and Gas Company Inc.

Site Type: [X] Well [ ] Facility

Licence Number: 99Q123

Lease Surface Location: 01-01-049-25W3

Access Surface Location: 01-01-049-25W3

ACTIVITY TYPE	DESCRIPTION	DATE (mm/dd/yyyy)
Site Initialized	Provide finished drilling date (for well site)	01/02/2000
Abandonment Completed	Provide well cut & capped date (for drilled well site)	04/25/2019
Site Reclamation Completed	Provide approximate date reclaimed by third party	10/29/2021
Topsoil Addition	Not Applicable	
Fertilizer Addition	Provide date added (provide further details in question 8 below)	10/15/2022
Amendment Addition	Not Applicable	

1) Land use criteria (indicate all that apply):

[X] Cultivated (Annual Crop) [ ] Cultivated (Perennial Crop) [X] Grasslands [ ] Peat lands [ ] Forest

2) Does the endpoint land use differ from the historical land use of the site? Yes; approval(s) attached and explanation provided below:

A large portion of the lease was converted from Grasslands to Cultivated Annual Crop usage as per the landowners request. Landowner provided approval and sign-off for this within the Reclamation Feedback Form.

3) Has the landowner agreed to allow "improvements" to remain on site? Yes; list of improvement feature(s) provided below:

The Texas gate and a portion of the fence remain on site. Landowner provided approval and sign-off for this within the Reclamation Feedback Form.

4) Has an Exemption from Reclamation been approved by ER for any portion of the site or access? Yes

5) How was the site accessed? Access Road (Developed/Undeveloped/Minimal Disturbance)

6) Were low/minimal disturbance practices used to construct the site and/or access? No

7) If topsoil additions were applied during site reclamation provide additional details below (i.e. date of application, incorporation method, source, volume, chemical/physical composition compatibility with the site, weed content, etc):

No topsoil additions were applied to the site.

8) If fertilizers or amendments were applied during site reclamation provide additional details below (i.e. type, application rate, quantity, location where applied):

50 pounds of fertilizer XYZ were applied to the lease and access road on October 15, 2022. A DSA was conducted in 2025 after the required minimum 2 year waiting period was completed.

DSA Form (February 1, 2026)

A. Landscape Assessment

Landscape criteria is assessed by comparing the site with the adjacent land. This assessment should be conducted by looking from several vantage points at the site as a whole (not at individual assessment points). Any differences noted between the site and the adjacent land must not interfere with normal land use and not show a negative impact on or off-site.

Licence # or Lease Surface Location	Assessors Name	Assessment Date
99Q123	John Doe	08/27/2025

As the evaluation of landscape criteria is somewhat subjective, a brief summary and discussion of inconsistencies should be provided:

DRAINAGE		
1) Is the surface water flow and onsite drainage (i.e. cross site flow, direction, dispersion, ponding, depressional storage) comparable to adjacent land offsite?		Yes; Site Passes
2) Are there any facilities or features left in place (i.e. clay pads, etc) onsite that would negatively impact drainage?		No; Site Passes
EROSION		
3) Is there any soil erosion (i.e. rills, gullies or blowouts) occurring onsite?		No
4) Based on a qualitative assessment of bare soil in relation to cover, is the onsite erosion comparable to the adjacent land offsite?		Yes; Site Passes
CONTOUR		
5) Does the contour/roughness onsite conform and blend with adjacent land offsite, and is it consistent with the present and/or intended land use?		Yes; Site Passes
STABILITY		
6) Is there any slope movement, slumping, subsidence, or tension cracks occurring onsite?		No
7) Is the onsite stability comparable to the adjacent land offsite?		Yes; Site Passes
GRAVEL & ROCKS		
8) Is there any gravel (<10cm) and/or rocks (>10cm) piled, windrowed or concentrated in areas onsite?		No; Site Passes
9) For Cultivated Sites:	Is there more than a 10% gravel increase in the surface cover anywhere onsite?	No; Site Passes
	Is there a rock increase in the surface cover anywhere onsite?	No; Site Passes
10) For Grassland Sites:	Is there more than a 20% gravel (plus rock) increase in the surface cover anywhere onsite?	No; Site Passes
DEBRIS		
11) Is there any industrial or domestic debris/refuse onsite?		No; Site Passes
12) For Grassland & Peatland Sites:	Is the organic debris (i.e. straw, wood) onsite consistent with adjacent land offsite?	Yes; Site Passes
	Is there any woody debris (i.e. roots, slash) onsite that is interfering with normal land use or the adjacent lands offsite?	No; Site Passes

COMMENTS OR JUSTIFICATION
(provide additional information regarding landscape criteria below):

The initial landscape assessment did not identify any concerns or issues. A secondary site visit was completed on October 19, 2025, in order to discuss some roughness concerns the landowner expressed. The secondary site visit was completed with the landowner once harvest was completed so the vegetation was not impeding the landscape assessment. It was determined that the roughness the landowner was feeling in the sprayer was outside of the lease boundary, and was not caused by the oil and gas operations at this location. The landowner has been working on converting the northern 2/3 of the lease into cropland since 2021, and it was discussed that the roughness could be due to their cultivation activities. The landscape at the site passes.

B. Lease Sketch

Licence # or Lease Surface Location	Assessors Name	Assessment Date
99Q123	John Doe	08/27/2025

LEGEND

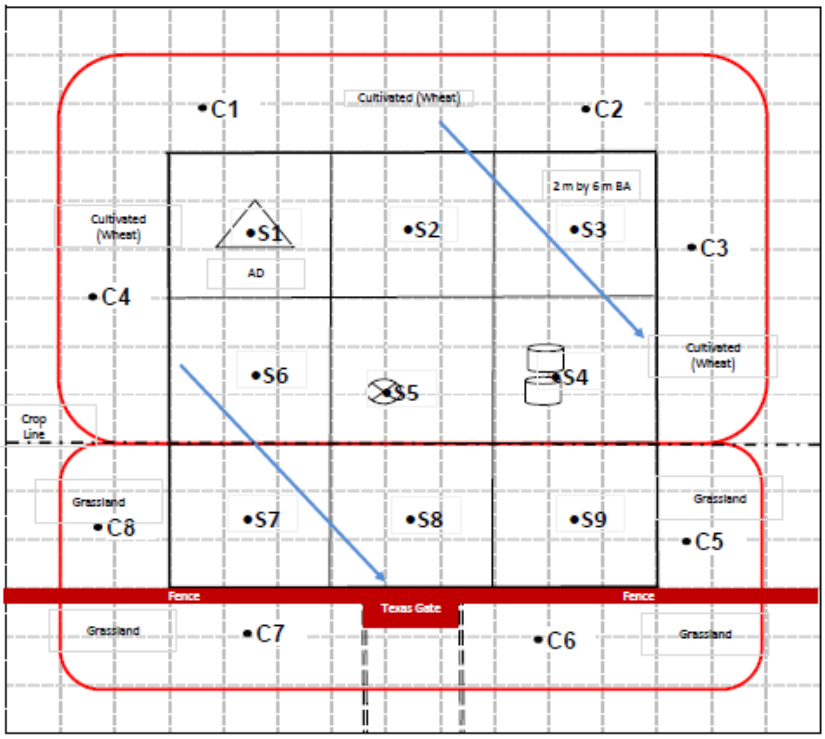
Control Point	Assessment Point	Step Out	Lease Boundary	Access Road Boundary	Drainage Direction	Former Wellhead	Former Storage Tank	Former Sump/Pit	Former Cement Pad
•C#	•S#	△	———	= = =	→	⊗	▭	▽	□

LANDSCAPE CRITERIA		VEGETATION CRITERIA	SOIL CRITERIA	OTHER INFORMATION		
PD - Poor Drainage	E - Erosion	VS - Vegetation Stress	AD - Admixing	text	Improvement Feature Remaining Onsite	Approved Reclamation Exempted Area
WP - Water Pooling	C - Contour	PH - Poor Health Areas	PR - Profile Restriction		DEFINE	
G/R - Gravel/Rocks	D - Debris	BA - Bare Areas				
ST - Stability		W - Weeds				

Lease Size	
Length (m)	100.0
Width (m)	100.0
Area (ha)	1.00

Grid Size (m x m)
33m X 33 m

Land Use / Vegetation	
Lease	Cultivated (Wheat)/ Grasslands
North	Cultivated (Wheat)
East	Cultivated (Wheat)/ Grasslands
South	Grasslands
West	Cultivated (Wheat)/ Grasslands



COMMENTS	
	The north 2/3 of the well site consisted of annual cultivated cropland (wheat) and the south 1/3 of the site and access road was seeded to a grassland mix approved by the landowner to match the surrounding. The grassland species were comprised of native species (plains rough fescue, northern wheatgrass, western porcupine grass) and tame species (Kentucky blue grass, smooth brome). This was consistent with the species observed offsite in the controls. A step-out was completed at S1 due to soil admixing in the topsoil, larger aggregates, and a slightly reduced vegetation height at this assessment point. The admixing and larger aggregate was not noticed within the step-out assessment points, and is localized to a small area. The vegetation height failure was located to this small area based on the step-out data, and did not impact the remaining vegetation parameters. No other areas of admixing, larger aggregates or reduced vegetation were observed in the other assessment points. A bare area (approx. 2m by 6m) was noticed in Assessment Grid 3 that appeared to be a seeding error. This was confirmed by the landowner. This bare area was an anomaly, and is not representative of the grid space, and was not due to oil and gas activities, so the grid assessment point was taken outside of this area.

C. Lease Soil Assessment

Licence # or Lease Surface Location	Assessors Name	Assessment Date
99Q123	John Doe	08/27/2025

Lease Assessment Points	Topsoil					Soil Profile Assessment			Comments/Anomalies Observed
	Depth (cm)	Admixing (%)	Texture	Strength	Aggregate Size (cm)	Depth (cm)	Topsoil	Subsoil	
SO-1	12.3	0 to 30	CL	Friable	<2	50.0	NR	NR	Step-out was completed due to admixing, aggregate size and height. Admixing and larger aggregate was not observed in step-out locations
S2	11.0	0 to 30	CL	Friable	<2				
S3	15.0	0 to 30	CL	Friable	<2	35.0	NR	R	Hardpan noticed at 35 cm. Did not impact root elongation (23 cm) and was discovered on the east side of the site, both on and off lease.
S4	9.0	0 to 30	CL	Friable	<2				
S5	16.0	0 to 30	CL	Friable	<2	50.0	NR	NR	
S6	12.0	0 to 30	CL	Friable	<2				
S7	13.0	0 to 30	CL	Friable	<2	50.0	NR	NR	
S8	15.0	0 to 30	CL	Friable	<2				
S9	11.0	0 to 30	CL	Friable	<2	33.0	NR	R	Hardpan noticed at 33 cm. Did not impact root elongation (21 cm) and was discovered on the east side of the site, both on and off lease.
Average	12.7								

Control Assessment Points	Topsoil					Soil Profile Assessment			Comments/Anomalies Observed
	Depth (cm)	Admixing (%)	Texture	Strength	Aggregate Size (cm)	Depth (cm)	Topsoil	Subsoil	
C1	12.0	0 to 30	CL	Friable	<2	50.0	NR	NR	
C2	11.0	0 to 30	CL	Friable	<2				
C3	14.0	0 to 30	CL	Friable	<2	33.0	NR	R	Hardpan noticed at 33 cm. Did not impact root elongation (24 cm) and was discovered on the east side of the site, both on and off lease.
C4	10.0	0 to 30	CL	Friable	<2				
C5	13.0	0 to 30	CL	Friable	<2	32.0	NR	R	Hardpan noticed at 32 cm. Did not impact root elongation (22 cm) and was discovered on the east side of the site, both on and off lease.
C6	15.0	0 to 30	CL	Friable	<2				
C7	10.0	0 to 30	CL	Friable	<2	50.0	NR	NR	
C8	13.0	0 to 30	CL	Friable	<2				
60% Average	7.4								
50% Average	6.1								

C. Lease Soil Assessment (Step Out Data)

When a failed parameter is encountered at a lease soil assessment point, the third party consultant may opt to conduct a step-out assessment to determine if it is representative of the assessment grid or not. A step-out consists of assessing three additional points which can be up to 10 m from the original point in a triangular shape around it.

The data for the original assessment point, along with the individual step-out data must be reported on the step-out portion of the DSA form. The average of the step out data, denoted as SO #, should then be transferred into the lease soil assessment table in place of the original assessment point data and used when assessing the criteria requirements for that particular grid.

Licence # or Lease Surface Location	Assessors Name	Assessment Date
99Q123	John Doe	08/27/2025

Assessment Points	Topsoil					Soil Profile Assessment			Comments/Distance from Failed Point
	Depth (cm)	Admixing (%)	Texture	Strength	Aggregate Size (cm)	Depth (cm)	Topsoil	Subsoil	
S1 (original)	12.0	>30 to 60	CL	Friable	2 to 5	50.0	NR	NR	Admixing and larger aggregate size was observed in original assessment point
SO #-1	14.0	0 to 30	CL	Friable	<2	50.0	NR	NR	5 m from failed point
SO #-2	11.0	0 to 30	CL	Friable	<2	50.0	NR	NR	4 m from failed point
SO #-3	12.0	0 to 30	CL	Friable	<2	50.0	NR	NR	5 m from failed point
	12.3	Average of the 3 Step-Out Locations							

D. Lease Vegetation Assessment

Licence #	Assessors Name	Assessment Date
99Q123	John Doe	08/27/2025

The assessment method used on and offsite were consistent and defined as follows:	Plant Density	Bare Area	Weeds
	# of plants per linear meter	% bare	% cover

Lease Assessment Points	Plant Species Composition & 80% Requirement					Plant Productivity Ratings								
	Desirable Species Type	Plant Health	Plant Height	Plant Density	Head Length	Seed Health	Seed Development	Pod Density	PPR	Bare Area (%)	Weeds Species Type	Nox Density	Nui Density	Comments
SO-1	Wheat	Good	88.3	29	6.5	3.7	3.3		3.5	0	None	0	0	
S2	Wheat	Good	84.0	31	6.3	3.0	3.0		3.0	0	None	0	0	
S3	Wheat	Good	86.0	28	8.1	3.0	4.0		3.5	0	None	0	0	
S4	Wheat	Good	82.0	34	7.8	3.0	3.0		3.0	0	None	0	0	
S5	Wheat	Good	87.0	29	6.5	3.5	3.0		3.3	0	None	0	0	
S6	Wheat	Good	88.0	33	6.1	4.0	3.0		3.5	0	None	0	0	
Lease Average			85.9	30.7	6.9	3.4	3.2	#DIV/0!	3.3			0.0	0.0	

Control Assessment Points	Plant Species Composition & 80% Requirement					Plant Productivity Ratings								
	Desirable Species Type	Plant Health	Plant Height	Plant Density	Head Length	Seed Health	Seed Development	Pod Density	PPR	Bare Area (%)	Weeds Species Type	Nox Density	Nui Density	Comments
C1	Wheat	Good	83.0	35	6.5	3.0	3.0		3.0	0	None	0	0	
C2	Wheat	Good	88.0	29	8.3	4.0	4.0		4.0	0	None	0	0	
C3	Wheat	Good	91.0	32	5.9	3.0	3.0		3.0	0	None	0	0	
C4	Wheat	Good	82.0	33	6.8	4.0	4.0		4.0	0	None	0	0	
Minimum Requirement Averages			68.8	25.8	5.5	2.5	2.5	#DIV/0!	3.0 2.5	10		0.0	0.0	

D. Lease Vegetation Assessment (Step Out Data)

When a failed parameter is encountered at a lease vegetation assessment point, the third party consultant may opt to conduct a step-out assessment to determine if it is representative of the assessment grid. A step-out consists of assessing three additional points which can be up to 10 m from the original point in a triangular shape around it.

The data for the original assessment point, along with the individual step-out data must be reported on the step-out portion of the DSA form. The average of the step out data, denoted as SO #, should then be transferred into the lease vegetation assessment table in place of the original assessment point data and used when assessing the criteria requirements for that particular grid.

Licence #	Assessors Name	Assessment Date
99Q123	John Doe	8/27/2025

Assessment Points	Plant Species Composition & 80% Requirement					Plant Productivity Ratings								
	Desirable Species Type	Plant Health	Plant Height	Plant Density	Head Length	Seed Health	Seed Development	Pod Density	Average Rating	Bare Area (%)	Weed Species Type	Nox Density	Nui Density	Comments/Distance from Failed Point
S1 (original)	Wheat	Good	65.0	29	6.6	4.0	4.0		4.0	0	None	0	0	Step-out was completed due to failed height
SO #-1	Wheat	Good	88.0	27	6.1	3.0	3.0		3.0	0	None	0	0	5 m from failed point
SO #-2	Wheat	Good	92.0	30	6.8	4.0	4.0		4.0	0	None	0	0	4 m from failed point
SO #-3	Wheat	Good	85.0	29	6.5	4.0	3.0		3.5	0	None	0	0	5 m from failed point
Average of the 3 Step-Out Locations:			88.3	29	6.5	3.7	3.3	#DIV/0!	3.5	0		0.0	0.0	

D. Lease Vegetation Assessment

Licence #	Assessors Name	Assessment Date
99Q123	John Doe	08/27/2025

The assessment method used on and offsite were consistent and defined as follows:	Plant Density	Bare Area	Weeds
	% cover	% bare	% cover

Lease Assessment Points	Plant Species Composition & 80% Requirement					Plant Productivity Ratings				Bare Area (%)	Weeds Species Type	Nox Density	Nui Density	Comments
	Dezirable Species Type	Plant Health	Plant Height	Plant Density	Head Length	Seed Health	Seed Development	Pod Density	PPR					
S7	PRF, NW, WPG, KB, SB	Good		90					#DIV/0!	10	None	0	0	PRF - plains rough fescue, NW - northern wheatgrass, WPG - western porcupine grass, KB - kentucky bluegrass, SB - smooth brome
S8	PRF, NW, WPG, KB, SB	Good		85					#DIV/0!	15	None	0	0	
S9	PRF, NW, WPG, KB, SB	Good		90					#DIV/0!	10	None	0	0	
Lease Average			#DIV/0!	88.3	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			0.0	0.0	

Control Assessment Points	Plant Species Composition & 80% Requirement					Plant Productivity Ratings				Bare Area (%)	Weeds Species Type	Nox Density	Nui Density	Comments
	Dezirable Species Type	Plant Health	Plant Height	Plant Density	Head Length	Seed Health	Seed Development	Pod Density	PPR					
C5	PRF, NW, WPG, KB, SB	Good		85					#DIV/0!	15	None	0	0	
C6	PRF, NW, WPG, KB, SB	Good		90					#DIV/0!	10	None	0	0	
C7	PRF, NW, WPG, KB, SB	Good		95					#DIV/0!	5	None	0	0	
C8	PRF, NW, WPG, KB, SB	Good		85					#DIV/0!	15	None	0	0	
Minimum Requirement Averages:			#DIV/0!	71.0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	21		0.0	0.0	

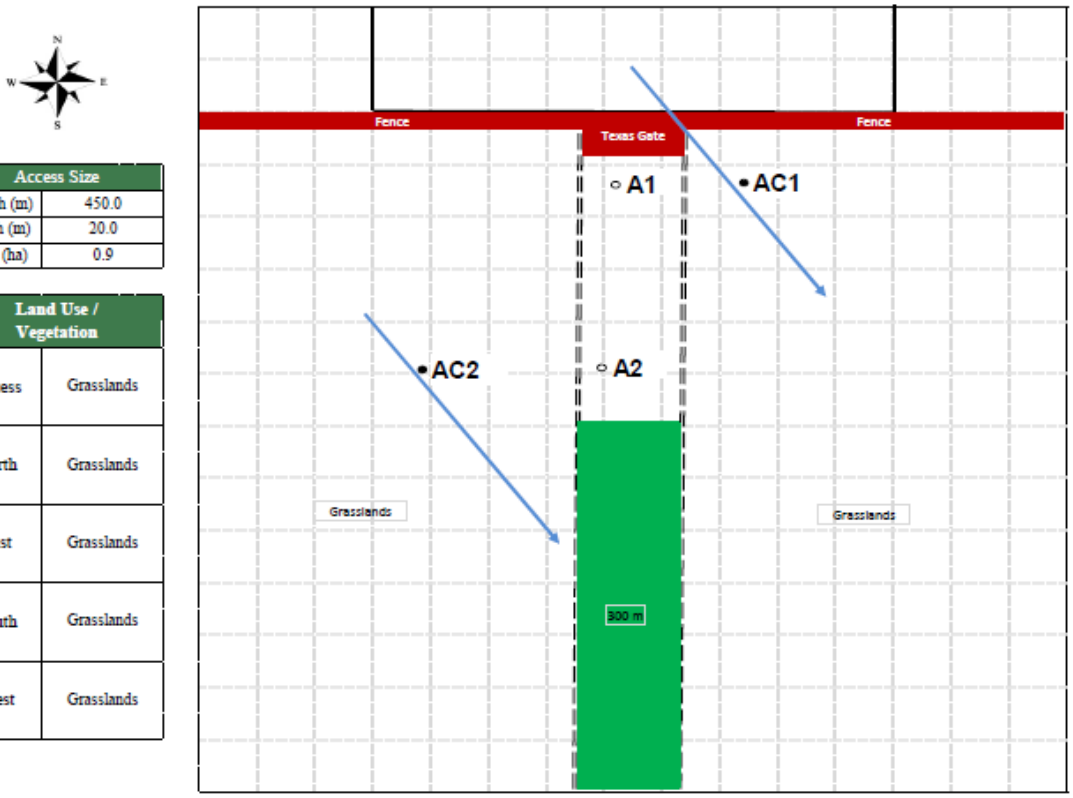
E. Access Sketch

Licence # or Access Surface Location	Assessors Name	Assessment Date (mm/dd/yyyy)
99Q123	John Doe	08/27/2025

LEGEND

Access Control Point	Access Assessment Point	Lease Boundary	Access Road Boundary	Drainage Direction
•AC#	○ A#	———	═══:	→

LANDSCAPE CRITERIA		VEGETATION CRITERIA	SOIL CRITERIA	OTHER INFORMATION		
PD - Poor Drainage	E - Erosion	VS - Vegetation Stress	AD - Admixing		Improvement Feature Remaining Onsite	Approved Reclamation Exempted Area
WP - Water Pooling	C - Contour	PH - Poor Health Areas	PR - Profile Restriction	text	DEFINE	
G/R - Gravel/Rocks	D - Debris	BA - Bare Areas				
ST - Stability		W - Weeds				



Access Size	
Length (m)	450.0
Width (m)	20.0
Area (ha)	0.9

Land Use / Vegetation	
Access	Grasslands
North	Grasslands
East	Grasslands
South	Grasslands
West	Grasslands

COMMENTS	The access road is located within grasslands. The southern 300 m of the access road is exempted to a wellsite located within 01-01-049-25W3 (Licence #00K123). The Texas gate and fence remain on site as improvements by request of the landowner.

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F. Access Soil Assessment

Licence # or Access Surface Location	Assessors Name	Assessment Date
99Q123	John Doe	08/27/2025

	Topsoil					Soil Profile Assessment			
Assessment Points	Depth (cm)	Admixing (%)	Texture	Strength	Aggregate Size (cm)	Depth (cm)	Topsoil	Subsoil	Comments/Anomalies Observed
A1	12.0	0 to 30	CL	Friable	<2	38.0	NR	R	Hardpan noticed at 38 cm. Did not impact root elongation (23 cm) and was discovered in both A1 and the paired assessment control, AC1.
AC1	13.0	0 to 30	CL	Friable	<2	35.0	NR	R	Hardpan noticed at 35 cm. Did not impact root elongation (24 cm) and was discovered in both A1 and the paired assessment control, AC1.
A2	11.0	0 to 30	CL	Friable	<2	50.0	NR	NR	
AC2	10.0	0 to 30	CL	Friable	<2	50.0	NR	NR	

G. Access Vegetation Assessment

Licence # or Access Surface Location	Assessors Name	Assessment Date
99Q123	John Doe	08/27/2025

The assessment method used on and offsite were consistent and defined as follows:	Plant Vegetation	Bare Area	Weeds / Undesirable Plants
	% cover	% bare	% cover

	Plant Species Composition & 80% Requirement					Plant Productivity Ratings								
Assessment Points	Desirable Species Type	Plant Health	Plant Height	Plant Density	Head Length	Seed Health	Seed Development	Pod Density	PPR	Bare Area (%)	Weed Species Type	Nox Density	Nui Density	Comments
A1	PRF, NW, WPG, KB, SB	Good		85					#DIV/0!	15.0	None	0	0	PRF - plains rough fescue, NW - northern wheatgrass, WPG - western porcupine grass, KB - kentucky bluegrass, SB - smooth brome
AC1	PRF, NW, WPG, KB, SB	Good		90					#DIV/0!	10.0	None	0	0	
A2	PRF, NW, WPG, KB, SB	Good		90					#DIV/0!	10.0	None	0	0	
AC2	PRF, NW, WPG, KB, SB	Good		85					#DIV/0!	15.0	None	0	0	

H. Photos

ESG	Licence # or Lease Surface Location	Detailed Site Assessment Photos Prepared by:
	99Q123	John Doe

PHOTO # 1	
Date Taken:	
08/27/2025	
Location:	
East of Well Center, looking west	
Description:	Photo of well center and surrounding crop. Well center is denoted by the stake. No noticeable difference in the vegetation can be found at well center compared to surrounding.

PHOTO # 2	
Date Taken:	
08/27/2025	
Location:	
Assessment point S4, looking north	
Description:	View of the site, looking north, at assessment point S4, where the ASTs were previously located. No noticeable difference in the vegetation can be found within the area of previous ASTs compared to surrounding.

ESG	Licence # or Lease Surface Location	Detailed Site Assessment Photos Prepared by:
	99Q123	John Doe

PHOTO # 3	
Date Taken:	
08/27/2025	
Location:	
Assessment point S3	
Description:	View of Vegetation Assessment at S3, with measuring reference.

PHOTO # 4	
Date Taken:	
08/27/2025	
Location:	
Assessment point S3	
Description:	View of the soil profile assessment at S3, with measuring reference. No evidence of rooting restrictions (matts, flattening, dense soil structures, or uneven crop height within this area) were observed (23 cm root depth which is comparable to the controls).

ESG	Licence # or Lease Surface Location	Detailed Site Assessment Photos Prepared by:
	99Q123	John Doe

PHOTO # 5	
Date Taken:	
10/19/2025	
Location:	
View from the west side of the lease, looking northeast	
Description:	View of the landscape after the crop was harvested, in order to not impede the assessment. The landscape was found to be comparable on and off site.

PHOTO # 6	
Date Taken:	
08/27/2025	
Location:	
	 
Description:	This is an example of a Drone Photo which provides a good aerial image of the site, along with a navigation panel that shows the lease boundary, as well as the location and direction of the photo being taken.

I. Summary

Licence # or Lease Surface Location	Assessors Name	Assessment Date
99Q123	John Doe	08/27/2025

Landscape Assessment Criteria Summary	Lease & Access
1) Is the landscape on-site comparable to the adjacent lands offsite?	Yes; Site Passes (Summary and Justification provided in section A)

Soil Assessment Criteria Summary	Lease	Access
2) Has topsoil been adequately replaced as per topsoil depth requirements?	Yes; Site Passes	Yes; Site Passes
3) Is the topsoil admixing onsite comparable to the admixing offsite?	Yes; Site Passes	Yes; Site Passes
4) Is the topsoil texture onsite comparable to offsite?	Yes; Site Passes	Yes; Site Passes
5) Is the topsoil strength onsite comparable to offsite?	Yes; Site Passes	Yes; Site Passes
6) Is the topsoil aggregate size onsite comparable to offsite?	Yes; Site Passes	Yes; Site Passes
7) Is there a restrictive layer in the topsoil or subsoil profile onsite that is not comparable to offsite?	No; Site Passes	No; Site Passes

Vegetation Assessment Criteria Summary	Lease	Access
8) Is the plant species composition onsite comparable to the plant species composition found offsite?	Yes; Site Passes	Yes; Site Passes
9) Is the plant health onsite comparable to the plant health offsite?	Yes; Site Passes	Yes; Site Passes
10) Is the plant height onsite comparable to the plant height offsite?	Yes; Site Passes	Not Applicable
11) Is the plant density onsite comparable to the plant density offsite?	Yes; Site Passes	Yes; Site Passes
12) Is the plant productivity ratings onsite equal to or greater than the productivity ratings offsite?	Yes; Site Passes	Not Applicable
13) Is the head/pod/tuber length onsite comparable to the head/pod/tuber length offsite?	Yes; Site Passes	Not Applicable
14) Are the % bare areas onsite comparable to the % bare areas offsite?	Yes; Site Passes	Yes; Site Passes
15) Is the weed or undesirable plant species onsite also found offsite?	Yes; Site Passes	Yes; Site Passes
16) Is the density of noxious/nuisance weeds or undesirable plants onsite greater than offsite?	No; Site Passes	No; Site Passes
17) Were any prohibited weeds found onsite eradicated?	Not Applicable	Not Applicable

COMMENTS OR JUSTIFICATION
(in the space below provide additional information regarding soil/vegetation criteria and justification, where applicable)

The north 2/3 of the well site consisted of annual cultivated cropland (wheat) and the south 1/3 of the site and access road was seeded to a grassland mix approved by the landowner to match the surrounding. The grassland species were comprised of native species (plains rough fescue, northern wheatgrass, western porcupine grass) and tame species (Kentucky blue grass, smooth brome). This was consistent with the species observed offsite in the controls.

A step-out was completed at S1 due to soil admixing in the topsoil, larger aggregates, and a slightly reduced vegetation height at this assessment point. The admixing and larger aggregate was not noticed within the step-out assessment points, and is localized to a small area. The vegetation height failure was located to this small area based on the step-out data, and did not impact the remaining vegetation parameters. No other areas of admixing, larger aggregates or reduced vegetation were observed in the other assessment points.

A bare area (approx. 2m by 6m) was noticed in Assessment Grid 3 that appeared to be a seeding error. This was confirmed by the landowner. This bare area was an anomaly, and is not representative of the grid space, and was not due to oil and gas activities, so the grid assessment point was taken outside of this area.

The access road is located within grasslands. The southern 300 m of the access road is exempted to a wellsite located within 01-01-049-25W3 (Licence #00K123). The Texas gate and fence remain on site as improvements by request of the landowner.

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J. Conclusions and Recommendations

Licence # or Lease Surface Location	Assessors Name	Assessment Date
99Q123	John Doe	08/27/2025

CONCLUSIONS	
1) Overall does any area on the site or access fail to meet landscape criteria where justification could not be provided?	No; Landscape DSA Passes
2) Overall does more than one grid fail to meet soil criteria where justification could not be provided?	No; Soil DSA Passes
3) Overall do any grids fail to meet vegetation criteria where justification could not be provided?	No; Vegetation DSA Passes
RECOMMENDATIONS (Based on the professional opinion of the qualified third party consultant, the DSA for the given site and access)	
PASSES (landscape/soil/vegetation conclusions above all pass)	
ADDITIONAL WORK REQUIRED	
No additional work is required. It is recommended that the site continue onto an Acknowledgement of Reclamation Application.	

K. Declaration

DSA Completeness Checklist

Please check off the appropriate boxes indicating the sections completed and included in this DSA.

- [X] Title Page
- [X] A. Landscape Assessment
- [X] B. Lease Sketch
- [X] C. Lease Soil Assessment
- [X] D. Lease Vegetation Assessment
- [X] E. Access Sketch
- [X] F. Access Soil Assessment
- [X] G. Access Vegetation Assessment
- [X] H. Photos
- [X] I. Summary
- [X] J. Conclusions & Recommendations
- [X] K. Declaration by Qualified Third Party Consultant

This Detailed Site Assessment was conducted on behalf of Rndo Oil and Gas Company Inc. for the site, with surface located at 01-01-049-25W3).

I John Doe of Environmental Services Org.

certify that all applicable sections within this DSA form have been completed and, to the best of my knowledge, all of the aforementioned information is accurate and has been provided. I understand that all applicable sections within this form (and required attachments) are mandatory as part of the DSA submission to the Ministry of the Energy and Resources, and an incomplete submission will result in the application being denied.

Doe, John — Digitally signed by Doe, John Date: 2025.12.12 12:49:12 -06'00'

December 12, 2025

PROFESSIONAL ENGINEER J. A. DOE MEMBER 18297 25 12 12 SASKATCHEWAN

Qualified Third Party Consultant Signature | Date | Third Party Consultant Qualifications

The above signature must meet the third party consultant qualifications provided in the AOR Directive.

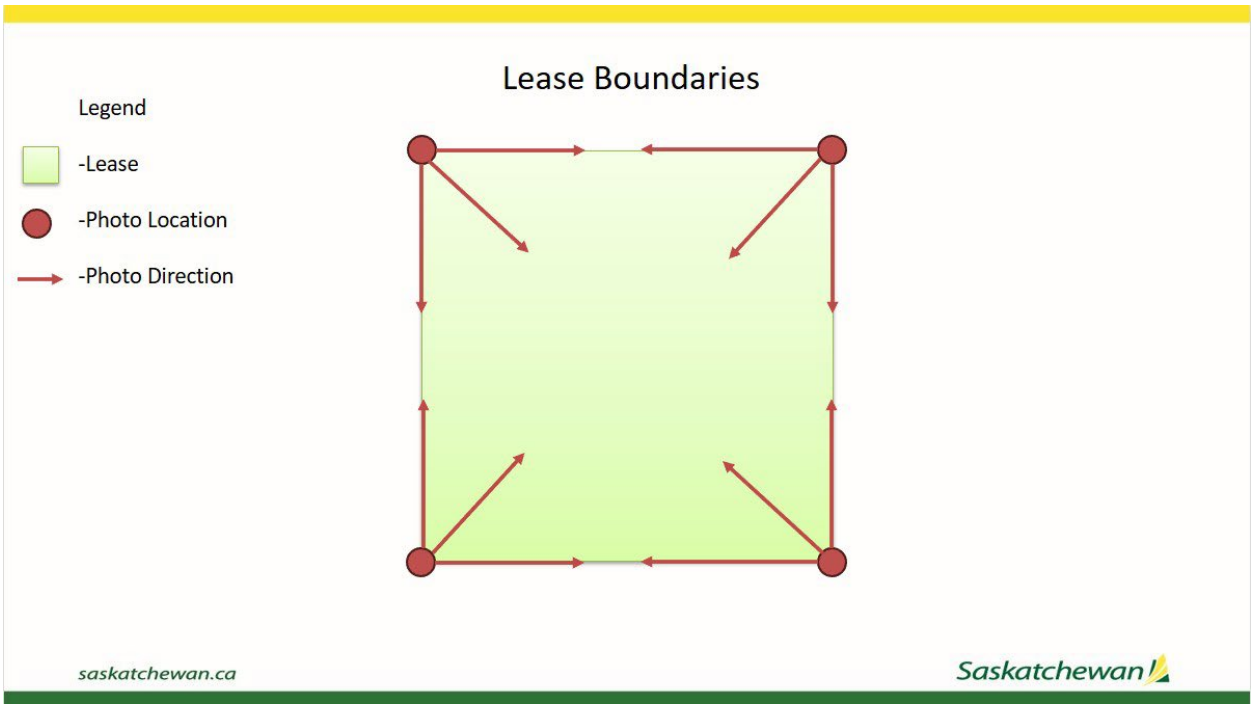
DSA Form (February 1, 2026)

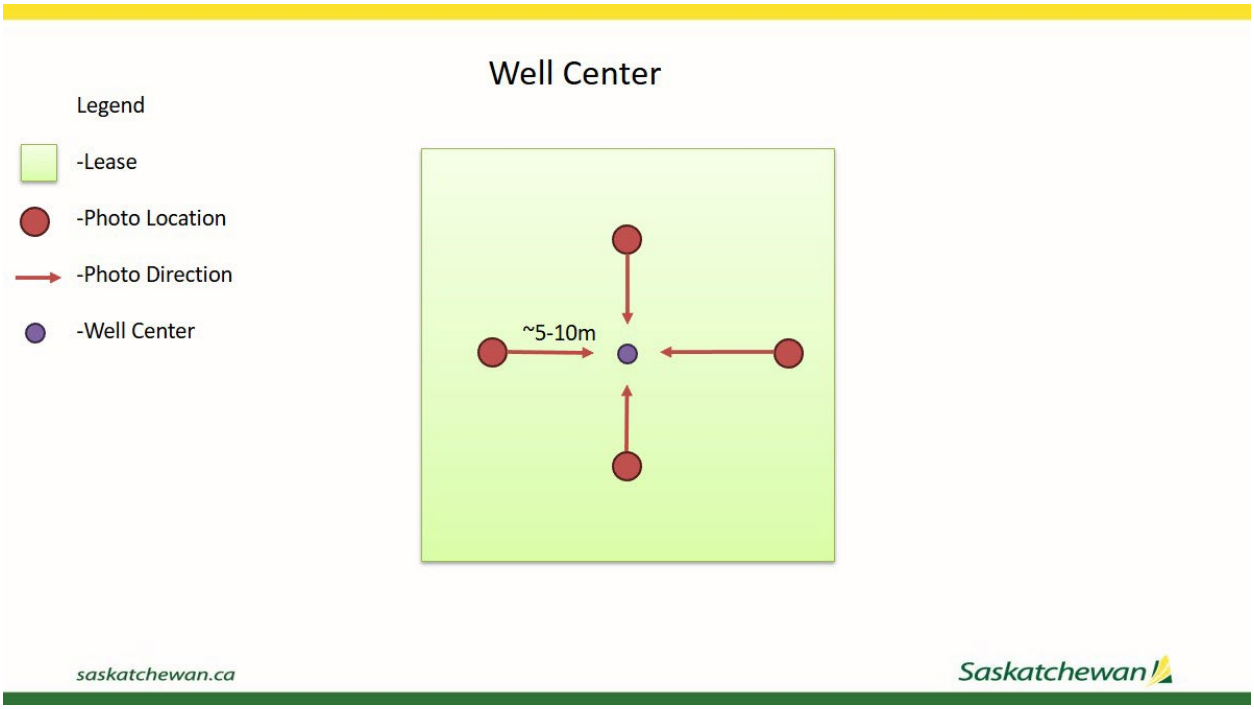
Appendix B – Root, Permeability, and Aeration Restriction Indicators

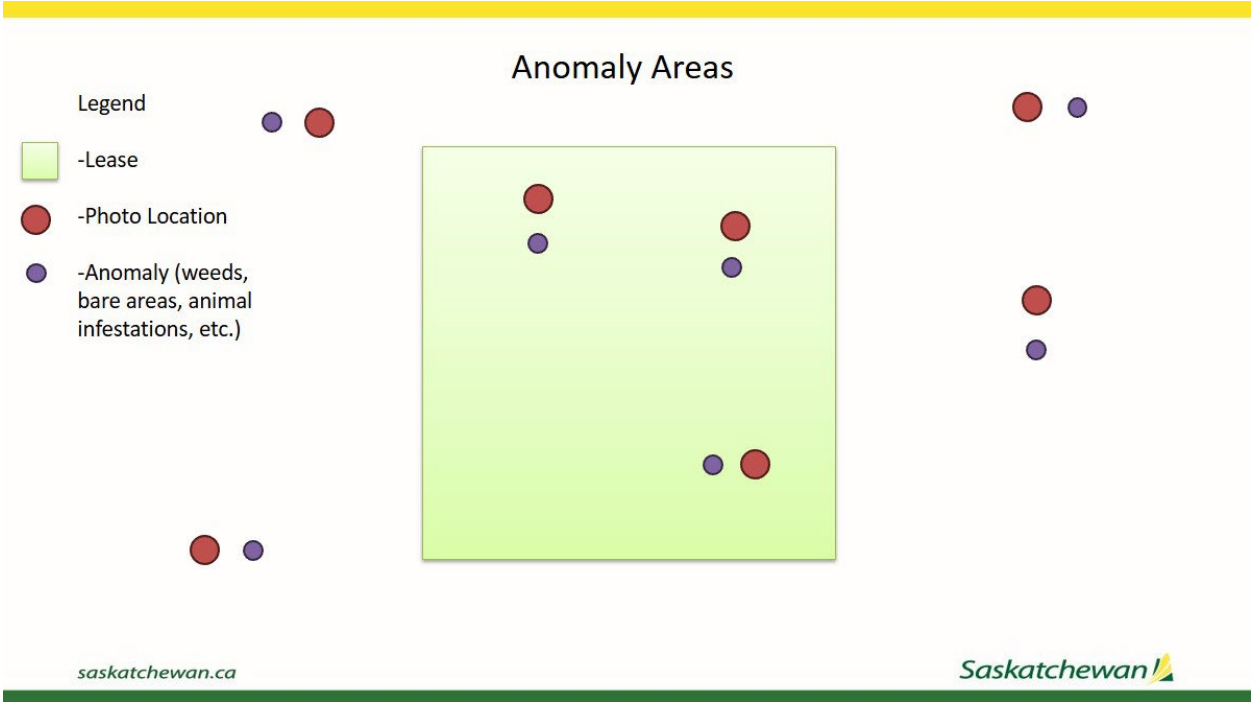
Commonly observed indicators of root, permeability and aeration restriction indicators to look for when completing the soil profile assessment.

Vertical Root Elongation Restriction Indicators	Water Permeability Restriction Indicators	Soil Aeration Restriction Indicators
• Presence of root mats and bunches • Presence of flattened and highly branched roots • Presence of horizontal roots • Presence of exposed roots • Presence of soil layers or abrupt texture or structure transitions • Absence of roots within or below reconstructed profile zones • Presence of dense and massive soil structure • Absence of roots within soil aggregates • Presence of early maturing crop with reduced height and density • In mixed pasture or haylands, uneven distribution of species • Uneven crop height and density in cropland	• Presence of surface ponding • Presence of surface vehicle (equipment) ruts • Presence of stratified or abrupt moisture changes within the soil profile • Presence of dense, massive or layered structure (compaction) • Presence of flooded (yellow or stunted) crop conditions • Presence of abrupt texture or structure transitions	• Presence of dense, massive or layered soil structure (compaction) • Presence of reduced pore size and pore space • Presence of brownish-red ped surfaces • Presence of sour odours

Appendix C – Mandatory Photographs






Anomaly Areas
Legend
-Lease
-Photo Location
-Anomaly (weeds, bare areas, animal infestations, etc.)
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