Industrial Activity in Foothills Fescue Grasslands —
Guidelines for Minimizing Surface Disturbance

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Cover Photo: Ocean of fescue and litter seen in early spring, photo shows various types of litter from standing to fallen.

Courtesy of Jody Best, Rangeland Management Branch, Lands Division, Alberta SRD
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Introduction

This background document has been prepared to supplement Information Letter 2009-04, Foothills Fescue Grassland Information Letter- Principles for Minimizing Surface Disturbance.

The importance of foothills fescue grasslands has been recognized through the designation of foothills rough fescue (*Festuca campestris*) as our provincial grass. Extensive tracts of foothills fescue grassland within the landscape of south western Alberta have been lost due to agricultural crop production, industrial development, urban and rural infrastructure. Alberta Sustainable Resource Development (SRD) has placed Protective Notations (PNT) on specified public lands known to include foothills fescue grassland. The purpose of the PNT is not to restrict development but to alert industry to the environmental and economic risk. The Information Letter supporting the PNT identifies the expectations for planning and development standards.

Foothills fescue grasslands contribute ecological goods and services important to the economy and public interests of Alberta. The value of retaining the ecological health and function of these grasslands is acknowledged by the ranching community, government agencies, stewardship groups and through conservation easements on freehold lands. Of increasing value to Albertans is the role foothills fescue grasslands play in maintaining surface and groundwater resources. Also there is an increasing awareness of their role in capturing and storing carbon. It is recognized that fragmentation of these remaining fescue grasslands jeopardizes their ecological health, function and operability.

The Spatial Distribution of Foothills Fescue Grasslands

Foothills rough fescue grasslands occur as the dominant native plant communities in the Foothills Fescue Natural Subregion and are co-dominant with forest and shrub communities in the Foothills Parkland Natural Subregion. These grasslands may also occur in open valley bottoms and on south facing slopes, ridges, or as patches in the Montane and Sub-alpine
Natural Subregions. IL2009-04 and the associated PNT apply to all foothills fescue plant communities located on public lands within these Natural Subregions. The Natural Regions and Subregions Map of Alberta is provided as Attachment 1.

For more information on rough fescue and detailed descriptions of rough fescue communities within each Natural Subregion consult the **Range Plant Community Guides** for the Foothills Fescue, Foothills Parkland, Montane and Sub-Alpine Natural Subregions and the Range Health Assessment Field Workbook prepared by SRD Rangeland Management Branch. The Range Plant Community Guides can be useful during the field based site selection process for determining the location of foothills fescue plant communities. The Range Health Assessment Field Workbook can be used to determine the integrity and ecological status of the native plant communities.

**Existing Information Letters and Guidelines**

The oil and gas industry has been alerted to the importance of minimizing surface disturbance in native prairie and parkland areas through Energy Resources Conservation Board (ERCB) Information Letter IL 2002-1 *Principals for Minimizing Surface Disturbance in Native Prairie and Parkland Areas*. Additional background information has been provided through publications such as *Petroleum Industry Activity in Native Prairie and Parkland Areas, Guidelines for Minimizing Surface Disturbance* (Native Prairie Guidelines Working Group 2002) and *Prairie Oil and Gas, A Lighter Footprint* (Sinton H. M. 2001). While many of the guiding principals apply to foothills fescue grasslands, the differences in soils, climate and topography of foothills fescue grasslands present additional challenges for industrial development and require special consideration.
The importance of maintaining the ecological function of the south eastern slopes of the Rocky Mountains, and the need for well planned development activity has long been recognized by government agencies. ERCB IL 93-9 *Oil and Gas Development Eastern Slopes, (Southern Portion)*, outlines the expected approach to the planning of new developments on the south eastern slopes. This information letter identifies key principles to further assist industry when planning exploration and development activities in the southern east slopes. The ERCB has provided recent clarification of IL 93-9 in Bulletin 2007-35 *Clarification of Information Letter (IL) 93-9: Oil and Gas Development Eastern Slopes (Southern Portion)*. This bulletin clarifies the ERCB’s intention to continue to use IL 93-9 and requires companies to consider all aspects of this IL when submitting applications for development in the Eastern Slopes area.

It is expected that efforts to avoid, minimize, or mitigate disturbances to foothills fescue grasslands would be identified in the Environmental Assessment required under IL93-9, and that this issue would be discussed with SRD land managers as part of the consultation requirements. The ERCB also confirms that all applications in the southern east slopes must be filed as non-routine. Although these documents were produced for the petroleum industry it is recommended that all industries use these publications as guiding documents.

**The Qualities of Foothills Fescue Grasslands**

Foothills rough fescue is the dominant native grass species of the foothills fescue grassland. It grows in association with other native grasses, forbs and shrubs in response to specific ecological site conditions. Foothills rough fescue is a densely tufted bunchgrass, often forming large tussocks up to 30 cm in diameter, with stiff upright stems from 30 to 140 cm in height and roots up to 120 cm deep. Seed production is highly variable, often not for several years, occurring sporadically in response to environmental conditions that are not well understood. Established plants do not reproduce vegetatively from rhizomes.

Rough fescue produces substantial litter that serves to conserve scarce moisture, enhancing moisture retention and infiltration (Desserrud 2006). Its deep fibrous root structure performs an important hydrologic function by retaining moisture within the soil profile, making it...
resistant to drought and fire. Its growth begins early in the spring when temperatures are relatively cool, completing the growth cycle by early summer. This growth cycle allows mature rough fescue plants to survive during the heat of the summer months, relying on the moisture stored deep within the soil profile when surface moisture is less reliable. Seedling survival is more limited by climatic conditions during the first two to three years of growth until root development is sufficient to penetrate lower reaches of the soil profile. Rough fescue plants “cure on the stem”, due to a leaf cell structure that resists weathering and breakdown. Consequently they provide valuable fall and winter forage for livestock and wildlife and are tolerant of winter grazing. The stiff, upright leaves of rough fescue are accessible to foragers such as cattle and elk, even in deep snow. Once established they are low maintenance and are highly productive. Well managed fescue grasslands are a valuable and sustainable resource for livestock production, which is a significant economic factor in southwestern Alberta.

**Factors Influencing Restoration of Foothills Fescue Grassland Health and Function**

We currently lack the tools and knowledge to consistently and reliably restore foothills fescue grasslands after they are disturbed by land use activities such as road construction, oil and gas development, mineral exploration developments, and cultivation. In the past, a number of invasive introduced grasses (termed invasive non-native species) including Kentucky bluegrass, smooth brome and Timothy, were used to reclaim industrial disturbances and to provide additional winter forage for livestock on cultivated hay land. These non-native invasive species are shallow rooted and do not retain moisture within the soil profile as effectively as rough fescue plant communities. They thrive on the surface soil moisture of early spring, expending their energy to set seed and their nutrition value declines steadily after seed set with the onset of summer heat. Unfortunately they are also prolific seed producers and their seed is readily dispersed by the wind, spring runoff, and overland flow. Seed is also transported by the tires, tracks and undercarriages of vehicles and heavy equipment. The seeds are opportunistic, germinating where soil disturbance has occurred. Kentucky bluegrass and smooth brome also reproduce from extensive creeping rhizomes, often forming thick mats, aggressively competing with native plants for solar energy, moisture and soil nutrients. Once invaded
by non-native species, the potential for recovery to a native community is quite limited based on current knowledge.

Industry should also be aware that Prohibited Noxious, Noxious weeds, control of which is legislated under the Alberta Weed Control Act, also presents a serious economic concern for development activity in foothills fescue grasslands. Municipal authorities and local stakeholders are well aware of the increasing number of weed species that invade soil disturbances, posing serious threat to the sustainability of native grasslands. Municipalities may upgrade the status of weed species under the Alberta Weed Control Act. Industry and landholders are expected to consult with municipal authorities regarding local weed concerns and their status within the municipality. Weed control is a requirement under the Public Lands Act for all dispositions and is considered a serious issue that affects all stakeholders in a multiple use landscape. The Alberta Invasive Plant Council (AIPC) is a valuable source of information. The AIPC is a not-for-profit organization of professionals from all levels of government, industry, and non-government organizations. The AIPC was formed to address the lack of coordination and understanding associated with invasive plants within the province of Alberta.

The spread of invasive non-native species and weeds dramatically reduces the health,
function and operability of fescue grasslands. Winter forage, critical for sustaining important wildlife species such as elk, is reduced. Forage production for livestock is less stable and forage quality is diminished. Biodiversity, critical to ecological health and function, is diminished. The important hydrologic function that rough fescue grasslands provide is reduced, accelerating surface runoff, and soil erosion. This in turn affects both water quantity and quality for downstream users.

Factors Limiting Restoration Potential

Unlike many native prairie ecosystems, natural recovery has failed to restore foothills fescue plant communities as the native plants simply cannot compete with invasive non-native species. Disturbed sites seeded with native plant cultivars have resulted in limited success in reducing non-native species invasion. Long term restoration success has yet to be demonstrated and documented on industrial sites subjected to the full range of production and operational disturbance related activities.

Efforts and research to develop methods to successfully restore native rough fescue plant communities are ongoing and these efforts are encouraged. To date, commercially available rough fescue seed is available only through wild harvest collection. Many factors have prohibited the native seed industry from providing a reliable source of wild harvested rough fescue seed from the Natural Subregions of Alberta. Research projects and reclamation trials are ongoing regarding the use of nursery raised rough fescue grass plugs, forbs and shrubs. Wild harvested native seed has been used on a trial basis and research is currently being conducted regarding the use of wild harvested hay. These projects, while encouraging in the initial stages, have not been completed, nor subjected to a full range of environmental and climatic conditions.
Development Guidelines

Foothills fescue grasslands occur within a multiple resource valued landscape; where land use practices must be carefully integrated. These guidelines have been developed from minimum disturbance practices developed for the Grassland and Parkland Natural Regions of Alberta and the emerging concepts of Integrated Land Management (ILM). While many of these guidelines have been specifically designed to reduce the footprint of the petroleum industry in native grassland, it is expected that all industrial development will adhere to the broad concepts of the guidelines and develop industry specific best management practices.
Avoid Disturbance and Fragmentation of the Remaining Foothills Fescue Grasslands

The key guiding principle is **avoidance** of foothills fescue plant communities. Avoidance is accomplished by siting development (this includes all industrial, agricultural, residential, and recreational developments) adjacent to existing transportation corridors, on cultivated lands or improved pasture, and by using existing access trails or previously disturbed and non-native cover areas. It is important to include the infrastructure required during all phases of the project during planning. Avoidance is achieved through knowledge of the location, integrity and ecological status foothills fescue plant communities. To assist industry in identifying foothills fescue plant communities, the early engagement of a qualified rangeland professional, with training in the SRD rangeland health assessment protocol is expected. Site selection is expected to include the rangeland professional and experienced industrial construction personnel.
Minimize the Surface Soil Disturbance

Where avoidance of foothills fescue plant communities is not feasible, it is important that soil disturbance is reduced to the extent possible. The following guidelines apply to all development activities:

- minimize the amount and type of linear road or trail required to complete the development;
- utilize existing access trails and roads;
- conserve the integrity of the sod, topsoil and subsoil in situ where stripping is not required;
- minimize the amount of topsoil stripping and grading required for development.

The petroleum industry has been able to reduce the footprint of development activity on the native prairie landscape through:

- directional drilling of multiple wellbores from a single well pad;
- aligning flowlines with access requirements and by utilizing existing pipeline corridors;
- no strip or ploughed-in flow line construction in compatible soil profiles;
- and detailed soil handling procedures for large diameter pipelines with trench line stripping implemented in all areas that do not require grading for safety requirements.
All industrial developments are expected to incorporate the best available technology to reduce surface soil disturbance. This may include but is not limited to:

- the use of geotextiles to reduce the amount of topsoil stripping during construction where grading is required, and to reduce the scalping of the native prairie sod during topsoil and grade replacement in the rough micro-topography of foothills fescue grasslands;
- the use of interlocking rig mats installed over the grassland for temporary access or where appropriate, to reduce the amount of surface soil disturbance;
- minimize the disturbance related to fence line development (no grading of fence line route);
- locate agriculture infrastructure development (corrals, water developments etc.) to minimize disturbance.

**Control Invasive Species**

A detailed pre-development site assessment is required to determine the restoration risk associated with development activity. The seeds of invasive non-native plants are easily transported by wind, water, livestock, and machinery from source points within a much larger landscape. The following tools are important to determining restoration risk:

- Characterization of ecological range sites within the development footprint and local study area;
- Range Health assessment by a suitably trained rangeland agrologist of the local study area;
- Consultation with local municipal authorities (MD Council and Ag Fieldsman) to determine weed species of local concern with elevated status under the Alberta Weed Control Act;
- Identification of potential source points for invasive non-native species within the regional study area;
- Habitat requirements for the invasive species identified within the source points;
- Knowledge of the livestock grazing management plan within the project footprint and local study area.
Dormant Season Construction and Reclamation

Experience with minimal disturbance construction during the dormant season (August to April) has reduced the impact to native grasslands when implemented under dry or frozen ground conditions. However, foothills fescue grasslands are strongly influenced during the winter months by the sudden warming influence of the Chinook winds. Very strong winds (in excess of 100 km per hour) and sudden temperature rises to above freezing can cause serious delays in development activity, and adversely affect the chances for reclamation success. Serious rutting of unstripped sod can occur and there can be degradation of stripped soil quality and quantity through wind and water erosion. Therefore it is recommended that construction and reclamation activities occur between August 1 and Dec. 15th under dry or frozen ground conditions in foothills fescue grasslands.

The Importance of Site Maintenance and Long Term Monitoring

The restoration and stewardship of foothills fescue grasslands requires long term commitments by those that choose to live in the landscape, maintain sustainable ranching operations or develop sub-surface resources. There are no quick fixes for errors made, and recovery takes a long time. The petroleum industry requirements for reclamation certification at abandonment in native grasslands recognize the importance of maintaining native grassland ecological health and operability. Industry should be aware that sufficient funds for maintenance programs such as weeds and invasive non-native species control
will be required during the construction, production and reclamation phases of development. Science-based monitoring programs are required to guide the recovery of industrial disturbances in foothills fescue grasslands. Well designed monitoring programs are particularly important during the first five years following construction and reclamation. During this initial recovery period, issues can be flagged and management adjustments made that will increase the restoration outcome. Examples could include removing the perimeter fence to facilitate grazing on a well site to reduce Kentucky bluegrass invasion, or controlling early erosion issues on a pipeline, access road or production site. Range Health assessments conducted at year 5 and year 10 are particularly important to ensure the process of rough fescue recovery is proceeding in a positive trajectory, over time. The time frame for restoration of industrial soil disturbances to the pre-disturbance native plant community has not been documented to date but is estimated to take in excess of 30 years.

Closing Knowledge Gaps

SRD has initiated a number of projects designed to improve the management of foothills fescue grasslands within the context of multiple land use. The Grassland Vegetation Inventory, the Range Health Assessment Workbook, and the Range Plant Community guides, when combined, are powerful site selection, pre-disturbance assessment and post-disturbance monitoring tools. SRD and industry are in the process of developing training and certification programs for industrial application.
The Foothills Restoration Forum was established in 2007 as a venue for government agencies, industry, researchers, and stakeholders to promote the conservation, stewardship and restoration of the native plant communities of the south eastern slopes of the Rocky Mountains. The initial focus of the Forum is to promote restoration research of foothills fescue grasslands. In 2009, the technical advisory committee drafted key research questions in *A Prospectus for a Shared Approach to Research: Conserving and Restoring Rough Fescue Grasslands*. The prospectus was forwarded to research institutions across western Canada and the United States. The Forum general membership meets annually in the fall of the year and produces a newsletter entitled the *Hard Grass Advocate*. Information regarding Forum activities, the research prospectus, updates on ongoing research projects and copies of the newsletters can be accessed via the Foothills Restoration Forum website.
Additional Information:

Alberta Invasive Plant Council
www.invasiveplants.ab.ca

Range Health Community Guides: Foothills Fescue, Montane, Foothills Parkland and Sub-Alpine Natural Subregions

Range Health Assessment for Grassland, Forest & Tame Pasture, Field Workbook

ERCB Information Letters:

IL-2002-1 Principles for Minimizing Surface Disturbance in Native Prairie and Parkland Areas

IL 93-9 Oil and Gas Development Eastern Slopes, (Southern Portion)

Bulletin 2007-35 Clarification of Information Letter (IL) 93-9: Oil and Gas Development Eastern Slopes (Southern Portion). www.ercb.ca Click on Industry Zone, then Rules Regulations and Requirements

Foothills Restoration Forum

www.foothillsrestorationforum.com