# Restoration of Saskatchewan's Agricultural Crown Rangelands
# Guidelines and Procedures for Developers

December 2019

## Executive Summary

This document describes procedures and guidelines for restoration of Saskatchewan agricultural Crown rangelands (see definitions, Appendix A) affected by:

- Seismic operations;
- Oil or gas well sites and associated facilities;
- Sand and gravel development;
- Coal or oil sands development;
- Pipeline development;
- Utility development; and
- Roads.

The Saskatchewan Ministry of Agriculture supports the above development based on these principles:

- Orderly and efficient resource management through proper planning and development;
- Environmental conservation and protection as an integral component in the planning and development process;
- Conservation of Saskatchewan's remaining rangelands;
- Minimal overall extent of land surface disturbance;
- Restoration of disturbances to pre-development conditions; and
- The use of native plant materials when reseeding or revegetation is required as part of site restoration.

Based on these principles, restoration activities on agricultural Crown rangelands are governed by the guidelines and procedures contained herein, in addition to existing policies and regulations as referenced in this guide. It is the responsibility of developers to ensure that these guidelines and procedures are followed. It is the responsibility of ministry representatives to ensure developers are aware of these guidelines and procedures.

The species listed in this publication are not recommended seed mixes. They are a reference that developers can use as a guide to selecting species for restoration or for selecting sites for potential native hay mulch. It is the responsibility of developers to prepare appropriate restoration plans. The attached appendices contain government contacts for technical and regulatory information as well as information required in a Development Restoration Plan and a Sample Seed Analysis.

## A. Background

Agricultural Crown rangelands that are used for grazing account for about 5.8 million acres in Saskatchewan. The Saskatchewan Ministry of Agriculture, Lands Branch is responsible for the surface disposition and management of agricultural Crown rangelands. Proper restoration is an important component in the ministry's efforts to conserve these rangelands. The focus of this document is to ensure the use of native plant materials when reseeding or revegetation is required as part of site restoration. The use of native plant materials will help to maintain biodiversity, continuous native habitat and reduce or eliminate the use of exotic species which often displace native species and invade into adjacent stands. This document will also make developers aware of what is required in terms of restoration requirements and help them fulfill this obligation.

There have been problems with using native species such as limited seed availability and seed dormancy. The ministry is aware of these concerns and that restoration activities are site-specific and require proper planning prior to development. The following guidelines therefore are flexible based on site-specific requirements and limitations to restoration. These guidelines are also subject to periodic review and updates as rangeland restoration technology improves.

## B. Native Plan Ecology

### 1. Plant Reproduction Under Natural Conditions

Most native plants are perennials. They reproduce by seed and vegetative means. For example, bunch grasses may increase in size through tillering but their main reproduction is by seed. On the other hand, sod-forming species reproduce both by seed and vegetatively by rhizomes.

Because of the long-lived nature of most native plants, they usually do not invest much energy in seed production. Their seed production may be low or infrequent and energy and nutrient reserves in the seed of many species are rather small.

Furthermore, seed dormancy is found in some native species. Dormancy could be mechanical (hard seed coat), physiological (hormonal) or environment-induced. Dormancy may be an adaptation that helps preserve the seed in the seed bank for a long period. Examples of species exhibiting substantial seed dormancy include green needlegrass and Indian ricegrass.

Seeds of many native plants may have certain appendages such as glumes, palea and lemma. In some cases, the appendages remain attached to the seed. Long awns or hairs may also be present.

While such structures may have an adaptive value under natural conditions, they make seed handling and processing and large scale seeding of such species difficult.

### 2. Plant Establishment Under Natural Conditions

Native sod usually contains a diverse seed bank. Seed germination and seedling establishment takes place when the environmental conditions are adequate. Adequate conditions means meeting the requirements of the species (i.e. temperature, moisture, cover, protection and nutrients) or simply providing a safe site. Competition from existing plants appears to be a

major factor limiting seedling establishment. For example, blue grama will not establish from seed until a sizeable opening is created in the native sod.

Environmental requirements for germination and seedling establishment vary among species. For example, most cool-season plants, (which are dominant in Saskatchewan) such as northern wheatgrass, will germinate early in the spring as long as soil moisture is adequate. On the other hand, warm-season plants, such as little bluestem, will germinate in the summer when soil temperature is much higher.

Blue grama requires moist soils at two separate time intervals for germination and for establishment of adventitious roots.

Some of the seed in the soil seed bank may have some type of dormancy. The change in soil moisture and temperature (e.g. freeze/thaw cycles) is often sufficient to break seed dormancy.

A major objective of site restoration is to provide the best conditions possible for recruitment of native species from the existing soil seed bank.

## C. Ecological Regions

The present ecological land classification (see map, Appendix B) describes the province's ecosystems. At the broadest level, four ecozones are recognized, corresponding roughly to the prairie, southern boreal forest, Canadian Shield and Northern subarctic areas of the province. To incorporate increasing levels of detail, these broad ecozones are subdivided into eleven ecoregions, each characterized by different plant and animal communities, soils and climate. Knowledge of these characteristics will help in restoration planning. This guide will focus mainly on the prairie ecoregions but will also provide guidelines for the boreal transition and mid-boreal upland ecoregion.

## D. Ecological Sites

Within each ecoregion, there are a variety of ecological sites determined mainly by soil type, moisture and salinity, or alkalinity conditions. Each ecological site has its own characteristics, which result in a specific plant community that makes it noticeably different from other sites. A listing of ecological sites for the various ecoregions and the associated species for these sites is provided, however variations on these sites do occur. The use of the technical contacts listed in Appendix C is recommended for all problem areas.

The following information can be used to help identify adapted species when selecting commercially available native seed for restoration or when selecting local sites for wild harvesting.

Within a climatic zone or region, range sites may be grouped into the following categories mainly on the basis of the soil moisture regime:

- Normal upland sites: Normal uplands reflect the normal response to the climate of the region. The soil moisture regime here is considered average for that climate. The Saskatchewan upland sites are: sands, sandy, loamy and clayey.
- Other range sites: Due to significant variations in topography, drainage or type

of parent material, certain range sites are characterized by drier or wetter moisture regimes than the normal uplands. Examples of areas receiving greater than average moisture are wetlands and saline lowlands. Sites that exhibit greater than average moisture limitations include gravel, saline upland and steep slopes.

The following is a brief description of some of the range sites found in Saskatchewan:

**1. Normal Upland Sites**

- Sands: These are nearly level to rolling land with deep, loose, coarse-textured soils (coarse to very fine sands). This site is characterized by very weak soil development and high wind erosion hazard. Permeability is rapid and water holding capacity is low. Common soils classified as sands range site include undifferentiated sand, regosolic sands and loamy sands.
- Sandy: These are nearly level to rolling land with somewhat finer soil texture than in the previous site (fine sandy loam, loamy fine sands, loamy very fine sands). The soil is darker than in the preceding site reflecting greater soil development. Permeability is moderate to rapid and available water capacity is moderate. The potential for soil erosion by wind is relatively high. Examples of this include Chaplin sandy loam, Biggar sandy loam and other light loam soils.
- Loamy: Loamy sites include gently undulating to rolling uplands with medium to moderately fine-textured soils (loam, clay loam). The soils are deep with well to moderately well drainage. Examples of soils included in this site are Haverhill loam, Weyburn loam and Oxbow loam.
- Clayey: These are nearly level to rolling uplands with moderately deep, well drained, fine textured soils (ie: clay, heavy clay). This site is mostly associated with glacial lake plains (lacustrine plains). Clayey sites include Sceptre heavy clay and Elstow clay soils and other fine-textured soils.

**2. Range Sites with Drier Moisture Regime**

- Dune Sands: The dune sand site is characterized by very rough topography with deep, coarse-textured soils (loose sands). Little or no soil development is noted in this site. Soils grouped under this site include Dune sands, Antelope regosol, and Vera regosol.
- Burnouts: These are nearly level lands with moderately fine to moderately coarse-textured soils underlain by dense, slowly permeable subsoil that is high in sodium. This site occurs mainly in the southwestern corner of the province (solonetzic soils such as the Echo Association).
- Thin Upland or Shallow: These include shallow soils with various textures occurring on steep slopes. The weakly developed soils characteristics of this site restrict plant rooting. Soil water holding capacity is low. Examples of this include soils mapped as "eroded" and the rough phases of the "Dissected Plateau complex", and "Hillwash complex".
- Gravelly: These are coarse-textured soils with high gravel content (50%). The soils of the shallow-to-gravel range site is underlain by gravel at approximately 40 cm or less. They are associated with glacial outwash or steam-eroded till. An example is Biggar gravelly loam.
- Saline Upland: Saline upland site is characterized by high content of soluble salts and

occurs on nearly level to depressional topography. Soils are poorly drained and weakly developed. Although salt tolerant plants are present in large amounts, many upland species are still important. Salt may appear on soil surface in dry periods.

- Badlands: This site is characterized by a mosaic of non-vegetated, highly eroded areas and vegetated "islands." The vegetated areas may resemble the normal uplands but are not large enough to map separately. Productivity is extremely low. Examples include the Kildeer and Big Muddy badlands.

**3. Range Sites Receiving Above Average Moisture**

- Wetlands and Overflow Sites: These are marshy lands with surface water remaining during part of the growing season. Soils are deep but poorly drained and are too wet to cultivate. Subirrigated sites are low-lying wetlands, but usually with no surface water appearing during the growing season. Saskatchewan wetlands show extremely high variability in terms of species composition and productivity.
- These are poorly drained saline wetlands receiving additional water from seepage or overflow. Salt tolerant plants supply the bulk of the production.
- Closed Depression: These are shallow upland depressions and basins which occasionally receive a relatively small amount of runoff. This is usually included in a complex with the dominant upland site due to its small areal extent.

## E. Primary and Associated Species Found on Various Range Sites

| **Brown Soils- Dry** | | |
|---|---|---|
| **Range Site** | **Primary Species** | **Other Common Species** |
| Loamy | Needle-And-Thread Northern<br>Wheatgrass Western Wheatgrass<br>Blue Grama | June Grass<br>Low Sedge<br>Thread-Leaf Sedge<br>Sun-Loving Sedge<br>Moss Phlox<br>Clubmoss<br>Pasture Sage<br>Winterfat |
| Clayey | Northern Wheatgrass Western<br>Wheatgrass Blue Grama<br>June Grass | Upland Sedges<br>Moss Phlox<br>Clubmoss<br>Pasture Sage<br>Winterfat<br>Green Needlegrass |
| Sandy | Needle-And-Thread Northern<br>Wheatgrass Blue Grama<br>Western Wheatgrass | Upland Sedges<br>Moss Phlox<br>Clubmoss<br>Pasture Sage<br>June Grass<br>Silver Sage<br>Sand Grass |

| | | |
|---|---|---|
| Sands | Needle-And-Thread Sand Grass<br>Blue Grama June Grass | Upland Sedges<br>Pasture Sage<br>Hairy Golden Aster<br>Northern Wheatgrass<br>Lance-Leaf Psoralea |
| Dune Sands | Needle-And-Thread<br>Sand Grass<br>Northern Wheatgrass June Grass | Awned Wheatgrass<br>Lance-Leaf Psoralea<br>Wood's Rose<br>Silver Sage Sand<br>Dropseed<br>Creeping Juniper<br>Chokecherry<br>Indian Ricegrass |
| Saline | Nuttall's Alkaligrass Saltgrass<br>Western Wheatgrass Slender<br>Wheatgrass | Blue Grama Alkali<br>Cordgrass<br>Nuttall's Saltbush<br>Greasewood |
| Burnout | Western Wheatgrass Blue Grama<br>Northern Wheatgrass Needle-And Thread | Nuttall's Alkaligrass<br>Salt Grass<br>Nuttall's Saltbush<br>Sandburg Bluegrass |
| Thin Uplands | Needle-And-Thread<br>Blue Grama<br>Prairie Muhly<br>June Grass<br>Upland Sedges<br>Moss Phlox | Pasture Sage<br>Northern Wheatgrass<br>Western Wheatgrass<br>Pasture Sage<br>Clubmoss<br>Prairie Muhly<br>Creeping Juniper<br>Silver Sage<br>Winterfat<br>Colorado Rubberweed<br>Purple Prairieclover |
| Wetlands | Northern Reedgrass<br>Fowl Bluegrass<br>Tufted Hairgrass<br>Sloughgrass<br>Prairie Cordgrass<br>Cattail<br>Bulrushes<br>Spike Rushes<br>Spangletop | Narrow Reedgrass<br>Mana Grasses<br>Reed Canarygrass<br>Smartweed<br>Water Plantain<br>Willows<br>Marsh Reedgrass<br>Little Bluestem |
| **Brown Soils- Moist** | | |
| **Range Site** | **Primary Species** | **Other Common Species** |

| | | |
|---|---|---|
| Loamy | Northern Wheatgrass<br>Western Porcupinegrass<br>Western Wheatgrass<br>Needle-And-Thread | June Grass<br>Green Needlegrass<br>Upland Sedges<br>Pasture Sage<br>Blue Grama<br>Moss Phlox<br>Clubmoss<br>Plains Reedgrass |
| Clayey | Northern Wheatgrass<br>Western Wheatgrass<br>June Grass<br>Green Needlegrass | Winterfat<br>Blue Grama<br>Upland Sedges<br>Moss Phlox |
| Other Sites (See Brown- Dry) | | |
| **Dark Brown Soils** | | |
| **Range Site** | **Primary Species** | **Other Common Species** |
| Loamy | Northern Wheatgrass<br>Western Porcupinegrass<br>Green Needlegrass<br>Western Wheatgrass | June Grass<br>Rough Fescue<br>Upland Sedges<br>Pasture Sage<br>Hooker's Oatgrass<br>Blue Grama<br>Needle-And-Thread |
| Clayey | Northern Wheatgrass<br>Western Wheatgrass<br>June Grass<br>Green Needlegrass<br>Rough Fescue | Winterfat<br>Blue Grama<br>Upland Sedges<br>Hooker's Oatgrass<br>Blue Grama |
| Sandy | Needle-And-Thread<br>Northern Wheatgrass<br>Sand Grass | Blue Grama<br>Pasture Sage<br>June Grass<br>Awned Wheatgrass |
| Sands | Needle-And-Thread<br>Northern Wheatgrass<br>Sand Grass<br>Awned Wheatgrass | June Grass<br>Blue Grama<br>Pasture Sage<br>Upland Sedges<br>Shrubs |
| Dune Sands | Needle-And-Thread<br>Sand Grass<br>Shrubs<br>Sand Dropseed<br>Awned Wheatgrass | Lance-Leaf Psoralea<br>June Grass<br>Pasture Sage<br>Upland Sedges<br>Creeping Juniper |
| Thin Uplands | Northern Wheatgrass<br>Western Wheatgrass<br>Needle-And-Thread<br>Blue Grama<br>June Grass | Upland Sedges<br>Moss Phlox<br>Pasture Sage<br>Clubmoss<br>Prairie Muhly<br>Purple Prairieclover<br>Little Bluestem |
| Other Sites (See Brown Soils- Moist) | | |

| Black Soils | | |
|---|---|---|
| **Range Site** | **Primary Species** | **Other Common Species** |
| Loamy | Rough Fescue<br>Awned Wheatgrass<br>Northern Wheatgrass<br>Western Porcupinegrass<br>Green Needlegrass | Western<br>Needle-And-Thread<br>Hooker's Oatgrass<br>Pasture Sage Timber<br>Oatgrass<br>Bedstraw |
| Clayey | Rough Fescue<br>Green Needlegrass | Northern Timber<br>Oatgrass<br>Pasture Sage<br>Bedstraw Shrubs |
| Sandy | Needle-And-Thread<br>Northern Wheatgrass<br>Sand Grass<br>Western Porcupinegrass | June Grass<br>Pasture Sage<br>Shrubs<br>Rough Fescue<br>Awned Wheatgrass |
| Sands | Needle-And-Thread<br>Northern Wheatgrass<br>Sand Grass<br>Awned Wheatgrass | June Grass<br>Blue Grama<br>Pasture Sage<br>Shrubs |
| Dune Sands | Needle-And-Thread<br>Sand Grass<br>Northern Wheatgrass<br>Awned Wheatgrass<br>Shrubs | Sand Dropseed<br>June Grass Pasture<br>Sage Indian<br>Ricegrass |
| Thin Uplands | Northern Wheatgrass<br>Western Wheatgrass<br>Needle-And-Thread<br>June Grass | Upland Sedges<br>Moss Phlox<br>Pasture Sage<br>Prairie Muhly<br>Rough Fescue<br>Western Porcupinegrass<br>Shrubby Cinquefoil |
| Wetlands | Northern Reedgrass<br>Fowl Bluegrass<br>Tufted Hairgrass<br>Sloughgrass<br>Marsh Reedgrass<br>Prairie Cordgrass<br>Bulrushes<br>Spike Rushes | Narrow Reedgrass<br>Mana Grasses<br>Reed Canarygrass<br>Smartweed<br>Cattail<br>Water Plantain<br>Willows<br>Spangletop |
| Other Sites (See Dark Brown Soils) | | |

## F. Grey Wooded Soil

Aspen and to a lesser extent aspen-white spruce, is the dominant tree cover in much of the

mixed-wood forest of Saskatchewan. Aspen occurs over a wide range of moisture and nutrient conditions and as a result a variety of understorey communities can be identified based on the dominant shrubs and herbs present. Generally moist, well drained sites support aspen stands with a well-developed shrub understorey dominated by low-bush cranberry, roses and beaked hazelnut. Dominant forbs and grasses include sarsaparilla, bunchberry, peavine, dewberry, fireweed, reed grasses, rice grasses and hairy wild rye. Jack pine occurs on dry, rapidly drained, coarse-textured soils with bearberry, twinflower, buffalo berry, rice grasses and hairy wild rye often dominant in the understorey. Poorly drained soils are generally dominated by black spruce, willow, sedge species and reedgrasses. The current preferred species used for reseeding if needed, is slender wheatgrass and/or native tree and shrub plantings. Monitoring of disturbed sites in forested areas is ongoing and may result in additional site-specific restoration practices and/or species as they become available.

## G. Availability of Native Plant Material

### 1. Native Cultivars

Registered cultivars exist for some of Saskatchewan's native plants however, other native plant cultivars and ecovars are being developed by provincial and federal research centres and seed companies. A list of Canadian and American suppliers of native plant material can be obtained from the Native Plant Society website.

Shortage of local harvested native plant material or ecovars is the main reason that licensed native cultivars are generally used. Other reasons include the genetic uniformity, good germination characteristics, generally abundant supply and relatively lower cost. However it is estimated that about 50% of the major native grass species are imported from the U.S. Because of ecotypic variation some of this seed may be poorly adapted to Canadian conditions. Imported seed may also be contaminated with weed seeds such as annual brome.

In addition, very few of the species required for rangeland restoration are currently available as varieties and the breeding or selection for varieties may take in excess of 10 years.

The development of ecovars fills some of the gaps between licenced varieties and harvested wild materials. Selected ecovars take a shorter period to develop yet retain much of the natural genetic variation of wild populations with some of the predictability of varieties.

### 2. Wild-type Seed

Wild harvested material is the only source for much of Saskatchewan's native vegetation and in areas where this is feasible is likely cost-effective. The harvesting of material locally from a range site similar to that of the site being restored can be economical, and along with natural succession is likely to help restore disturbances to pre-development conditions over time. It is unrealistic to assume that by seeding and possibly establishing native species that a site has been restored. A more practical approach is to help natural succession along by the establishment of an initial cover, protection from further disturbance, monitoring plant establishment and recruitment from the existing soil seed bank and on-going maintenance.

Effective restoration depends upon good planning prior to development. Detailed information on specific site conditions is an important component of planning. A detailed description of existing vegetation provides information on plant species adapted to local climatic and soil conditions. Examination of species colonizing nearby disturbed sites will be beneficial in understanding natural succession patterns. This will also help in identifying local sources of plant materials that may be available for revegetation.

**3. Native Hay Mulch**

The use of native hay mulch involves the cutting of native plant stands as hay and either bulking the material or baling it to be respread over the restoration site. The native hay should be cut to obtain the maximum amount of viable seed from the dominant species in the stand.

Use of native hay mulch is a promising technique for reintroducing native species. Use of native hay mulch as a seed source eliminates seed collection and processing requirements. This technique also provides the opportunity for reintroduction of seeds of species that are not commercially available. Furthermore, mulch protects soil against erosion and reduces soil moisture loss.

Hay is spread evenly on the prepared seedbed or standing stubble and then crimped to reduce potential loss. The method is adaptable to a variety of conditions and is relatively inexpensive. It is often used in conjunction with seeding to help improve species diversity.

Limitations of this technique include:

1. The limited sources of native hay mulch; and
2. The variability in range condition or health of the hay source, and therefore the composition and amounts of viable seed.

## H. Procedures for Development/Restoration on Agricultural Crown Lands

All development/restoration activity on agricultural Crown Lands requires the approval of the Saskatchewan Ministry of Agriculture, Lands Branch (see Appendix C).

Approval procedures are as follows:

**1. Initial Contact**

Developers apply to the Saskatchewan Ministry of Agriculture, Lands Branch Regional office with project proposal. The initial project proposal must include:

A development/restoration plan for review by ministry representatives, including a pre-site assessment with a description of the general landscape, soil type and vegetation cover (see Appendix D). Any plant materials to be used for reseeding or revegetation purposes (either after project completion or upon project abandonment) must be pre-approved by a ministry agrologist.

The restoration plan should also outline mitigating measures to minimize surface disturbance and unintentional transport of invasive seed species, and to avoid any unique landscape features and/or rare or endangered flora or fauna. Ministry staff (see Appendix C) are available

for technical assistance.

The Regional office will provide any Crown land status and reservation information relative to the project proposal including the current agricultural lessee.

The Regional office will provide approval including additional restoration requirements if deemed necessary. Any easement, lease, permit or authority for seismic or other activity will not be issued without an approved development/restoration plan.

A project proposal may also be required for review by the Saskatchewan Ministry of Environment under the *Environmental Assessment Act*. Information on this project can be found on the Saskatchewan Ministry of Environment 's website.

**2. Project Completion**

Developers are to notify the Lands Branch Regional Office upon development initiation and completion. An As-Built Report is to be completed and submitted within 60 days of development completion to the regional lands branch office. As Built reports will be completed according to the Saskatchewan Petroleum Industry/Government Environment Committee's Guidelines For The Preparation Of As-Built Reports.

**3. Project Abandonment**

Developers are to notify Lands Branch Regional Office upon proposed project abandonment. The Regional Office will then review the restoration plan and approve any seed mixtures and/or other restoration procedures to be used. Following site restoration developers must apply for a release from Lands Branch Regional Office.

Prior to issuing a release developers must provide Lands Branch Regional Office with a restoration statement, complete with site photographs. Restoration conditions must meet the criteria for landscape, soils and vegetation as outlined in this guide.

Upon review of the restoration statement a ministry agrologist will complete a site inspection prior to issuing a release.

## I. Requirements for Development/ Restoration Plan

The following guidelines have been developed for use across Saskatchewan. The main measure of restoration is the comparison to pre-development site conditions including soils, landscape and vegetation criteria. The following guidelines have been developed for the entire province. However, at the discretion of the ministry agrologist, site specific circumstances may require different or additional restoration techniques.

- Site specific development/ restoration plans should be submitted to the Saskatchewan Ministry of Agriculture, Lands Branch for review prior to the issuance of any easement, lease or authority for seismic or other activity. The restoration plan required by the Saskatchewan Ministry of Agriculture will also satisfy a portion of the project proposal if required by the Saskatchewan Ministry of Environment under the *Environmental Assessment Act*.

- It is the responsibility of the developer to ensure that any plant material to be used for restoration is free of noxious weeds as specified under the *Canada Seeds Act* and *The Weed Control Act*. The following additional species are also prohibited:

| | |
|---|---|
| Smooth Brome | Bromus inermis |
| Downy Brome | Bromus tectorum |
| Japanese Brome | Bromus japonicus |
| Hairy Chess | Bromus commutatus |
| Cheat Grass | Bromus secalinus |
| Rattail Fescue | Festuca myuros |
| Kentucky Blue Grass | Poa pratensis |

- A certificate of seed analysis is required for all seed by the ministry. This must be attached to the development/restoration plan. For assistance and a sample certificate of seed analysis contact your local regional office.
- No exotic plant materials are to be used for restoration. Where required, cereals for cover crops and weed free straw for crimping are permitted. The use of short-lived species for the quick establishment of cover, where required, is permitted.
- All seed mixtures or plant materials to be used in restoration must be approved by a ministry agrologist.
- Restoration sites should be fenced wherever possible within active grazing leases.
- Native species should be seeded in early spring or dormant seeded in late fall. Any seedings containing slender wheatgrass or cereal cover crops must be cut prior to seed set.
- Manure is not to be used as a soil additive.
- The broadcast application of phosphorous fertilizer at 100 lb/ac. of P2O5 to help germination/root growth is recommended.
- On forested rangelands natural regeneration is favored and no reseeding or other procedures are required as part of site restoration unless erosion prone sites or specific cases are identified by the Saskatchewan Ministry of Agriculture. Restoration plans, however, are still required for all forested areas outlining general landscape, soil type and vegetation cover. The current preferred species for reseeding if needed is slender wheatgrass and/or native tree/shrub plantings. Additional site specific restoration practices and/or species may be required.
- Approval from the Saskatchewan Ministry of Agriculture, Lands Branch is required prior to harvesting native plant material on any agricultural Crown lands.
- All development or activity must minimize the extent of surface disturbance. This is particularly critical in sensitive areas such as sand dunes. Any topsoil removed is to be done so using a two-lift stripping method. Topsoil and subsoil should be stockpiled separately then re-spread for restoration. Admixing of topsoil and subsoil is not permitted. The mixing of drilling by products is not permitted. The importing of off-site topsoil is not permitted without prior approval from Lands Branch.
- Whenever possible development or activity shall occur on relatively level, sheltered sites which are less prone to erosion and more conducive to re-colonization by native plants.
- Where an Integrated Land-Use Plan for a particular area exists, the conditions outlined in such a plan will apply in addition to those contained in this guide.
- Additional requirements may be necessary as a result of the Saskatchewan Ministry of Environment's environmental assessment review process, oil and natural gas projects.
- Spills and/or drilling wastes or other wastes must be properly disposed of according to

*The Oil and Gas Conservation Regulations, 2012* administered by the Saskatchewan Ministry of Energy and Resources

- When requesting a release, developers are required to submit a restoration statement outlining landscape, soils and vegetation conditions. Prior to issuing a release, developers must provide the Saskatchewan Ministry of Agriculture, Lands Branch Regional office, with a statement outlining restoration conditions; (refer to the restoration statement and criteria for landscape, soils and vegetation as outlined in this guide).
- In cases where restoration requirements are not being met, the Saskatchewan Ministry of Agriculture may undertake restoration activities at the expense of the developer.
- Projects developed prior to the issuance of these guidelines will be dealt with on an individual basis, following the intent of these guidelines.

## J. Restoration Statement and Criteria

The following criteria are supplied as a reference for developers when submitting a restoration statement or when requesting a release. The restoration statement should supply basic information relative to the criteria on landscape, soils and vegetation conditions. *(Site photographs are required as part of the restoration statement.)*

The main emphasis of these criteria is that the success of restoration is measured against pre-disturbance or adjacent site conditions. Upon review of the statement by the ministry, a field inspection will be completed prior to issuing a release. Contaminated sites will not be released but will be dealt with according to Environmental Operating Guidelines for the Saskatchewan Petroleum Industry. Restoration statements lacking adequate information relative to the criteria will be returned.

### 1. Vegetation Criteria

- The live plant cover should reflect the seed mixture or other procedures used for revegetation. Average live plant cover of the three dominant species should be included with the restoration statement.
- No noxious weeds are allowed, as specified under the *Seeds Act* and the
- *Saskatchewan Noxious Weeds Act,* as well as additional species listed in section 8.11.
- Total live plant cover should be 65 per cent of pre-disturbance or adjacent site conditions and should be evenly distributed on the restoration site.

### 2. Soil Guidelines

Any surface and/or subsoil stripped must be replaced as evenly as possible. The average depth of replaced topsoil must be 70 per cent of predisturbance conditions or adjacent soil conditions. Soil texture must be consistent with pre-disturbance or adjacent soil conditions.

1. Admixing of topsoil and subsoil is not permitted.
2. Soil texture must be consistent with pre-disturbance or adjacent soil conditions
3. The mixing of drilling by products is not permitted without prior approval from Lands Branch.
4. The import of off-site soil is not permitted without prior approval from Lands Branch.
    - Imported soil will be subject to laboratory analyses including, but not limited to, texture, salinity, and weed seeds. A detailed account of sampling methodology will be a

requirement.

Any contaminated soil must be dealt with according to *The Oil and Gas Conservation Regulations, 2012* administered by the Saskatchewan Ministry of Energy and Resources. Acceptable soil criteria will be based on the Saskatchewan Petroleum Industry Government Environmental Committee's guidelines titled:

- Restoration of Spill Sites on Saskatchewan Ministry of Agriculture and Pasture Lands
- Restoration of Well Sites and Associated Facilities on Cultivated Land
- Saskatchewan Upstream Petroleum Sites Remediation Guidelines

**3. Landscape Criteria**

- Drainage- site drainage should be consistent with surrounding landscape patterns, directions and flow rates and pre-disturbance conditions.
- Erosion- erosion should be no more than on the adjacent landscape.
- Contour and Stability - no slope movement, slumping or subsidence is allowed.
- Gravel and Rocks- no piling or concentrations of gravel and/or rocks is allowed.
- Woody debris- all woody debris must be salvaged where so required as part of the lease agreement, easement, permit or approval.
- Debris- no industrial or domestic debris is allowed.

# Appendices

## Appendix A: Definitions

**Adapted Species-** species with evolved or selected characteristics allowing establishment or growth and reproduction in a specific environment.

**Agricultural Crown Rangeland-** Crown rangeland administered by the Saskatchewan Ministry of Agriculture, Lands Branch.

**Cultivar-** a registered plant variety selected by plant breeders for specific traits and which has been registered for use in an area by a certifying agency (Agriculture Canada's Variety Registration Office).

**Ecological Site-** a kind of land with a specific potential natural community and specific physical site characteristics differing from other kinds of land in its ability to produce vegetation and respond to management.

**Ecotype-** a locally adapted population of a species which has a distinctive limit of tolerance to environmental factors.

**Ecotypic Variations-** the genetic variations between localized strains of widely distributed species. These localized adaptations may restrict the re-establishment from one location to another depending upon distance and other ecological factors.

**Ecovar-** refers to an ecological variety or a strain of a species selected for genetic diversity rather than genetic uniformity.

**Exotic-** introduced, non-indigenous, non-native species.

**Native Plant Materials-** refers to seed, hay, mulch or other plant parts either commercially available or wild harvested; used for restoration or other purposes.

**Native Vegetation-** plants or plant populations that have developed in and are adapted to a particular climatic or soil zone.

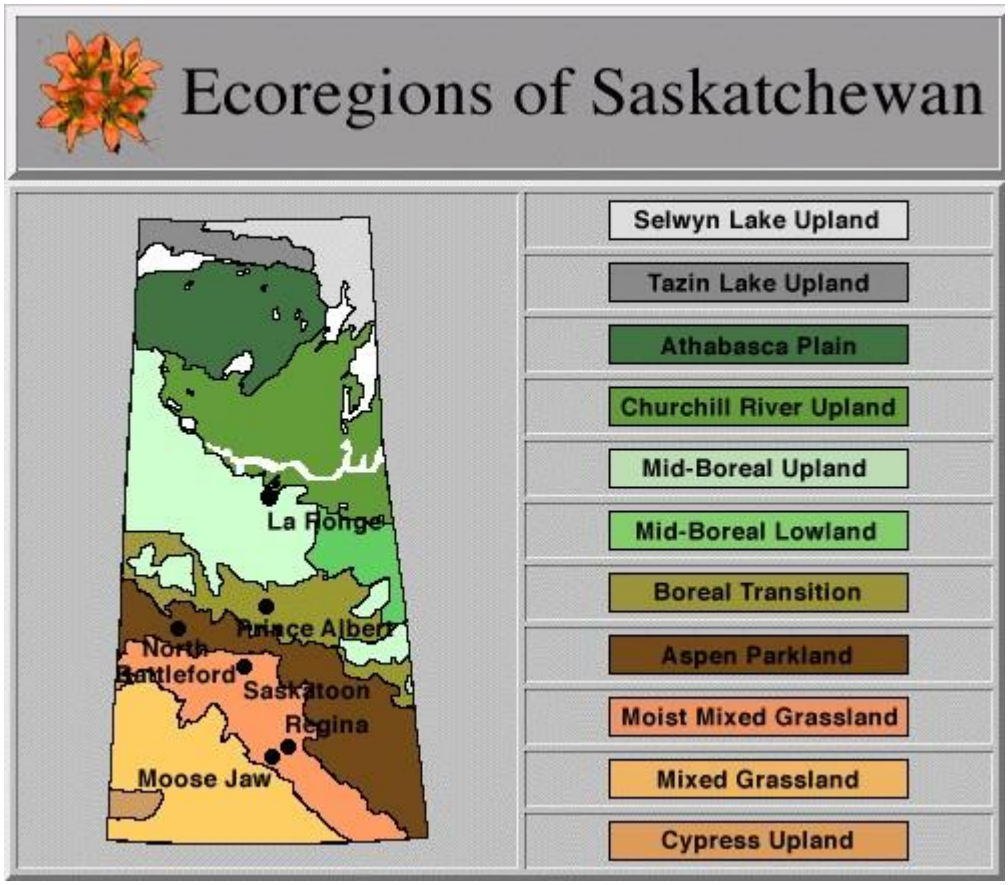
**Natural Succession-** the process of vegetation development following disturbance whereby an area becomes successively occupied by species recruited from the existing soil seed bank.

**Rangeland-** land supporting native vegetation and managed ecologically rather than agronomic or culturally.

**Reservation-** certain attributes on the land which may prohibit, restrict or facilitate the use, development or sale of the land.

**Restoration-** the process of returning disturbed sites to pre-disturbance conditions.

**Appendix B**




## Appendix C: Lands Branch Regional Offices

**Tisdale**
1105-99th St.
Box 1480
Tisdale SK S0E-1T0
306-878-8842

**North Battleford**
A131-1192- 102 St.
North Battleford SK S9A 1E9
306-446-7962

**Swift Current**
101-350 Cheadle St.
Swift Current SK S9H 4G3
306-778-8285

## Appendix D: Information required in a Development/Restoration Plan

As a minimum, the following information should be provided to the Saskatchewan Ministry of Agriculture, Lands Branch, and be included in a project proposal for review by the Saskatchewan Ministry of Environment under the *Environmental Assessment Act*:

- Detailed development plan outlining measures to minimize surface disturbance (i.e. access routes, timing of development, type of equipment being used);
- Site photographs;
- Legal land location;
- Detailed landscape description (i.e. slope, aspect, elevation, distance from water bodies, drainage, water resources);

- Detailed soil description (i.e. texture, soil classification association);
- Dominant plant species present (i.e. grasses, forbs, shrubs and trees);
- Occurrence of, or potential for rare and/or endangered flora and fauna. Note: a detailed survey may be requested by the ministry, or the Saskatchewan Ministry of Environment representatives during the spring and summer months if landscape features or habitat type suggest a potential for rare species occurrence;
- Site restoration methods (i.e. seed mixtures or other revegetation techniques being considered, topsoil stripping and stockpiling or minimum surface disturbance development methods, weed control measures, fencing);
- Seeded sites must be inspected for plant cover and weeds twice per year during the growing season; and
- Any noxious weeds or problems with plant establishment with either interim or final restoration are to be reported to a ministry agrologist (see Appendix C).