RECLAMATION CRITERIA FOR WELLSITES AND ASSOCIATED FACILITIES -

1995 UPDATE

The fundamental principle of these criteria is that the success of land reclamation is measured against the original (pre-construction) or representative (adjacent) site conditions with due consideration for construction norms at the time of development. In cases where pre-construction data are not available, the land, soil and vegetation adjacent to the site will be used as a comparison. However, in special cases, the operator may have to find representative land, soil and vegetation a short distance from the site; the reasons for doing this must be explained in the application and to the Conservation and Reclamation Inspector (CRI) at the inquiry.

The certification criteria describe the allowable changes in site conditions. They typically require landscape, soils and vegetation assessments.

All surface soils must be salvaged and replaced on the site. Two-lift stripping and minimum disturbance construction techniques are encouraged, as they will increase the likelihood of meeting the reclamation criteria and of retaining soil organic matter in the rooting zone.

Drilling and other oilfield wastes must be properly disposed of according to Energy and Utilities Board (EUB) guidelines. **All contamination must be treated prior to application for certification**. Specific criteria for the assessment and remediation of contaminants (e.g., salts, metals, sterilants, organic chemicals) will be provided by Alberta Environmental Protection.

The certification criteria apply to wellsite leases and access roads, and associated facilities such as borrow pits, campsites, and off-site sumps. They do not apply to facilities or features that are left in place (e.g., roads, pads, dugouts, etc.) with the landowner's written approval although these facilities or features will be covered by the reclamation certificate. These facilities or features must not cause off-site damage or be a safety hazard.

A reclamation certificate will be delayed until any off-site damage is repaired (this is necessary to guarantee access to the area for repairs). Conservation and Reclamation Notices and Environmental Protection Orders will be issued if necessary.

The criteria will be used to judge reclamation success and issue the reclamation certificate. The operator must supply information relative to the criteria on the *Wellsite Reclamation Certificate Application - 1995 Update* form (or a suitable substitute) and in the Detailed Site Assessment Report. The more information the operator provides, the better and quicker the CRI will be able to make his or her decision. More information will also decrease the chances of an appeal of the certificate.

When the CRIs hold the inquiry on the site for certification they will be confirming the information the operator supplied. Therefore it is to the operator's advantage to ensure that the site is adequately assessed and ready for certification before submitting an application. **Applications will be cancelled if they are incomplete**. If some parameters do not pass, an application may still be submitted if it is accompanied by detailed justification of why the operator thinks the site is ready to certify.

The criteria have been developed for the entire province and try to account for the environmental variability across the province. However, there will be site-specific circumstances where the criteria do not fit; the CRI will use his or her experience and judgement in interpreting the criteria on these sites.

Assessment density and level of detail described in the following sections are the minimum acceptable. On sites with a great deal of variability, or sites where justification for deviation from the criteria is submitted, more detail may be required. The CRI is not limited to the methods identified in the following sections to make his or her assessment.

When the inquiry is held and the CRI identifies a deficiency, he or she will continue to evaluate the site. The CRI may not reassess all the locations; instead, spot checks will be done and the CRI will conduct step-out assessments to confirm deficiencies. At each assessment location reviewed, the CRI will clearly describe all the deficiencies he or she identifies based on a level of assessment similar to the operator's. This will ensure that the operator receives one description of deficiencies for the site that can be addressed at one time. However, if the industry assessment is obviously inaccurate, the CRI will stop the inquiry, clearly document their findings, and cancel the application.

These criteria were developed utilizing the expertise of government, industry and affected stakeholder groups. The criteria will be reviewed on a continual basis with another review conducted prior to the 1996 reclamation season.

Time Periods

The criteria identify three site construction time periods:

- Before 1983, when there was no legislated requirement for soil salvage;
- 1983 to April 30, 1994, when soil salvage and replacement were required; and
- After April 30, 1994, when the 1994 criteria came into effect.

Glossary of Terms

Access Roads or Pads Left in Place (also called facilities or features): In some cases the landowner may wish to have roads or pads left in place. They need not be vegetated, but must be stable, non-hazardous and non-erosive. In these cases, the vegetation criteria are not applied. In other cases, roads or pads may be left in place but will be expected to be vegetated (e.g., peat lands in agricultural areas, roads in Green Area). In these cases, some form of root zone must be established and the vegetation portions of the landscape criteria have to be met. The roads or pads must be stable, non-hazardous and non-erosive.

Anomaly: A result at an assessment location that does not appear representative of the entire grid being evaluated. If an anomaly is encountered, a 'step-out' assessment procedure may be used to see if the location is anomalous or representative of the grid.

Assessment Grid: An approximately 20 m x 20 m grid, or 30 m x 30 m grid, established on the lease to provide a systematic method for collecting soils and vegetation data.

Assessment Location: Is the point in the centre of each approximately 20 m x 20 m grid, or 30 m x 30 m grid, on the lease; or the location where soil and vegetation is assessed on the access road.

Bare Areas: Areas that do not have vegetation growing on them. This does not include the areas between drill seeded rows.

Control: The information collected in a pre-construction site assessment or from the adjacent or representative land. The control provides the comparison for the reclaimed site.

CRI: Conservation and Reclamation Inspector.

Detailed Site Assessment Report: The report that must be attached to the Wellsite Reclamation Certificate Application form that provides all the data collected on the site. The report will also contain the justification used to explain why a site should get a certificate if some of the criteria have not be met. Section 6 provides information on the expected content of a Detailed Site Assessment Report.

Distribution Tolerance: Two or three grids may have soil depths below the MRD.

Industry Assessment: The time (or times) when the site is assessed by the operator or his consultant. Data for the certificate application are collected at this time.

Inquiry: A formal review of the reclaimed site under Sec. 7 of the Conservation and Reclamation Regulation. The operator and the landowner are invited to the inquiry.

Landowner: Means landowner and occupant in this document.

Lease: Means the wellsite, not the access road, in this document.

Management Plan: A plan, developed in consultation with the landowner and the CRI, that will reclaim wellsites to a sustainable, manageable condition. A plan may be developed for sites that were constructed before 1983, and that do not have surface soil available for replacement. Section 7 provides information on the expected content of a Management Plan.

MRD: Minimum Replacement Depth. Calculated as 80% of the RRD. The intent of soil replacement is to get even distribution. The MRD ensures that the average replaced soil depth is not made up of deep and shallow soil pockets of replaced soil.

Non-surface Soil: Non-surface soil includes subsoil and other materials that do not normally comprise surface soil. Used in determining % admixing.

Quality Tolerance: Two or three grids may drop one soil quality class.

RRD: Required Replacement Depth. Calculated as 80%, 70% or 60% of the control soil depth depending on the date of construction.

Site: Means the lease and the access road in this document.

Soil Profile Assessment: An evaluation of the characteristics of the replaced surface soil and the layer of subsoil just beneath it. The purpose of the assessment is to ensure that there are no restrictions to rooting, or to water or air movement. The soil is assessed to a maximum depth of 50 cm.

Step-Out Assessment: When an anomaly is encountered at an assessment location, the operator may opt to conduct a 'step-out' assessment to determine if it is representative of the whole grid or not. A step-out consists of assessing a minimum of an additional 3 locations. These additional locations will be 3 m from the original point in a triangular shape around it. The average of these three locations is reported for those parameters where numbers are provided (e.g.,soil depth). The original location data are not reported.

Surface Soil: The uppermost mineral/organic material, valued as a growing medium and salvaged. More detailed definitions are provided in the text of the criteria for each land use.

Two-Lift Stripping: The selective salvage of all surface soil as the first lift and of good quality upper subsoil as the second lift. The lifts are then replaced in the proper order.

TABLE OF CONTENTS

The criteria are based on land use. The land use categories are: Cultivated, Grassland, Forest and Peat. **Determine the land use for the site based on the description below and use the part of the document that is applicable.**

1. CERTIFICATION CRITERIA - CULTIVATED LAND

Cultivated Land includes all lands that have been ploughed to prepare a seed bed at some point in time and have a well defined Ap horizon, including cultivated peat soils. The Cultivated Land criteria apply to lands under continuous and rotational cropping systems and hayland. These Cultivated Land criteria do not apply to range improvement areas in grazing dispositions or reserves which are assessed under the Grasslands criteria.

1.1 Surface Soil Definition

Surface soil is defined as the uppermost mineral/organic material, valued as a growing medium.

Salvage the plough layer (Ap) and any Ah, Ahe, or 'similar' horizons (e.g., Bp). Very deep surface soils are salvaged to a maximum depth of 70 cm. Very shallow surface soils (<10 cm) are salvaged to a minimum of 10 cm unless the underlying material is unsuitable (e.g., Bnt, bedrock, gravel, rock). **This must be documented in the Detailed Site Assessment Report.**

1.2 Site Assessment Scheme

Landscape criteria are assessed by looking at the site as a whole. It is necessary to do this from several vantage points on the site.

Soil quantity, soil quality and soil profiles are included as the complete soils assessment. No soils assessment is required on access roads or pads that are left in place. On the portions of the site where there has been no soil disturbance (e.g., stripping, rutting or compaction) and landscape criteria are met, no soils assessment is required.

Vegetation parameters must be assessed at each assessment location and the data recorded in the Detailed Site Assessment Report.

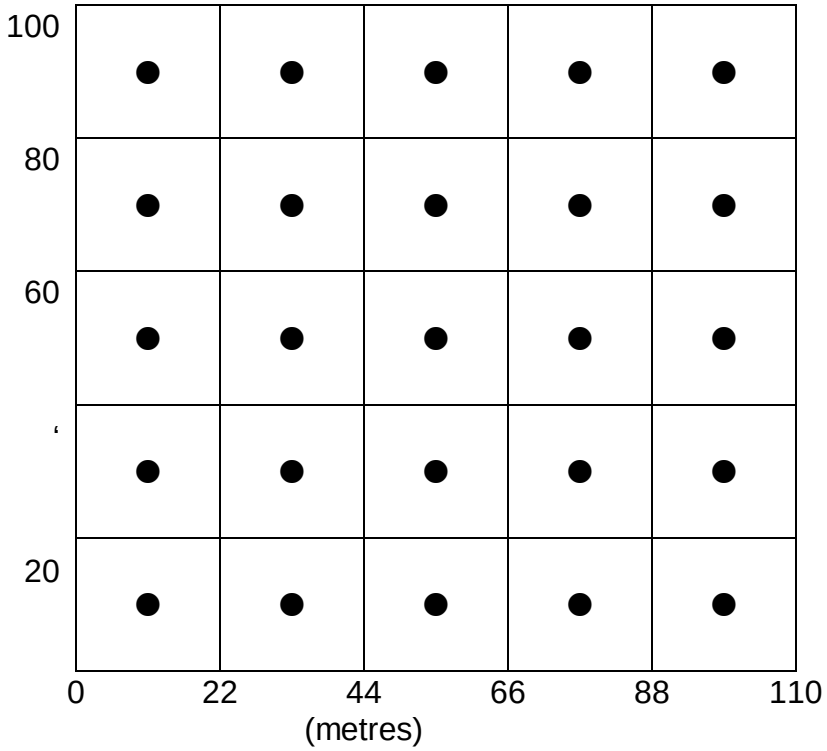
1.2.1 Lease

Quantity and quality of replaced surface soil will be assessed on an approximate 20 m x 20 m assessment grid, edges of which match up to the lease boundaries or the disturbed area. See Figure 1.

- The assessment grid should be adjusted to evenly cover the entire lease. The 20 m x 20 m grid size is approximate. Grid size needs to be adjusted to account for odd size leases. For a standard 20 m x 20 m grid, the largest size your grid should be is 22 m and the smallest is 18 m. For example:
  - If the lease edge is 88 m, then you should use 4 grids, each at 22 m wide.
  - If the lease edge is 114 m, then you should add a 6th set of grids and each grid will be approximately 19 m wide.

  Much bigger leases may require 7 or more sets of grids.
  On much smaller leases (e.g., 40 m x 60 m), you still use an approximately 20 m x 20 m grid for sampling. The Tolerance criteria still apply even though there are fewer grids being assessed. Landowners may question why a greater percentage of the disturbed area is below the target criteria. The landowner should consider that there is less overall disturbance to his land than if the operator had built a lease of normal size. Credit needs to be given to operators who attempt to minimize disturbance.

Figure 1. Assessment Locations Within an Approximate 20 m x 20 m Assessment Grid. Note the grid size along the bottom as an example of adjusting the grid to fit the lease. Soil and vegetation data are collected at each assessment location (shown by the dot).



- The assessment location will be in the middle of each grid for all grids.
- Adjust the assessment locations from the middle of the grid to include the following five locations if known: well centre, sump, flare pit, tank storage area and entrance to lease.
- When an anomaly is encountered within a grid, the operator may opt to conduct a 'step-out' assessment to determine if it is representative of the whole grid or not. A step-out consists of assessing a minimum of an additional 3 locations. These additional locations will be 3 m from the original point in a triangular shape around it. The average of these three locations is reported for those parameters where numbers are provided (e.g., soil depth). The original location data are not reported. **Document that the information reported is the result of a step-out.**
- The Conservation and Reclamation Inspector (CRI) may not reassess all the locations; instead, spot checks will be done and the CRI will conduct step-out assessments to confirm deficiencies.

A **minimum** of four control sites (one on each side of the disturbed area) must be assessed to provide comparisons for the disturbed area. **Experience in 1994 showed that four control sites often did not adequately represent the natural variability in the undisturbed soils.** Where control site characteristics vary significantly, the operator may use relevant controls to represent portions of the site.

If the following five locations are known: well centre, sump, flare pit, tank storage area and entrance to lease, then soil profile assessments will be conducted at these five PLUS a minimum of four additional random locations. If these five locations are not known, then soil profile assessments will be conducted at every second assessment location.

1.2.2 Access

Quantity and quality of replaced surface soil will be assessed on a paired (one off-site control and one on-site) basis.

- For roads >100 m in length: one paired assessment will be taken at 100 m intervals.
- For roads <100 m in length: a minimum of 2 paired assessment locations.

If topography is variable, more assessment locations should be used.

One full soil profile assessment will be conducted at every second assessment location. Sample both the road and the control. Adjust the sample locations so the road approach and side hill cut areas are included.

1.3 Landscape

Landscape criteria will be assessed by comparing the site with the pre-disturbance conditions or 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.

Drainage	Site drainage should be consistent with the original patterns, directions and capacity or be compatible with the surrounding landscape. Facilities or features left in place (e.g., clay pads) must not negatively impact drainage.
Erosion	No more erosion 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.
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.
Vegetation	Plants should be healthy and suitable for the site. Characteristics to look for are vigour, height, colour, disease and crop quality.
Bare Areas	Number and size of bare areas should not be greater than original or control vegetation.

1.4 Surface Soil Quantity, Distribution and Quality

If the control surface soil is ≥15 cm deep, then the depth of replaced surface soil, soil quality, soil profile assessment and loss of organic matter content assessments may be done after soil replacement or after cultivation in the entire replaced soil layer.

If the control surface soil is <15 cm deep, then the operator may wish to assess depth of replaced surface soil after soil replacement but before cultivation in order to be able to demonstrate to the CRI that adequate soil was replaced. The Ap depth, soil quality,

soil profile assessment and loss of organic matter content assessments must be done in the replaced Ap horizon after cultivation of the site has occurred.

1.4.1 Quantity and Distribution of Replaced Surface Soil

The required replacement depth (RRD) is:

- 80% of control for sites constructed after April 30, 1994; or
- 70% of control for sites constructed from 1983 to April 30, 1994; or
- 60% of control for sites constructed before 1983.
  If there is not enough available surface soil to meet this then replace as evenly as possible all that is available. Soil will be suitably amended so that it is not an obstacle to normal farming methods practiced (i.e., same implements and timing of operations). A Management Plan may be put together involving the operator, landowner and the CRI. See Section 7 for more information on the expected content of a Management Plan.

Thus RRD = Control depth x 0.8, 0.7 or 0.6.
Refer to Table 2 to determine the appropriate RRD for the site.

1.4.1.1 Lease

The average replaced surface soil depth is the 'mean' or overall average of all the assessment locations (the lease and access roads are assessed separately) and must be equal to or greater than the required replacement depth (RRD).

The replaced soil should be distributed uniformly across the lease. The average replaced depth should not be achieved through averaging very high and very low soil depth values. Therefore, the soil depth values at each assessment location must be at least 80% of the RRD.

Thus minimum replacement depth (MRD) = RRD x 0.8.

Refer to Table 2 to determine the appropriate MRD for the site. A distribution tolerance may allow up to three grids to have lower surface soil replacement depths (see Section 1.4.3). The average replaced soil depth must still be equal to or greater than the RRD.

Controls can be averaged to determine 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 Detailed Site Assessment Report.** If controls are highly variable and the MRD can't be achieved, the operator may qualify results based on control variability.

The MRD does not apply where control surface soils are <15 cm, however all available surface soil must be replaced as evenly as possible across the site.

1.4.1.2 Access

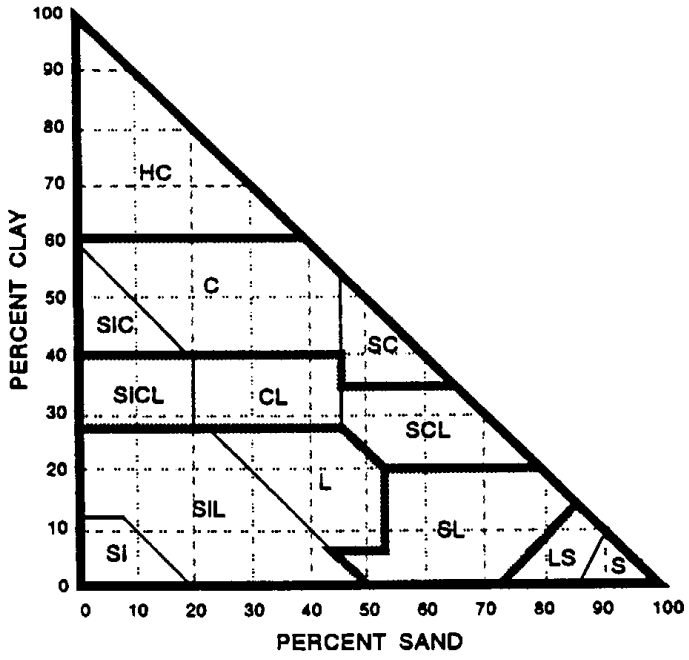
Access road soil depths are assessed on a paired basis by comparing the assessment location depth to the control depth. If the assessment location depth is equal to or greater than the MRD (from Table 2) the location passes.

1.4.2 Quality of Replaced Surface Soil

Surface soil quality will be assessed at each assessment location on the actual replaced surface soil. If the control surface soil is <15 cm deep, then the soil quality is assessed in the replaced Ap horizon (i.e., after cultivation). If the site Ap is deeper than the control then make the control depth the same as the site Ap depth.

When compared side by side with representative control samples from similar depths under similar light and moisture conditions, the assessment location samples must be in the same class as the controls as defined below. Improvements in the soil quality class are acceptable, but these must be justified in the Detailed Site Assessment Report.

Each of the parameters is assessed at each assessment location. The assessment location passes only when all the criteria are met. A quality tolerance may allow up to three grids to drop one soil quality class (see Section 1.4.3).

Texture	Remain in the same texture class (within the dark lines).  **Texture Class Triangle**

Soil Aggregate Size	Classes: <2 cm; 2 cm to 5 cm; and >5 cm to 10 cm. Remain in the same class. No soil aggregates greater than 10 cm are allowed unless similar size soil aggregates are present in the control soil.
Soil Aggregate Strength	Classes: friable, firm, hard. Remain in the same class.
Gravel and Rocks	May not be piled, windrowed or concentrated in one area. Gravel (<10 cm): No more than an increase of 10% is allowed. Rocks (>10 cm): No increase allowed.

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.

When most or all of the surface soil depth is made up through the use of amendments, or is the result of a Management Plan for sites constructed before 1983, then some of the surface soil quality criteria may be waived.

1.4.3 Distribution and Quality Tolerance

The criteria for quantity and quality reflect the desired outcome for soil replacement. In recognition of the capabilities of soil moving equipment, and the size of an area that could be fixed if a problem were identified, the following tolerance is allowed.

For sites with original surface soil ≥15 cm deep, a total of three grids may vary from the desired outcome (see example). Each of the three grids may:

- have a replaced surface soil depth between 40% and 80% of the RRD (refer to Table 2 for the appropriate Distribution Tolerance range); **or**
- drop one soil quality class; **or**
- have both a replaced surface soil depth between 40% and 80% of RRD (refer to Table 2 for the appropriate Distribution Tolerance range) and drop one soil quality class.

Since sites with original surface soil <15 cm do not have an MRD, three grids may drop one quality class.

None of the three grids may be adjacent to each other (side by side). Adjacent grids are of sufficient size to warrant remediating the problem.

Quantity, Distribution and Tolerance Example

If average control depth = 20 cm for a site constructed in 1995:

Surface Soil Quantity

Required replacement depth (RRD) from Table 2 = 16 cm. If the average replaced depth = 17 cm, the site passes the quantity criteria (must be at least RRD).

Distribution

The MRD from Table 2 = 13 cm. Therefore, if all of the soil depth measurements are greater than or equal to 13 cm, the site passes.

Tolerance

For the site **any one** of the following variations would be acceptable:

Three grids may have a replaced surface soil depth between 6 cm and 13 cm (from Table 2 Distribution Tolerance column) with no grids dropping one quality class; **or**

One grid may have a replaced surface soil depth between 6 cm and 13 cm (from Table 2) and two other grids may drop one quality class; **or**

All grids may be above the MRD and three grids may drop one soil quality class; **or**

Three grids may have a replaced surface soil depth between 6 cm and 13 cm (from Table 2) and the same three grids may drop one quality class (i.e., only three grids in total are affected).

1.4.4 Loss of Organic Matter Content

The loss of organic matter is to be measured by the % admixing of non-surface soil in the replaced surface soil. This parameter is used as a 'flag' of potential problem soils, not as a criteria.

Report the control class and the % admixing class at each assessment location. Note that the control may be 'admixed' (i.e., a mixture of soil layers). % Admixing Classes are: 0 to 10%, >10% to 20%, >20% to 30%, >30% to 40%, >40% to 50%, and >50%.

Targets for % admixing of non-surface soil component:

- Sites constructed after April 30, 1994: Less than 30% difference in non-surface soil in the sample (i.e., sample minus control).
- Sites constructed from 1983 to April 30, 1994: Less than 40% difference in non-surface soil in the sample.
- Sites constructed before 1983: Record % admixing class.

For those sites where the dominant (most common) % admixing class does not meet the target, fully headed out vegetation must be present at the time of industry's assessment. The CRI will prioritize these sites for timing of the inquiry. The CRI has the discretion to delay his or her visit from the year of industry assessment to the next growing season with available crop. It is to the operator's advantage to ensure vegetation is not negatively affected on these sites.

1.5 Soil Profile Assessment

Surface soil plus an additional 20 cm below it will be assessed, to a maximum total depth of 50 cm. In the assessment depth, process restriction parameters will be documented at least as either 'restrictive' or 'non-restrictive' in the soil profile as compared to the control.
The process restriction parameters are:

- Water permeability.
- Vertical root elongation.
- Soil aeration.

See Table 1 for more details on assessing process restrictions. **Since root elongation is being assessed, soil profile assessment should be done at the same time as the vegetation assessment.**

Use common sense to identify restrictive vs. non-restrictive. Document the results of the profile assessment in the Detailed Site Assessment Report and discuss on-site with the CRI at the inquiry.

Table 1. Some Commonly Observed Indicators of Root, Permeability and Aeration Restrictions.

Vertical Root Elongation Restriction Indicators

- Presence of root mats and bunches
- Presence of flattened and highly branched roots
- Presence of horizontal roots
- Presence of exped 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

Water Permeability Restriction Indicators

- 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

Soil Aeration Restriction Indicators

- 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

1.6 Vegetation

Vegetation must be present at time of the operator's assessment. On sites where justifications are being proposed for parameters that do not meet the criteria, it would be best to have vegetation present when the CRI conducts the inquiry.

No special management practices (e.g., not consistent with those on the control) are allowed on the disturbed area that would affect the vegetation results. Fertilizer applications will be considered consistent with the control if:

- the site was fertilized by the landowner as part of his normal management practice; or
- the operator fertilizes the site to bring it up to the same nutrient levels as the control soils based on lab fertility analyses.

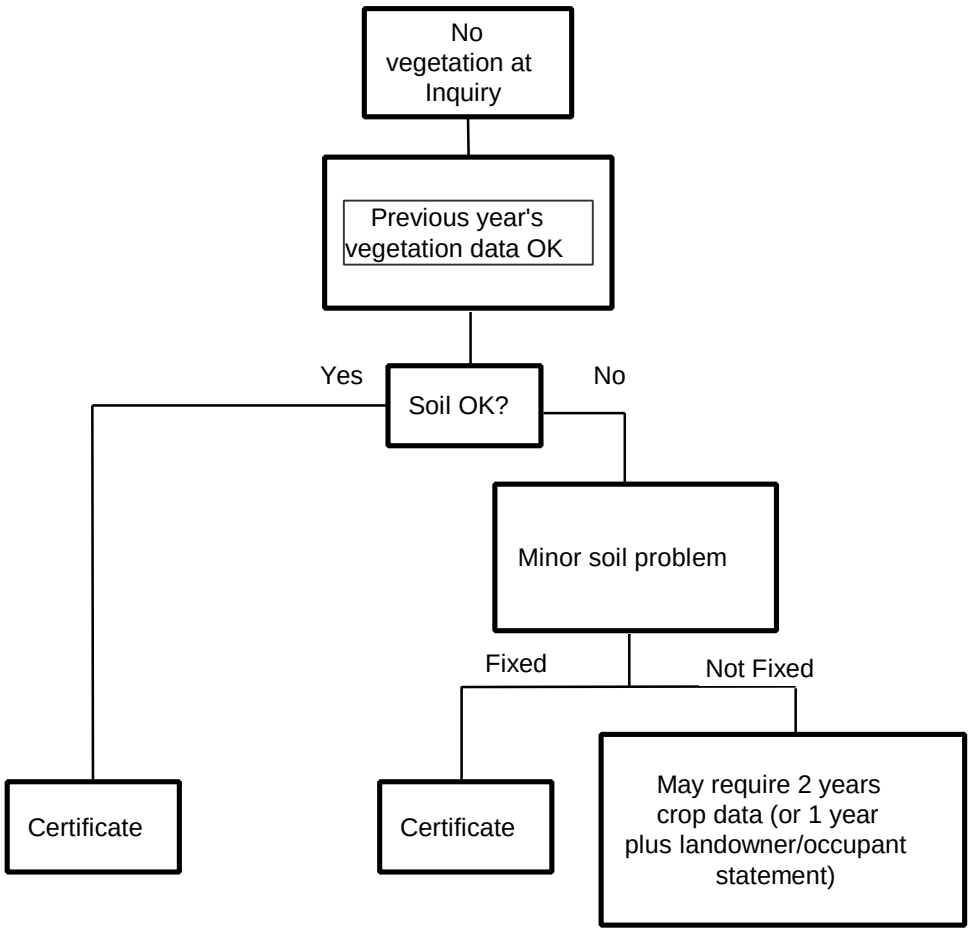
Fertilizer use must be documented in the Detailed Site Assessment Report.

A vegetation assessment is not required on access roads and pads left in place. If the roads or pads have had soil replaced, or have been amended, and have been seeded, the vegetation component of the landscape criteria will apply.

1.6.1 Annuals

Crop assessments by industry should be conducted when the crop is fully headed out. If possible, the inquiry should also be held when the crop is headed out. Since this will not always be possible, Figure 2 provides a flowchart describing some of the possible variations.

FIGURE 2: FLOWCHART SHOWING WHAT CAN HAPPEN WHEN THERE IS NO VEGETATION AT THE INQUIRY STAGE



- If all the soil and vegetation parameters pass the criteria the year the assessment is conducted and the land is summerfallowed the year the inquiry is

conducted, then the previous year's crop data collected will be sufficient evidence for the inquiry.

- If the soils have a minor problem (e.g., four assessment locations do not meet the desired quality criteria) and vegetation parameters pass the criteria, then two years of cropping data are required to submit an application. If the operator has only one year of cropping data, a signed statement from the landowner stating the vegetation has been performing may be used in lieu of 2 years cropping data.
- In the situation where fully headed out crop data are not available but stubble data are collected and the soils pass the criteria, this is acceptable for submission of an application.

1.6.2 Forage

Generally expect one full growing season including an over wintering period and a minimum of twelve months from time of seeding on sites without fertilizer. On sites that have been fertilized, generally expect two years from the time of fertilizer addition.

1.6.3 Criteria

At each assessment location, the operator will document the following parameters where applicable. **These assessments are based on a visual comparison between grid vegetation and the control.**

Species Composition	Revegetation species and species composition should be compatible with original or control vegetation or meet reasonable land management objectives.
Density	≥80% of control.
Height	≥80% of control.
Health	Plants should be healthy. Characteristics to look for are vigour, height, colour, disease and vegetation quality.

Cover (does not apply to annual crops)	Where the control vegetation is similar, ≥80% of control. If the control vegetation has <40% cover, the site should be 100% of control. Where there is no control vegetation, or the control vegetation is different, ≥80% cover unless otherwise authorized by the CRI in writing. Litter can be included in the cover assessment, however cannot contribute more than the amount on the control. Amendment materials (e.g., straw) are not included as litter in the calculation for cover. The required cover must be evenly distributed on the site or be similar to the distribution on the control.

TABLE 2: SURFACE SOIL QUANTITY CHART FOR CULTIVATED LAND

Control (cm)	80% of Control (cm)				70% of Control (cm)				60% of Control (cm)			
Depth	RRD	MRD	Distribution Tolerance		RRD	MRD	Distribution Tolerance		RRD	MRD	Distribution Tolerance	
15	12	10	5	10	11	9	4	9	9	7	4	7
16	13	10	5	10	11	9	4	9	10	8	4	8
17	14	11	6	11	12	10	5	10	10	8	4	8
18	14	11	6	11	13	10	5	10	11	9	4	9
19	15	12	6	12	13	10	5	10	11	9	4	9
20	16	13	6	13	14	11	6	11	12	10	5	10
21	17	14	7	14	15	12	6	12	13	10	5	10
22	18	14	7	14	15	12	6	12	13	10	5	10
23	18	14	7	14	16	13	6	13	14	11	6	11
24	19	15	8	15	17	14	7	14	14	11	6	11
25	20	16	8	16	18	14	7	14	15	12	6	12
26	21	17	8	17	18	14	7	14	16	13	6	13
27	22	18	9	18	19	15	8	15	16	13	6	13
28	22	18	9	18	20	16	8	16	17	14	7	14
29	23	18	9	18	20	16	8	16	17	14	7	14
30	24	19	10	19	21	17	8	17	18	14	7	14
31	25	20	10	20	22	18	9	18	19	15	8	15
32	26	21	10	21	22	18	9	18	19	15	8	15
33	26	21	10	21	23	18	9	18	20	16	8	16
34	27	22	11	22	24	19	10	19	20	16	8	16
35	28	22	11	22	25	20	10	20	21	17	8	17
36	29	23	12	23	25	20	10	20	22	18	9	18
37	30	24	12	24	26	21	10	21	22	18	9	18
38	30	24	12	24	27	22	11	22	23	18	9	18
39	31	25	12	25	27	22	11	22	23	18	9	18
40	32	26	13	26	28	22	11	22	24	19	10	19
41	33	26	13	26	29	23	12	23	25	20	10	20
42	34	27	14	27	29	23	12	23	25	20	10	20
43	34	27	14	27	30	24	12	24	26	21	10	21
44	35	28	14	28	31	25	12	25	26	21	10	21
45	36	29	14	29	32	26	13	26	27	22	11	22
46	37	30	15	30	32	26	13	26	28	22	11	22
47	38	30	15	30	33	26	13	26	28	22	11	22

Control (cm)	80% of Control (cm)				70% of Control (cm)				60% of Control (cm)			
Depth	RRD	MRD	Distribution Tolerance		RRD	MRD	Distribution Tolerance		RRD	MRD	Distribution Tolerance	
48	38	30	15	30	34	27	14	27	29	23	12	23
49	39	31	16	31	34	27	14	27	29	23	12	23
50	40	32	16	32	35	28	14	28	30	24	12	24
51	41	33	16	33	36	29	14	29	31	25	12	25
52	42	34	17	34	36	29	14	29	31	25	12	25
53	42	34	17	34	37	30	15	30	32	26	13	26
54	43	34	17	34	38	30	15	30	32	26	13	26
55	44	35	18	35	39	31	16	31	33	26	13	26
56	45	36	18	36	39	31	16	31	34	27	14	27
57	46	37	18	37	40	32	16	32	34	27	14	27
58	46	37	18	37	41	33	16	33	35	28	14	28
59	47	38	19	38	41	33	16	33	35	28	14	28
60	48	38	19	38	42	34	17	34	36	29	14	29
61	49	39	20	39	43	34	17	34	37	30	15	30
62	50	40	20	40	43	34	17	34	37	30	15	30
63	50	40	20	40	44	35	18	35	38	30	15	30
64	51	41	20	41	45	36	18	36	38	30	15	30
65	52	42	21	42	46	37	18	37	39	31	16	31
66	53	42	21	42	46	37	18	37	40	32	16	32
67	54	43	22	43	47	38	19	38	40	32	16	32
68	54	43	22	43	48	38	19	38	41	33	16	33
69	55	44	22	44	48	38	19	38	41	33	16	33
70	56	45	22	45	49	39	20	39	42	34	17	34

RRD = Required Replacement Depth
= Control x 0.8 for sites constructed after April 30, 1994 or
= Control x 0.7 for sites constructed between 1983 and April 30, 1994 or
= Control x 0.6 for sites constructed before 1983

Average Replaced Depth is calculated by summing the soil depths at each assessment location and dividing by the number of assessment locations. The average is compared to the RRD.

MRD = Minimum Replacement Depth
= RRD x 0.8

Distribution Tolerance = RRD x 0.4 or = RRD x 0.8

THIS PAGE INTENTIONALLY LEFT BLANK

2. CERTIFICATION CRITERIA – GRASSLANDS

Grasslands includes all lands that are permanently grassed including, but not limited to, range improvement areas, grazing dispositions on public lands (White Area or Green Area), native prairie and grassland areas, Special Areas Board land, and Eastern Irrigation District land. Note that grasslands that have a well defined Ap horizon, and have a reasonable likelihood of cultivation, are to be reclaimed to Cultivated Land criteria.

The criteria will typically require landscape, soil and vegetation assessments. For well-vegetated older sites (i.e., those with at least three year old established vegetation), portions of the landscape and soils criteria may be waived by the Conservation and Reclamation Inspector (CRI).

Minimal disturbance of native grassland is recommended. Where disturbance occurs, surface soil must be salvaged for replacement. The use of native species is encouraged to revegetate native grassland on public land.

2.1 Surface Soil Definition

Surface soil is defined as the uppermost mineral/organic material, valued as a growing medium.

Salvage all Ah and Ahe horizons. If A horizon(s) are <15 cm, then a minimum of 15 cm of material will be salvaged unless the material is unsuitable (e.g., Bnt, bedrock, gravel, rock). **This must be documented in the Detailed Site Assessment Report.**

2.2 Site Assessment Scheme

Landscape criteria are assessed by looking at the site as a whole. It is necessary to do this from several vantage points on the site.

Soil quantity, soil quality and soil profiles are included as the complete soils assessment. No soils assessment is required on access roads and pads that are left in place. If there has been no soil disturbance (e.g., stripping, rutting or compaction) and landscape criteria are met, no soils assessment is required.

Sites Constructed Before April 30, 1994: Soils assessments will be conducted on those areas of the lease (e.g., teardrop, access, tanks, graded areas) and the access road that have been disturbed for the purposes of reclamation. On those areas of the site previously reclaimed that have self-sustaining vegetation at least three years old and

meet the vegetation criteria, no soils assessment is required. **This must be documented in the Detailed Site Assessment Report.**

Sites Constructed After April 30, 1994: Soils assessments must be done on the entire site.

Vegetation parameters must be assessed at each assessment location and the data recorded in the Detailed Site Assessment Report.

2.2.1 Lease

Sites Constructed Before April 30, 1994: On those areas that require assessment, assess enough locations (a minimum of five) to adequately describe these areas.

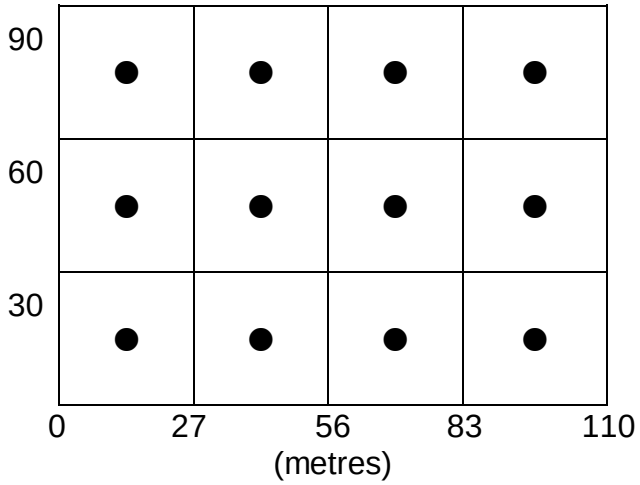
Sites Constructed After April 30, 1994: Quantity and quality of replaced surface soil will be assessed on an approximate 30 m x 30 m assessment grid, edges of which match up to the lease boundaries or the disturbed area. See Figure 1.

- The assessment grid should be adjusted to evenly cover the entire lease. The 30 m x 30 m grid size is approximate. Grid size needs to be adjusted to account for odd size leases. For a standard 30 m x 30 m grid, the largest size your grid should be is 34 m and the smallest is 26 m. For example:
  - If the lease edge is 84 m, then you should use 3 grids, each 28 m wide.
  - If the lease edge is 114 m, then you should use 4 grids each 33 m wide.

  Much bigger leases may require more sets of grids.
  On much smaller leases (e.g., 40 m x 60 m), you still use an approximately 30 m x 30 m grid for sampling. The Tolerance criteria still apply even though there are fewer grids being assessed. Landowners may question why a greater percentage of the disturbed area is below the target criteria. The landowner should consider that there is less overall disturbance to his land than if the operator had built a lease of normal size. Credit needs to be given to operators who attempt to minimize disturbance.
- The assessment location will be in the middle of each grid for all grids.
- Adjust the assessment locations from the middle of the grid to include the following five locations if known: well centre, sump, flare pit, tank storage area and entrance to lease.
- When an anomaly is encountered within a grid, the operator may opt to conduct a 'step-out' assessment to determine if it is representative of the whole grid or not. A step-out consists of assessing a minimum of an additional 3 locations. These additional locations will be 3 m from the original location in a triangular shape around it. The average of these three locations is reported for those parameters where numbers are provided (e.g., soil depth). The original location data are not reported. **Document that the information reported is the result of a step-out.**

- The CRI may not reassess all the locations; instead, spot checks will be done and the CRI will conduct step-out assessments to confirm deficiencies.

Figure 1. Assessment Locations Within an Approximate 30 m x 30 m Assessment Grid. Note the grid size along the bottom as an example of adjusting the grid to fit the lease. Soils and vegetation data are collected at each location (shown by the dot).



A **minimum** of four control sites (one on each side of the disturbed area) must be assessed to provide comparisons for the disturbed area. **Experience in 1994 showed that four control sites often did not adequately represent the natural variability in the undisturbed soils.** Where control site characteristics vary significantly, the operator may use relevant controls to represent portions of the site.

If the following five locations are known: well centre, sump, flare pit, tank storage area and entrance to lease, then soil profile assessments will be conducted at these five. If these five locations are not known, then soil profile assessments will be conducted at every second assessment location (minimum of five locations).

2.2.2 Access

Quantity and quality of replaced surface soil will be assessed on a paired (one off-site control and one on-site) sample basis.

- For roads >100 m in length: one paired assessment will be taken at 100 m intervals.
- For roads <100 m in length: a minimum of 2 paired assessment locations.

If topography is variable, more assessment locations should be used.

One full soil profile assessment will be conducted at every second assessment location. Sample both the road and the control. Adjust the sample locations so the road approach and side hill cut areas are included.

2.3 Landscape

Landscape criteria will be assessed by comparing the site with the pre-disturbance conditions or 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.

Drainage	Site drainage should be consistent with the original patterns, directions and capacity or be compatible with the surrounding landscape. Facilities or features left in place (e.g., clay pads) may not negatively impact drainage.
Erosion	No more erosion 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.
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) 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.
Vegetation	Plants should be healthy and suitable for the site. Characteristics to look for are vigour, height, colour, disease and crop quality.
Bare Areas	Number and size of bare areas should not be greater than original or control vegetation.

2.4 Surface Soil Quantity, Distribution and Quality

2.4.1 Quantity of Replaced Surface Soil

The required replacement depth (RRD) is:

- For sites constructed after April 30, 1994; 80% of control if the control surface soil is ≥15 cm.
  If the control surface soil is <15 cm, salvage and replace as evenly as possible all available surface soil. Provide soil depth data.
- For sites constructed before April 30, 1994; 60% of control.
  If there is not enough available surface soil to meet this then replace as evenly as possible all that is available. The soil profile assessment must pass.
- Thus RRD = Control depth x 0.8 or 0.6

2.4.1.1 Lease

The average replaced surface soil depth is the 'mean' or overall average of all the assessment locations on the lease and must be equal to or greater than the required replacement depth (RRD).

These criteria apply to sites constructed after April 30, 1994, and to those portions of sites that have been recently disturbed (i.e., that have vegetation less than three years old).

The replaced soil should be distributed uniformly across the lease. The average replaced depth should not be achieved through averaging very high and very low soil depth values. Therefore, the soil depth values at each assessment location must be at least 80% of the RRD.

Thus minimum replaced depth (MRD) = RRD x 0.8.

Refer to Table 2 to determine the appropriate MRD for the site. A distribution tolerance may allow up to two grids to have lower surface soil replacement depths (see Section 2.4.3). The average replaced soil depth must still be equal to or greater than the RRD.

Controls can be averaged to determine 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 Detailed Site Assessment Report.** If controls are highly variable and the MRD can't be achieved, the operator may qualify results based on control variability.

The MRD does not apply where control surface soils are <15 cm, however all available surface soil must be replaced as evenly as possible across the site.

2.4.1.2 Access

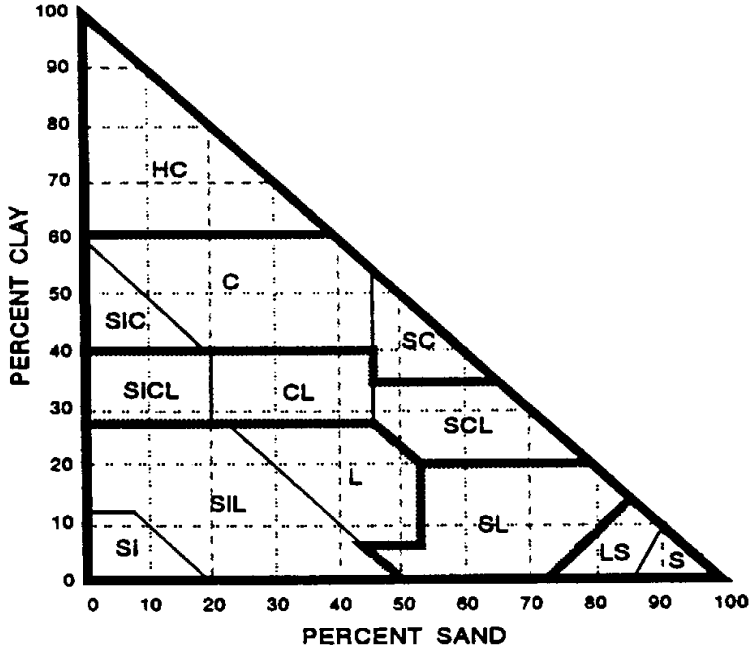
Access road soil depths are assessed on a paired basis by comparing the assessment location depth to the control depth. If the assessment location depth is equal to or greater than the MRD the location passes.

2.4.2 Quality of Replaced Surface Soil

These criteria apply to sites constructed after April 30, 1994, and to those portions of sites that have been recently disturbed (i.e., that have vegetation less than three years old).

Surface soil quality will be assessed at each assessment location on the actual replaced surface soil, regardless of the depth.

When compared side by side with representative control samples from similar depths under similar light and moisture conditions, the assessment location samples must be in the same class as the controls as defined below. Improvements in the soil quality class are acceptable, but these must be justified in the Detailed Site Assessment Report.

Texture	Remain in the same texture class (within the dark lines).  **Texture Class Triangle**

Soil Aggregate Size	Classes: <2 cm; 2 cm to 5 cm; and >5 cm to 10 cm. Remain in the same class. No soil aggregates greater than 10 cm are allowed unless similar size soil aggregates are present in the control soil.
Soil Aggregate Strength	Classes: friable, firm, hard. Remain in the same class.
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% is allowed.

Each of the parameters is assessed at each assessment location. The assessment location passes only when all the criteria are met. A quality tolerance may allow up to two grids to drop one soil quality class (see Section 2.4.3).

When there is more than one horizon mixed to make up the salvaged soil the control for the quality comparison must be a mix of salvaged soil horizons.

When most or all of the surface soil depth is made up through the use of amendments, some of the surface soil quality criteria may be waived.

2.4.3 Distribution and Quality Tolerance

The criteria for quantity and quality reflect the desired outcome for soil replacement. In recognition of the capabilities of soil moving equipment, and the size of an area that could be fixed if a problem were identified, the following variability is allowed.

For sites with original surface soil ≥15 cm deep, a total of two grids may vary from the desired outcome (see example). Each of the two grids may:

- have a replaced surface soil depth between 40% and 80% of the RRD (refer to Table 2 for the appropriate distribution tolerance); **or**
- drop one soil quality class; **or**
- have both a replaced surface soil depth between 40% and 80% of RRD (refer to Table 2 for the appropriate distribution tolerance) and drop one soil quality class.

Since sites with original surface soil <15 cm do not have an MRD, two grids may drop one quality class.

Quantity, Distribution and Tolerance Example

If average control depth = 17 cm for a site constructed in 1995:

Quantity

Required replacement depth (RRD) from Table 2 = 14 cm. If the average replaced depth = 16 cm, the site passes the depth criteria (must be at least RRD).

Distribution

The MRD from Table 2 is 11 cm. Therefore if all of the soil depth measurements are greater than or equal to 11 cm, the site passes.

Tolerance

For the site constructed **any one** of the following variations would be acceptable:

Two grids may have a replaced surface soil depth between 6 cm and 11 cm (from Table 2 Tolerance Distribution column) with no grids dropping one quality class; **or**

One grid may have a replaced surface soil depth between 6 cm and 11 cm (from Table 2) and one other grid may drop one quality class; **or**

All grids may be above the desired distribution tolerance and two grids may drop one soil quality class; **or**

Two grids may have a replaced surface soil depth between 6 cm and 11 cm (from Table 2) and the same two grids may drop one quality class (i.e., only two grids in total are affected).

Neither of the two grids may be adjacent to each other (side by side). Adjacent grids are of sufficient size to warrant remediating the problem.

2.4.4 Loss of Organic Matter Content

The loss of organic matter is to be measured by the % admixing of non-surface soil in the replaced surface soil. This parameter is used as a 'flag' of potential problem soils, not as a criteria.

Report the control class and the % admixing class at each assessment location. Note that the control may be 'admixed' (i.e., a mixture of soil layers). % Admixing Classes are: 0 to 10%, >10% to 20%, >20% to 30%, >30% to 40%, >40% to 50%, and >50%.

Targets for % admixing of non-surface soil component:

- Sites constructed after April 30, 1994: Less than 30% difference in non-surface soil in the sample (i.e., sample minus control).
- Sites constructed from 1983 to April 30, 1994: Less than 40% difference in non-surface soil in the sample.
- Sites constructed before 1983: Record % admixing class.

For those sites where the dominant (most common) % admixing class does not meet the target, vegetation must be present at the time of industry's assessment. The CRI will prioritize these sites for timing of the inquiry. The CRI has the discretion to delay his or her visit from the year of industry assessment to the next growing season. It is to the operator's advantage to ensure vegetation is not negatively affected on these sites.

2.5 Soil Profile Assessment

These criteria apply to sites constructed after April 30, 1994, and to those portions of sites that have been recently disturbed (i.e., that have vegetation less than three years old).

Surface soil plus an additional 20 cm below it will be assessed to a maximum total depth of 50 cm. In the assessment depth, process restriction parameters will be documented at least as either 'restrictive' or 'non-restrictive' in the soil profile as compared to the control.

The process restriction parameters are:

- Water permeability
- Vertical root elongation
- Soil aeration

See Table 1 for more details on assessing process restrictions. **Since root elongation is being assessed, the soil profile assessment should be done at the same time as the vegetation assessment.**

Table 1. Some Commonly Observed Indicators of Root, Permeability and Aeration Restrictions.

Vertical Root Elongation Restriction Indicators

- Presence of root mats and bunches
- Presence of flattened and highly branched roots
- Presence of horizontal roots
- Presence of exped 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

Water Permeability Restriction Indicators

- 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

Soil Aeration Restriction Indicators

- 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

Use common sense to identify restrictive vs. non-restrictive. Document the results of the profile assessment in the Detailed Site Assessment Report and discuss on-site with the CRI at the inquiry.

2.6 Vegetation

Vegetation must be present at the time of industry assessment and the inquiry unless otherwise directed by the CRI.

No special management practices (e.g., not consistent with those on the control) are allowed on the disturbed area that would affect the vegetation results. Fertilizer applications will be considered consistent with the control if:

- the site was fertilized by the landowner as part of his normal management practice; or

- the operator fertilizes the site to bring it up to the same nutrient levels as the control soils based on lab fertility analyses.

On public lands, it is expected that native species will not be fertilized unless the CRI gives approval. Fertilizer use must be documented in the Detailed Site Assessment Report.

A vegetation assessment is not required on access roads or pads left in place. If the roads or pads have had soil replaced, or have been amended, and have been seeded, the vegetation component of the landscape criteria will apply.

For sites constructed before 1983, landscape criteria must pass, however vegetation criteria may be waived by the CRI.

2.6.1 Length of Time Prior to Industry Assessment

Generally expect one full growing season including an over wintering period and a minimum of twelve months from time of seeding on sites without fertilizer. On sites that have been fertilized, generally expect two years from the time of fertilizer addition.

2.6.2 Criteria

At each assessment location, the operator will document the following parameters where applicable. **These assessments is based on a visual comparison between the grid vegetation and the control.**

Species Composition	Revegetation species and species composition should be compatible with original or control vegetation or meet reasonable land management objectives.
Density	≥80% of control.
Height	≥80% of control.
Health	Plants should be healthy. Characteristics to look for are vigour, height, colour, disease and vegetation quality.

Cover	Where the control vegetation is similar, ≥80% of control. If the control vegetation has <40% cover, the site should be 100% of control. Where there is no control vegetation, or the control vegetation is different, ≥80% cover unless otherwise authorized by the CRI in writing. Litter can be included in the cover assessment, however cannot contribute more than the amount on the control. Amendment materials (e.g., straw) are not included as litter in the calculation for cover. The required cover must be evenly distributed on the site or be similar to the distribution on the control.

TABLE 2: SURFACE SOIL QUANTITY CHART FOR GRASSLANDS

Control (cm)	80% of Control (cm)				60% of Control (cm)			
Depth	RRD	MRD	Distribution Tolerance		RRD	MRD	Distribution Tolerance	
15	12	10	5	10	9	7	4	7
16	13	10	5	10	10	8	4	8
17	14	11	6	11	10	8	4	8
18	14	11	6	11	11	9	4	9
19	15	12	6	12	11	9	4	9
20	16	13	6	13	12	10	5	10
21	17	14	7	14	13	10	5	10
22	18	14	7	14	13	10	5	10
23	18	14	7	14	14	11	6	11
24	19	15	8	15	14	11	6	11
25	20	16	8	16	15	12	6	12
26	21	17	8	17	16	13	6	13
27	22	18	9	18	16	13	6	13
28	22	18	9	18	17	14	7	14
29	23	18	9	18	17	14	7	14
30	24	19	10	19	18	14	7	14
31	25	20	10	20	19	15	8	15
32	26	21	10	21	19	15	8	15
33	26	21	10	21	20	16	8	16
34	27	22	11	22	20	16	8	16
35	28	22	11	22	21	17	8	17
36	29	23	12	23	22	18	9	18
37	30	24	12	24	22	18	9	18
38	30	24	12	24	23	18	9	18
39	31	25	12	25	23	18	9	18
40	32	26	13	26	24	19	10	19
41	33	26	13	26	25	20	10	20
42	34	27	14	27	25	20	10	20
43	34	27	14	27	26	21	10	21
44	35	28	14	28	26	21	10	21
45	36	29	14	29	27	22	11	22
46	37	30	15	30	28	22	11	22
47	38	30	15	30	28	22	11	22

Control (cm)	80% of Control (cm)				60% of Control (cm)			
Depth	RRD	MRD	Distribution Tolerance		RRD	MRD	Distribution Tolerance	
48	38	30	15	30	29	23	12	23
49	39	31	16	31	29	23	12	23
50	40	32	16	32	30	24	12	24
51	41	33	16	33	31	25	12	25
52	42	34	17	34	31	25	12	25
53	42	34	17	34	32	26	13	26
54	43	34	17	34	32	26	13	26
55	44	35	18	35	33	26	13	26
56	45	36	18	36	34	27	14	27
57	46	37	18	37	34	27	14	27
58	46	37	18	37	35	28	14	28
59	47	38	19	38	35	28	14	28
60	48	38	19	38	36	29	14	29
61	49	39	20	39	37	30	15	30
62	50	40	20	40	37	30	15	30
63	50	40	20	40	38	30	15	30
64	51	41	20	41	38	30	15	30
65	52	42	21	42	39	31	16	31
66	53	42	21	42	40	32	16	32
67	54	43	22	43	40	32	16	32
68	54	43	22	43	41	33	16	33
69	55	44	22	44	41	33	16	33
70	56	45	22	45	42	34	17	34

RRD = Required Replacement Depth
= Control x 0.8 for sites constructed after April 30, 1994 or
= Control x 0.6 for sites constructed before April 30, 1994

Average Replaced Depth is calculated by summing the soil depths at each assessment location and dividing by the number of assessment locations. The average is compared to the RRD.

MRD = Minimum Replacement Depth = RRD x 0.8

Distribution Tolerance = RRD x 0.4 or RRD x 0.8

3. CERTIFICATION CRITERIA - FORESTED LANDS IN THE WHITE AREA

Forested Lands in the White Area include a mixture of private and public land. Some of these lands have potential for cultivation. Forested lands may also have potential for multiple use.

Some forested lands have severe limitations (e.g., soils, topography, access) that will make cultivation unlikely. In these cases, the operator may default to Grasslands criteria or may, with the prior written approval of the Conservation and Reclamation Inspector (CRI), default to the Forested Lands in the Green Area criteria. The operator must provide the following information, where appropriate, to support the selection of an alternate land use criteria:

- Topography relative to adjacent developed land: less steep, same, steeper; types of slopes (long/short, simple/complex);
- Current forest type;
- Adjacent land use: distance to cultivated land, grassland, Green Area boundary;
- Access: distance; topography; water issues;
- Soils: depth (Ah, Ahe, Ae); subsoil texture; stoniness;
- Climate class;
- Agricultural capability class;

Any changes to the criteria must be documented on the Wellsite Reclamation Certificate Application - 1995 Update form. Unless the default to Grasslands criteria is agreed to by the CRI in advance, the operator must attend the inquiry. If, at the inquiry, the CRI cannot accept the default and justification, the application may be cancelled after consultation with the operator.

The criteria typically require landscape, soils and vegetation assessments. For well-vegetated older sites (i.e., those sites that have well established vegetation at least three years old), portions of the landscape and soils criteria may be waived by the CRI.

3.1 Surface Soil Definition

Surface soil is defined as the uppermost mineral/organic material, valued as a growing medium and salvaged.

Salvage duff (LFH) plus Ah, Ahe and up to 15 cm of Ae horizon. If A horizon(s) are <15 cm, then a minimum of 15 cm of material will be salvaged unless the material is unsuitable (e.g., Bnt, bedrock, gravel, rock). **This must be documented in the Detailed Site Assessment Report.**

3.2 Site Assessment Scheme

Landscape criteria are assessed by looking at the site as a whole. It is necessary to do this from several vantage points on the site.

Soil quantity, soil quality and soil profiles are included as the complete soils assessment. No soils assessment is required on access roads and pads that are left in place.

If there has been no soil disturbance (e.g., stripping, rutting or compaction) and landscape criteria are met, no soils assessment is required.

Vegetation parameters must be assessed at each assessment location and the data recorded in the Detailed Site Assessment Report.

3.2.1 Lease

Quantity and quality of replaced surface soil will be assessed on an approximate 20 m x 20 m assessment grid, edges of which match up to the lease boundaries or the disturbed area. See Figure 1.

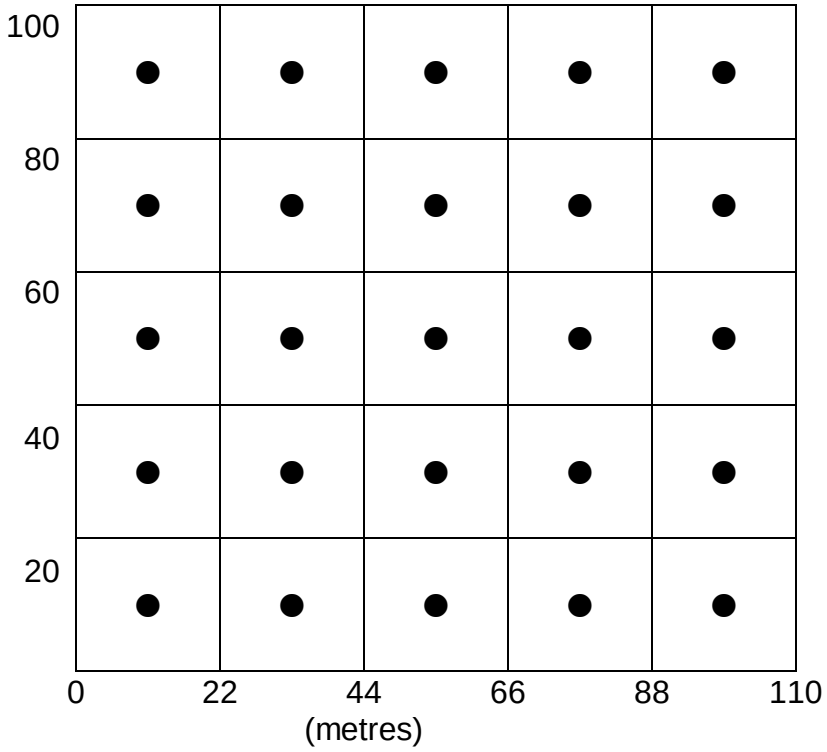
- The assessment grid should be adjusted to evenly cover the entire lease. The 20 m x 20 m grid size is approximate. Grid size needs to be adjusted to account for odd size leases. For a standard 20 m x 20 m grid, the largest size your grid should be is 22 m and the smallest is 18 m. For example:
  - If the lease edge is 88 m, then you should use 4 grids, each 22 m wide.
  - If the lease edge is 114 m, then you should use 6 grids, each 19 m wide.

  Much bigger leases may require 7 or more sets of grids.
  On much smaller leases (e.g., 40 m x 60 m), you still use an approximately 20 m x 20 m grid for sampling. The Tolerance criteria still apply even though there are fewer grids being assessed. Landowners may question why a greater percentage of the disturbed area is below the target criteria. The landowner should consider that there is less overall disturbance to his land than if the operator had built a lease of normal size. Credit needs to be given to operators who attempt to minimize disturbance.
- The assessment location will be in the middle of each grid for all grids.
- Adjust the assessment locations from the middle of the grid to include the following five locations if known: well centre, sump, flare pit, tank storage area and entrance to lease.
- When an anomaly is encountered within a grid, the operator may opt to conduct a 'step-out' assessment to determine if it is representative of the whole grid or not. A step-out consists of assessing a minimum of an additional 3 locations. These additional locations will be 3 m from the original location in a triangular shape around it. The average of these three locations is reported for those parameters where numbers are provided (e.g., soil depth). The original location

data are not reported. **Document that the information reported is the result of a step-out.**

- The CRI may not reassess all the locations; instead, spot checks will be done and the CRI will conduct step-out assessments to confirm deficiencies.

Figure 1. Assessment Locations Within an Approximate 20 m x 20 m Assessment Grid. Note the grid size along the bottom as an example of adjusting the grid to fit the lease. Soils and vegetation data are collected at each location (shown by the dot).



A **minimum** of four control sites (one on each side of the disturbed area) must be assessed to provide comparisons for the disturbed area. **Experience in 1994 showed that four control sites often did not adequately represent the natural variability in the undisturbed soils.** Where control site characteristics vary significantly, the operator may use relevant controls to represent portions of the site. Do not include duff (LFH) in control depth.

If the following five locations are known: well centre, sump, flare pit, tank storage area and entrance to lease, then soil profile assessments will be conducted at these five PLUS a minimum of four additional random locations. If these five locations are not known, then soil profile assessments will be conducted at every second assessment location.

3.2.2 Access

Quantity and quality of replaced surface soil will be assessed on a paired (one off-site control and one on-site) sample basis.

- For roads >100 m in length: one paired assessment will be taken at 100 m intervals.
- For roads <100 m in length: a minimum of 2 paired assessment locations. If topography is variable, more assessment locations should be used.

One full soil profile assessment will be conducted at every second assessment location. Sample both the road and the control. Adjust the assessment locations so the road approach and side hill cut areas are included.

3.3 Landscape

Landscape criteria will be assessed by comparing the site with the pre-disturbance conditions or 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.

Drainage	Site drainage should be consistent with the original patterns, directions and capacity or be compatible with the surrounding landscape. Facilities or features left in place (e.g., clay pads) may not negatively impact drainage.
Erosion	No more erosion 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.
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) 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 unless otherwise specified in the approved surface disposition on public lands.
Vegetation	Plants should be healthy and suitable for the site. Characteristics to look for are vigour, height, colour, disease and crop quality.
Bare Areas	Number and size of bare areas should not be greater than original or control vegetation.

3.4 Surface Soil Quantity, Distribution and Quality

3.4.1 Quantity of Replaced Surface Soil

The required replacement depth (RRD) is:

- 80% of control for sites constructed after April 30, 1994; or
- 60% of control for sites constructed from 1983 to April 30, 1994; or
- 60% of control for sites constructed before 1983.
  If there is not enough available surface soil to meet this then replace as evenly as possible all that is available. Soil must be suitably amended so it is not an obstacle to normal farming methods practiced (i.e., same implements and timing of operations). A Management Plan should be put together involving the operator, landowner and the CRI. See Section 7 for more information on the expected content of a Management Plan.

Thus RRD = Control depth x 0.8 or 0.6

3.4.1.1 Lease

The average replaced surface soil depth is the 'mean' or overall average of all the assessment locations (the lease and access roads are assessed separately) and must be equal to or greater than the required replacement depth (RRD).

The replaced soil should be distributed uniformly across the lease. The average replaced depth should not be achieved through averaging very high and very low soil

depth values. Therefore, the soil depth values at each assessment location must be at least 80% of the RRD.

Thus minimum replaced depth (MRD) = RRD x 0.8.

Refer to Table 2 to determine the appropriate MRD for the site. A distribution tolerance may allow up to three grids to have lower surface soil replacement depths (see Section 3.4.3). The average replaced soil depth must still be equal to or greater than the RRD.

Controls can be averaged to determine 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 Detailed Site Assessment Report.** If controls are highly variable and the MRD can't be achieved, the operator may qualify results based on control variability.

The MRD does not apply where control surface soils are <15 cm, however all available surface soil must be replaced as evenly as possible across the site.

3.4.1.2 Access

Access road soil depths are assessed on a paired basis by comparing the assessment location depth to the control depth. If the assessment location depth is equal to or greater than the MRD the location passes.

3.4.2 Quality of Replaced Surface Soil

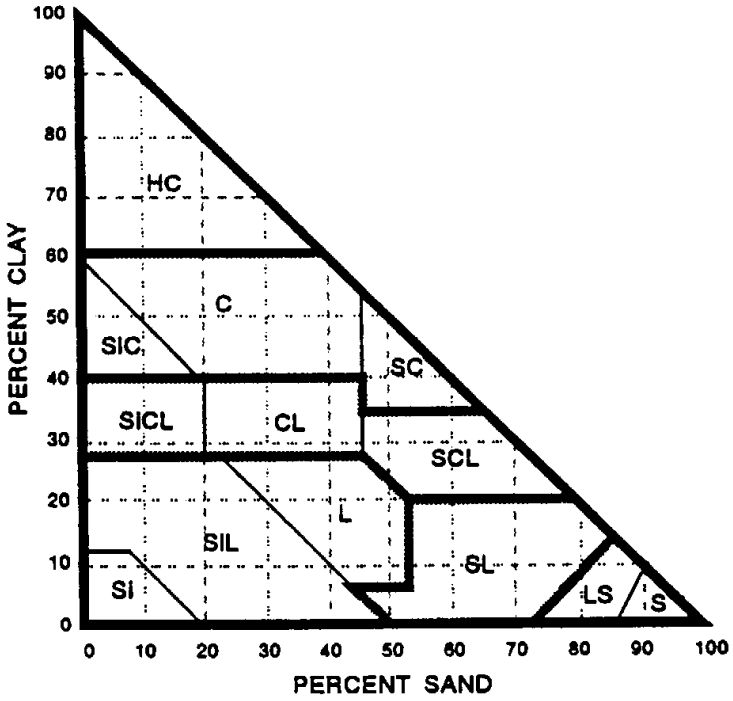
Surface soil quality will be assessed at each assessment location on the actual replaced surface soil, regardless of depth.

When compared side by side with representative control samples from similar depths under similar light and moisture conditions, the assessment location samples must be in the same class as the controls as defined below. Improvements in the soil quality class are acceptable but these must be justified in the Detailed Site Assessment Report.

Each of the parameters is assessed at each assessment location. The assessment location passes only when all the criteria are met. A quality tolerance may allow up to three grids to drop one soil quality class (see Section 3.4.3).

When there is more than one horizon mixed to make up the salvaged soil the control for the quality comparison must be a mix of salvaged soil horizons.

When most or all of the surface soil depth is made up through the use of amendments, or is the result of a Management Plan for sites constructed before 1983, then some of the surface soil quality criteria may be waived.

Texture	Remain in the same texture class (within the dark lines).  **Texture Class Triangle**
Soil Aggregate Size	Classes: <2 cm; 2 cm to 5 cm; and >5 cm to 10 cm. Remain in the same class. No soil aggregates greater than 10 cm are allowed unless similar size soil aggregates are present in the control soil.
Soil Aggregate Strength	Classes: friable, firm, hard. Remain in the same class.
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% is allowed.

3.4.3 Distribution and Quality Tolerance

The criteria for quantity and quality reflect the desired outcome for soil replacement. In recognition of the capabilities of soil moving equipment, and the size of an area that could be fixed if a problem were identified, the following tolerance is allowed **(Note that the tolerance is different than for Cultivated Lands)**.

For sites with original surface soil ≥15 cm deep, a total of six grids may vary from the desired outcome (see example):

- up to three grids may have a replaced surface soil depth between 40% and 80% of the RRD (refer to Table 2 for the appropriate Distribution Tolerance range); **and**
- up to three grids may drop one soil quality class.

Quantity, Distribution and Tolerance Example

If average control depth = 23 cm for a site constructed in 1995:

Quantity

Required replacement depth (RRD) from Table 2 = 18 cm. If the average replaced depth = 20 cm, the site passes the depth criteria (must be at least RRD).

Distribution

The MRD from Table 2 =14 cm. Therefore if all of the soil depth measurements are greater than or equal to 14 cm, the site passes.

Tolerance

For the site **any of the following variations** would be acceptable:

Three grids may have a replaced surface soil depth between 7 cm and 14 cm (from Table 2 Tolerance Distribution column) with no grids dropping one quality class; **or**

All grids may be above the MRD and three grids may drop one quality class; **or**

Three grids may have a replaced surface soil depth between 7 cm and 14 cm (from Table 2) and three **other** grids may drop one quality class (i.e., a total of 6 grids may have one or the other tolerance); **or**

Two grids may have a replaced surface soil depth between 7 cm and 14 cm (from Table 2) and two **other** grids may drop one quality class, and one **other** grid may have both a replaced surface soil depth between 7 cm and 14 cm (from Table 2) and **drop** one quality class (i.e., a total of 6 grids may have one or the other tolerance).

If a grid has both a replaced surface soil depth between 40% and 80% of RRD (refer to Table 2 for the appropriate Distribution Tolerance range) and drops one soil quality class then the grid counts as one depth grid and one quality grid.

Since sites with original surface soil <15 cm do not have an MRD, three grids may drop one quality class.

None of the three depth grids may be adjacent to each other (side by side) nor can the three quality grids be adjacent to each other. Adjacent grids are of sufficient size to warrant remediating the problem.

3.4.4 Loss of Organic Matter Content

The loss of organic matter is to be measured by the % admixing of non-surface soil in the replaced surface soil. This parameter is used as a 'flag' of potential problem soils, not as a criteria.

Report the control class and the % admixing class at each assessment location. Note that the control may be 'admixed' (i.e., a mixture of soil layers). % Admixing Classes are: 0 to 10%, >10% to 20%, >20% to 30%, >30% to 40%, >40% to 50%, and >50%.

Targets for % admixing of non-surface soil component:

- Sites constructed after April 30, 1994: Less than 30% difference in non-surface soil in the sample (i.e., sample minus control).
- Sites constructed from 1983 to 1994: Less than 40% difference in non-surface soil in the sample.
- Sites constructed before 1983: Record % admixing class.

For those sites where the dominant (most common) % admixing class does not meet the target, vegetation (fully mature crop) must be present at the time of industry's assessment. The CRI will prioritize these sites for timing of the inquiry. The CRI has the discretion to delay his or her visit from the year of industry assessment to the next growing season with available crop. It is to the operator's advantage to ensure vegetation is not negatively affected on these sites.

3.5 Soil Profile Assessment

Surface soil plus an additional 20 cm below it will be assessed to a maximum total depth of 50 cm. In the assessment depth a process restriction estimate will be documented at least as either 'restrictive' or 'non-restrictive' in the soil profile as compared to the control.

The process restriction parameters are:

- Water permeability.
- Vertical root elongation.
- Soil aeration.

See Table 1 for more details on assessing process restrictions. **Since root elongation is being assessed, the soil profile assessment should be done at the same time as the vegetation assessment.**

Use common sense to identify restrictive vs. non-restrictive. Document the results of the profile assessment in the Detailed Site Assessment Report and discuss on-site with the CRI at the inquiry.

Table 1 Some Commonly Observed Indicators of Root, Permeability and Aeration Restrictions.

Vertical Root Elongation Restriction Indicators

- Presence of root mats and bunches
- Presence of flattened and highly branched roots
- Presence of horizontal roots
- Presence of exped 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

Water Permeability Restriction Indicators

- 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

Soil Aeration Restriction Indicators

- 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

3.6 Vegetation

Vegetation must be present at time of the industry assessment and the inquiry.
No special management practices (e.g., not consistent with those on the control) are allowed on the disturbed area that would affect the vegetation results. Fertilizer applications will be considered consistent with the control if:

- the site was fertilized by the landowner as part of his normal management practice; or
- the operator fertilizes the site to bring it up to the same nutrient levels as the control soils based on lab fertility analyses.

Fertilizer use must be documented in the Detailed Site Assessment Report.

A vegetation assessment is not required on access roads or pads left in place. If the roads or pads have had soil replaced, or have been amended, and have been seeded, the vegetation component of the landscape criteria will apply.

3.6.1 Length of Time Prior to Industry Assessment

Generally expect one full growing season including an over wintering period and a minimum of twelve months from time of seeding on sites without fertilizer. On sites that have been fertilized, generally expect two years from the time of fertilizer addition.

3.6.2 Criteria

At each assessment location, the operator will document the following parameters where applicable. **These assessments are based on a visual comparison between grid vegetation and the control.**

Species Composition	Revegetation species and species composition should be compatible with original or control vegetation or meet reasonable land management objectives.
Density	≥80% of control.
Height	≥80% of control.
Health	Plants should be healthy. Characteristics to look for are vigour, height, colour, disease and vegetation quality.

Cover (does not apply to annual crops)	Where the control vegetation is similar, ≥80% of control. If the control vegetation has <40% cover, the site should be 100% of control. Where there is no control vegetation or the control vegetation is different, ≥80% cover unless otherwise authorized by the CRI in writing. Litter can be included in the cover assessment, however cannot contribute more than the amount on the control. Amendment materials (e.g., straw) are not included as litter in the calculation for cover. The required cover must be evenly distributed on the site or be similar to the distribution on the control.

TABLE 2: SURFACE SOIL QUANTITY CHART FOR FORESTED LANDS IN THE WHITE AREA

Control (cm)	80% of Control (cm)				60% of Control (cm)			
Depth	RRD	MRD	Distribution Tolerance		RRD	MRD	Distribution Tolerance	
15	12	10	5	10	9	7	4	7
16	13	10	5	10	10	8	4	8
17	14	11	6	11	10	8	4	8
18	14	11	6	11	11	9	4	9
19	15	12	6	12	11	9	4	9
20	16	13	6	13	12	10	5	10
21	17	14	7	14	13	10	5	10
22	18	14	7	14	13	10	5	10
23	18	14	7	14	14	11	6	11
24	19	15	8	15	14	11	6	11
25	20	16	8	16	15	12	6	12
26	21	17	8	17	16	13	6	13
27	22	18	9	18	16	13	6	13
28	22	18	9	18	17	14	7	14
29	23	18	9	18	17	14	7	14
30	24	19	10	19	18	14	7	14
31	25	20	10	20	19	15	8	15
32	26	21	10	21	19	15	8	15
33	26	21	10	21	20	16	8	16
34	27	22	11	22	20	16	8	16
35	28	22	11	22	21	17	8	17
36	29	23	12	23	22	18	9	18
37	30	24	12	24	22	18	9	18
38	30	24	12	24	23	18	9	18
39	31	25	12	25	23	18	9	18
40	32	26	13	26	24	19	10	19
41	33	26	13	26	25	20	10	20
42	34	27	14	27	25	20	10	20
43	34	27	14	27	26	21	10	21
44	35	28	14	28	26	21	10	21
45	36	29	14	29	27	22	11	22
46	37	30	15	30	28	22	11	22

Control (cm)	80% of Control (cm)				60% of Control (cm)			
Depth	RRD	MRD	Distribution Tolerance		RRD	MRD	Distribution Tolerance	
47	38	30	15	30	28	22	11	22
48	38	30	15	30	29	23	12	23
49	39	31	16	31	29	23	12	23
50	40	32	16	32	30	24	12	24
51	41	33	16	33	31	25	12	25
52	42	34	17	34	31	25	12	25
53	42	34	17	34	32	26	13	26
54	43	34	17	34	32	26	13	26
55	44	35	18	35	33	26	13	26
56	45	36	18	36	34	27	14	27
57	46	37	18	37	34	27	14	27
58	46	37	18	37	35	28	14	28
59	47	38	19	38	35	28	14	28
60	48	38	19	38	36	29	14	29
61	49	39	20	39	37	30	15	30
62	50	40	20	40	37	30	15	30
63	50	40	20	40	38	30	15	30
64	51	41	20	41	38	30	15	30
65	52	42	21	42	39	31	16	31
66	53	42	21	42	40	32	16	32
67	54	43	22	43	40	32	16	32
68	54	43	22	43	41	33	16	33
69	55	44	22	44	41	33	16	33
70	56	45	22	45	42	34	17	34

RRD = Required Replacement Depth
= Control x 0.8 for sites constructed after April 30, 1994 or
= Control x 0.6 for sites constructed before April 30, 1994

Average Replaced Depth is calculated by summing the soil depths at each assessment location and dividing by the number of assessment locations. The average is compared to the RRD.

MRD = Minimum Replacement Depth
= RRD x 0.8

Distribution Tolerance = RRD x 0.4 or RRD x 0.8

4. CERTIFICATION CRITERIA - FORESTED LANDS IN THE GREEN AREA

These criteria apply to treed (bush) lands in the Green Area. The criteria will require landscape and vegetation assessments. Native meadows or range improvement areas in grazing dispositions may be assessed using the Grassland criteria; the operator should confirm the appropriate criteria with the Conservation and Reclamation Inspector (CRI).

Minimal or low impact methods of construction are recommended where practical. The use of native species for revegetation is encouraged. The operator should confirm the appropriate species with the CRI.

4.1 Surface Soil Definition

Surface soil is defined as the uppermost mineral/organic material, valued as a growing medium.

Salvage a minimum of duff (LFH) plus 15 cm mineral soil unless the mineral soil is unsuitable (e.g., Bnt, bedrock, gravel, rock). **This must be documented on the Wellsite Reclamation Certificate Application form.**

4.2 Site Assessment Scheme

Landscape criteria are assessed by looking at the site as a whole. It is necessary to do this from several vantage points on the site.

No soils assessment is required for Forested Lands in the Green Area. The CRI may check for satisfactory soil replacement.

Vegetation is assessed from several vantage points on the site.

4.3 Landscape

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

4.3.1 Criteria

Drainage	Site drainage should be consistent with the original patterns, directions and capacity or compatible with the surrounding landscape. Facilities or features left in place (e.g., clay pads, roads) may not negatively impact drainage or adjacent forest growth.
Erosion	No more erosion 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.
Gravel and Rocks	May not be piled, windrowed or concentrated in one area. Meet requirements of the approved surface disposition on public lands.
Debris	No industrial or domestic debris allowed. Woody debris (roots, slash) 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 unless otherwise specified in the approved surface disposition on public lands.
Vegetation	Plants should be healthy and suitable for the site. Characteristics to look for are vigour, height, colour, disease and vegetation quality.
Bare Areas	Number and size of bare areas should not be greater than original or control vegetation.

4.4 Surface Soil Quantity

Salvage and replace all available surface soil as evenly as possible.

4.5 Surface Soil Quality

Does not apply to Forested Lands in the Green Area.

4.6 Soil Profile Assessment

Does not apply to Forested Lands in the Green Area.

4.7 Vegetation

Vegetation must be present at time of the industry assessment and the inquiry.

No special management practices (e.g., not consistent with those on the control) are allowed on the disturbed area that would affect the vegetation results. Fertilizer applications will be considered consistent with the control if:

- the site was fertilized by the landowner as part of his normal management practice; or
- the operator fertilizes the site to bring it up to the same nutrient levels as the control soils based on lab fertility analyses.

Fertilizer use must be documented in the Detailed Site Assessment Report.

A vegetation assessment is not required on access roads or pads left in place. If the roads or pads have had soil replaced, or have been amended, and have been seeded, the vegetation component of the landscape criteria will apply.

4.7.1 Length of Time Prior to Industry Assessment

Generally expect one full growing season including an over wintering period and a minimum of twelve months from time of seeding on sites without fertilizer. On sites that have been fertilized generally expect two years from the time of fertilizer addition.

4.7.2 Criteria

For the lease and access the operator will document species composition and cover. **These assessments are based on a visual comparison between lease or access vegetation and the control.**

Species Composition	Revegetation species and species composition should be compatible with original or control vegetation or meet reasonable land management objectives.
Cover	Where there is no control vegetation or the control vegetation is different, ≥80% cover of plants, litter and woody debris unless otherwise authorized by the CRI in writing.

5. CERTIFICATION CRITERIA - PEAT LANDS

The Peat Lands covered by these criteria may or may not be treed. The criteria apply only to those peat soils that have not been cultivated. All cultivated peat soils are dealt with under the Cultivated Land criteria.

5.1 Surface Soil Definition

Surface soil is defined as the uppermost organic material, valued as a growing medium.

- Deep Peat (>40 cm) - no salvage (pad will likely be constructed over the peat). If the land is potentially arable no salvage is required but pad removal may be required.
- Thin Peat (<40 cm) - salvage a minimum 15 cm depth. Salvage a maximum of 40 cm or to the mineral soil contact using conventional equipment (e.g., bulldozer not hoes).

Pads or roads may only be left in place with the landowner's approval.

5.2 Site Assessment Scheme

Landscape criteria are assessed by looking at the site as a whole. It is necessary to do this from several vantage points on the site.

No soils assessment is required on Peat Lands.

Vegetation is assessed from several vantage points on the site.

5.3 Landscape

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.

5.3.1 Criteria

Drainage	Site drainage should be consistent with the original patterns, directions and capacity or compatible with the surrounding landscape. Facilities or features left in place (e.g., clay pads, roads) may not negatively impact drainage or adjacent forest growth.
Erosion	No more erosion 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.
Gravel and Rocks	May not be piled, windrowed or concentrated in one area. Meet requirements of the approved surface disposition on public lands.
Debris	No industrial or domestic debris allowed. Woody debris (roots, slash) 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 unless otherwise specified in the approved surface disposition on public lands.
Vegetation	Plants should be healthy and suitable for the site. Characteristics to look for are vigour, height, colour, disease and vegetation quality.
Bare Areas	Number and size of bare areas should not be greater than original or control vegetation.

5.4 Surface Soil Quantity

If surface soil has been salvaged, replace what is available as evenly as possible across the site.

5.5 Surface Soil Quality

Does not apply to Peat Lands.

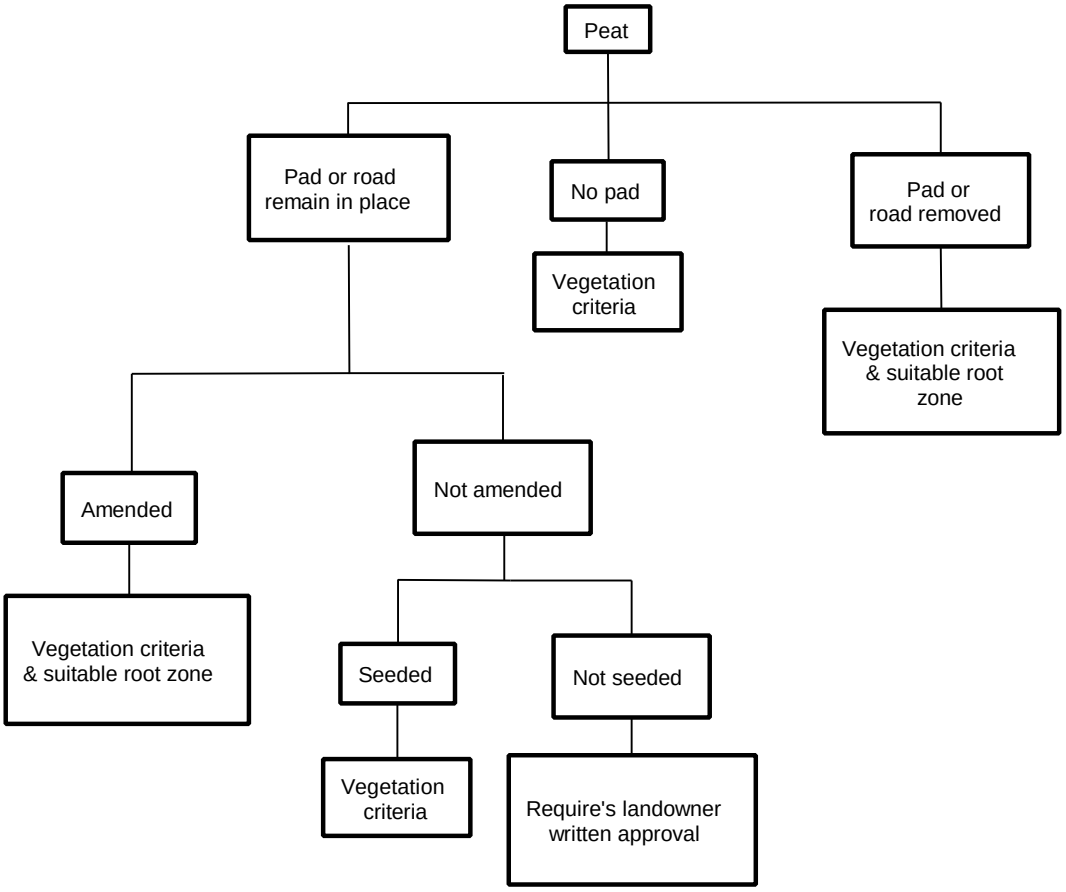
5.6 Soil Profile Assessment

Does not apply to Peat Lands.

5.7 Vegetation

Vegetation must be present at time of industry assessment and the inquiry. Figure 1 shows the relationship between road or pad removal and the criteria that will be applied.

FIGURE 1: RELATIONSHIP BETWEEN PAD CONSTRUCTION/REMOVAL AND CRITERIA



No special management practices (e.g., not consistent with those on the control) are allowed on the disturbed area that would affect the vegetation results. Fertilizer applications will be considered consistent with the control if:

- the site was fertilized by the landowner as part of his normal management practice; or
- the operator fertilizes the site to bring it up to the same nutrient levels as the control soils based on lab fertility analyses.

Fertilizer use must be documented in the Detailed Site Assessment Report.

5.7.1 Length of Time Prior to Industry Assessment

Generally expect one full growing season including an over-wintering period and a minimum of twelve months from time of seeding on sites without fertilizer. On sites that have been fertilized the assessment will be conducted two years after fertilizer addition.

5.7.2 Criteria

For the lease and access the operator will document species composition and cover. **These assessments are based on a visual comparison between lease or access vegetation and the control.**

Species Composition	Revegetation species and species composition should be compatible with original or control vegetation or meet reasonable land management objectives.
Cover	Where there is no control vegetation or the control vegetation is different, ≥80% cover of plants, litter and woody debris based on a visual assessment unless otherwise authorized by the Conservation and Reclamation Inspector in writing.

6. DETAILED SITE ASSESSMENT REPORT

The Detailed Site Assessment Report is a very important part of the application for a reclamation certificate. The report provides the Conservation and Reclamation Inspector (CRI) with a clear understanding of the results of the operator's site assessment. The report also provides the forum for the operator to justify why the site should receive a reclamation certificate even though the criteria may not have been met.

Failure to include a Detailed Site Assessment Report with the *Wellsite Reclamation Certificate Application - 1995 Update* may result in return of the application. Detailed Site Assessment Reports are not expected to be very extensive for sites under the Forested Lands in the Green Area criteria or Peat Lands criteria since there is less information collected at these sites.

The following provides some information on the expected content of the Detailed Site Assessment Report. Operators are encouraged to review the examples provided by the Petroleum Industry Training Service in their courses on the Wellsite Criteria.

All reports will contain:

- A Site Map
  - A detailed map of the site showing the assessment grid on the lease and the assessment locations on the access road should be included.
  - The control locations should be noted, as well as well centre, sump, flare pit, tank storage and entrance.
  - The assessment grid dimensions should be noted to help the CRI match the operator's data to his or her findings and ensure that the grid matches the disturbed area.

- Landscape Information
  - Some of the landscape information may be presented in graphic format on the detailed map discussed above (e.g., drainage, contour, areas with gravel and rocks, and bare areas).

- Soils Information
  - Indicate if the site has shallow control surface soil depths (e.g., less than 10 cm in Cultivated Lands or less than 15 cm in Grasslands) and clearly identify the amount of soil that was salvaged. This is particularly important where the soil below the surface soil was unsuitable and resulted in very shallow salvage. Shallow surface soils may also affect the use of the MRD and distribution tolerance and should be noted here.
  - Provide soil depth, soil quality, loss of organic matter, and soil profile assessment data. Some operators have presented these data in each of

the grids on the lease map for ease of reference in the field at the inquiry.
- If control(s) are being used to represent a portion of the site, clearly identify which control(s) are for which portion(s) of the site.
- Indicate any assessment locations where a step-out was conducted and report the average of the three measurements.

- Vegetation Data

Soils and vegetation data must be provided for each assessment location evaluated.

Some reports may also contain:

- The Management Plan for the site and details of the measured success of the plan.

- Documentation of the rationale for waiving some of the criteria including, where applicable, a copy of the signed approval of the CRI.

- Documentation of the rationale for assessing Forested Lands in the White Area sites by other land use criteria. Clearly identify the criteria being used for the site. If Forested Lands in the Green Area criteria are being used, provide the written approval of the CRI to use these criteria.

- Reasons why the site should receive a reclamation certificate even if the criteria have not been met.

7. MANAGEMENT PLAN FOR SITES CONSTRUCTED BEFORE 1983

Management Plans may be developed for sites constructed before 1983 on Cultivated Lands or Forested Lands in the White Area.

Due to construction methods prior to the 1983 legislative requirement to conserve topsoil, a large number of wellsites were constructed to the standards of the time and now have very little or no salvaged surface soil for replacement. This does not relieve the operator from the responsibility to reclaim the wellsite. However, strict application of these criteria may not be applicable to judge the condition of the wellsite.

The disturbed area should be reclaimed to a sustainable, manageable condition. This involves the creation of a plough zone or Ap horizon in Cultivated Lands, or a suitable surface soil zone for Forested Lands in the White Area. To achieve this condition the operator should develop a Management Plan in consultation with the landowner and the Conservation and Reclamation Inspector (CRI). The site will be left in such a condition that it is not an obstacle to normal farming methods practiced (i.e., same implements and timing of operations).

The intent of the established criteria should be followed by applying components of the criteria that are applicable. For example, if surface soil is available it must be used. The physical aspects of the landscape criteria must be met. Every reasonable attempt must be made to reach the minimum soil quality and quantity criteria for sites constructed before 1983. Vegetation must be sustainable.

7.1 Content of Management Plan

The following is a suggested outline for the content of a Management Plan. The level of detail for the plan will depend on the level of disturbance at the site.

- Introduction
  - chronological history of the site
  - clearly identify the problems at the site (type and extent)
  - identify landowner and CRI involvement

- Goals of the Plan
  - define what final reclamation goal is and describe the final site conditions; the site will be certified based on meeting the goal
  - describe the proposed timeframe for implementation

- Implementation
  - describe the types and amounts of amendments to be used (e.g., manure, soil, peat, straw, compost)

- describe the types and methods for incorporating the amendments (e.g., crimping, cultivation, spreading)
- describe other management methods to be used (e.g., fertilization, green manuring, irrigation, grazing)

- Monitoring
  - describe the assessment strategy to be used and the timing of assessment

7.2 Application for a Reclamation Certificate

The application should include details of the Management Plan and the measured success.