Petroleum Industry Activity in Native Prairie and Parkland Areas

Guidelines for Minimizing Surface Disturbance

Prepared by the
Native Prairie Guidelines Working Group

January 2002

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Copies of these guidelines are available from

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Contents

Foreword

As part of an ongoing process to monitor the effectiveness of the existing guidelines and to reflect continuing improvement in industry practices and our understanding of native prairie and parkland environments, a review of the EUB's *Informational Letter (IL) 96-9: Revised Guidelines for Minimizing Disturbance on Native Prairie Areas* was undertaken. Since the original IL was released in 1992, there has been a dramatic improvement in practice by the petroleum industry, which the review team recognized. The current review reflects the recognition by both industry and regulatory agencies of the need to continually raise standards as the level of understanding of methods to minimize impacts on native prairie and parkland improves.

Representatives of government agencies having jurisdiction over petroleum industry activities in the prairie and parkland areas of Alberta were brought together to form the Native Prairie Guidelines Working Group, whose members are listed below. Industry, government, and public interest stakeholders were invited to review a draft document and provide input before completion of these final revised guidelines.

Native Prairie Guidelines Working Group Members

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The Working Group thanks everyone who assisted in the preparation of this document and those who provided input.

1 Introduction

1.1 Objectives

The participating agencies exercise responsibility for regulations and approvals, land management, and reclamation on both public and private lands, and it is their intention to have all mandates reflected in these guidelines. These guidelines detail how oil and natural gas exploration, development, production, and pipeline activities should be conducted in areas of native prairie and parkland in Alberta. They apply to all disturbances associated with petroleum industry development and their implementation is encouraged for development in native prairie and parkland areas both on public and private land. Although the guidelines are developed specifically for the petroleum industry, the principles and practices should be applied to any other activities proposed for an area of native prairie or parkland. The guidelines are not intended to preclude innovation on the part of industry; they are considered to be the minimum standard that many stakeholders already meet or surpass.

Specifically, the objectives of these guidelines are to

- promote the conservation of native prairie and parkland areas,
- provide a consistent framework through which government, industry, and the public may consider development activities in prairie landscapes,
- provide clear, consistent, and integrated standards for use by industry undertaking development in native prairie and parkland, and
- ensure that practices are fair and practical, allowing reasonable opportunities for continued petroleum industry activities while conserving native prairie and parkland landscapes.

A supplementary educational document entitled *Prairie Oil and Gas: A Lighter Footprint* (Sinton, 2001) has been prepared. It provides details on best practices and mitigation options to protect native prairie and parkland.

1.2 Use of the Guidelines

The guidelines are intended to be a planning tool for project applicants and operators and serve as the best practices needed to achieve the principles of minimal disturbance identified in EUB *IL 2002-1*. These guidelines supplement the applicable regulatory processes by providing industry with an understanding of the principles and general guidelines for protection of native prairie and parkland. These guidelines are intended to be applied with judgement by the land manager/regulator in consultation with the industry operator based on the site-specific factors of each individual case. While examples of recommended practices for minimizing surface disturbance are cited, it is recognized that safety may be an issue and must also be considered.

Minimizing disturbance on native prairie and parkland is the shared responsibility of the appropriate land management agency or regulator, the surface leaseholder or landowner, and the industry representative. These guidelines are to be applied to large tracts of unbroken native prairie and

parkland, as well as small, remnant native prairie and parkland areas within disturbed landscapes. The responsibility for identifying the presence of native prairie and parkland and the subsequent application of these guidelines is held jointly by the appropriate agencies and the operator. Operators are strongly encouraged to contact landowners, lessees, and representatives of the public land management agencies (see Appendix 1) to determine if native prairie is present in areas where development is proposed.

Native prairie and parkland areas in Alberta are affected by a variety of land uses, including oil and gas development. These land uses affect the ecological integrity of the prairie environments and, if not managed properly, lead to the loss of native prairie and parkland landscapes. Past methods of land management and reclamation have not always resulted in preservation of or a return to the original native prairie and parkland structure, resulting in a net loss of native biodiversity. A twofold strategy is required: minimizing industrial disturbance to the extent possible, and developing practical methods that will allow eventual restoration of impacted areas of native prairie and parkland. Monitoring and adaptive management should be used to ensure validation of and continued improvement to the protection strategies being employed.

1.3 The Prairie Resource

Native prairie is an area of unbroken or recovered grassland or parkland dominated by native plant and wildlife species. It is found largely in the Grassland and Parkland Natural Regions of Alberta and in the Montane subregion, with remnant sites occurring elsewhere in the province (see Figure 1 and Appendix 2). Native prairie and parkland landscapes are diverse and may include riparian forests, potholes and wetlands, badlands, shrub-dominated communities, and sandhill complexes.

Native prairie landscapes remaining in Alberta are found mainly in the Grassland Natural Region where less than half of the land base remains in its native state. Much of the prairie that remains is highly fragmented. Extensive tracts of native prairie are found only in the east-central and southeastern parts of the province in the dry Palliser Triangle. Outside the Grassland Natural Region, native grasslands exist in the Parkland, Foothills, and Peace River areas. Baseline inventory work has been completed for the Grassland Natural Region, but less complete information is available for other natural regions (see Appendix 2). Information on the amount of native vegetation in every quarter-section of the Grassland Natural Region can be obtained on the Prairie Conservation Forum Web site <www.albertapcf.ab.ca/background.htm>.

In a global context, grasslands are considered to be the world's single most threatened ecosystem and are a conservation priority in North America (Samson and Knopf, 1996). In Canada, species at risk are concentrated in the southern prairies, (Canadian Biodiversity Strategy, 1995), and about 75 per cent of Alberta's seriously at-risk wildlife species rely on prairie habitats (Alberta Environment/Alberta Sustainable Resource Development, 2001). Over time, Alberta's native prairie and parkland landscapes have been and are continuing to be transformed by agricultural, industrial, commercial, recreational, and residential/urban development. Appendix 3 suggests sources of information on

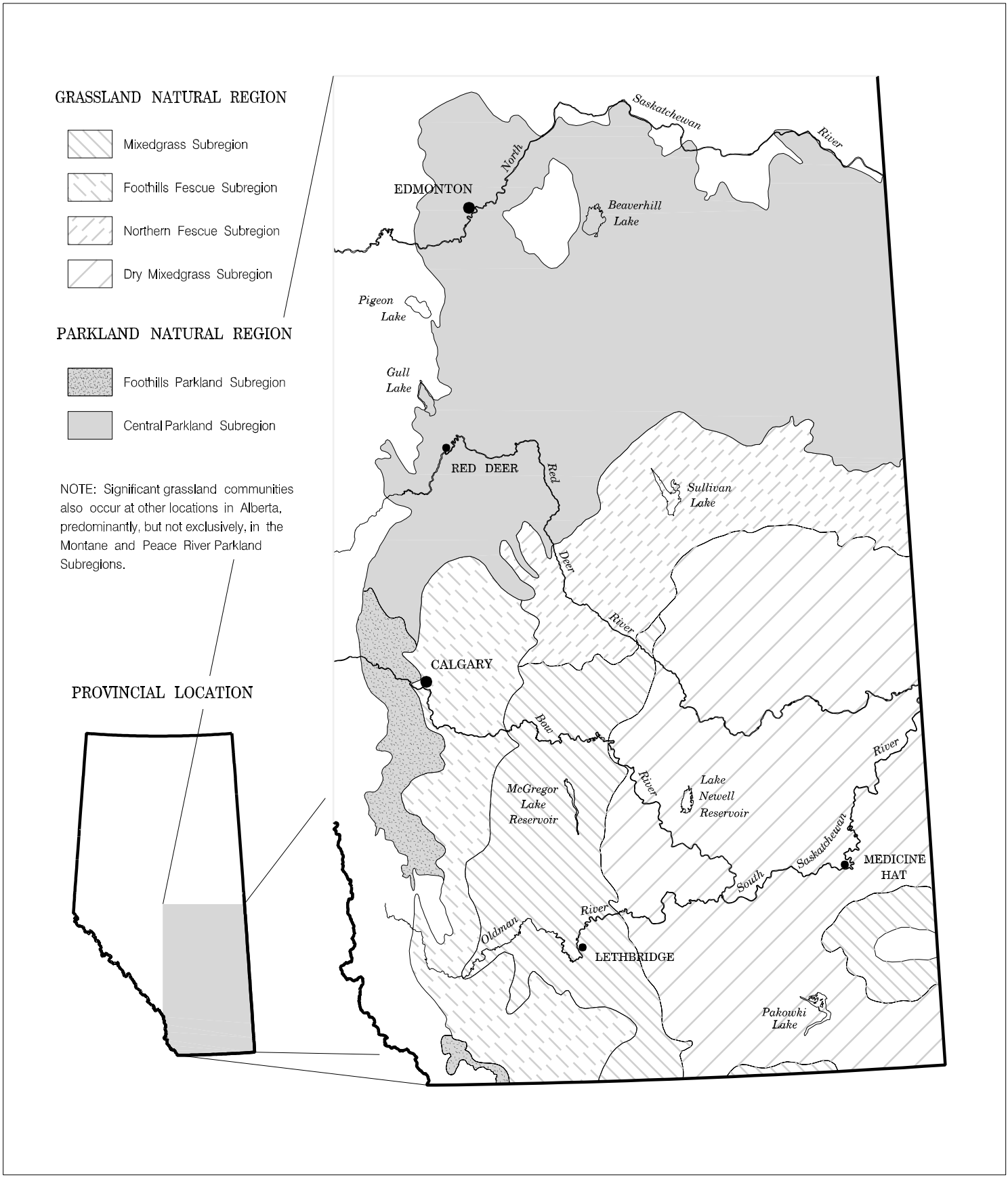

Figure 1: Natural regions in Prairie and Parkland Alberta. Native prairie is found largely in the Grassland and Parkland Natural Regions as well as in the Montane Subregion. Remnant sites occur elsewhere in the province. Refer to the Natural Regions map in the Native Plant Revegetation Guidelines (Native Plant Working Group 2000, or http://www.agric.gov.ab.ca/publiclands/nprg/index.html) for further information.

wildlife setback and timing restrictions. In addition, the Alberta Natural Heritage Information Centre (ANHIC) Web site contains information on elements of concern (e.g., plant communities, invertebrates) <www.gov.ab.ca/env/parks/anhic/anhic.html>.

In the past decade, the profile of prairie conservation in Alberta has been raised significantly. The Prairie Conservation Action Plan (PCAP) was released jointly by the World Wildlife Fund Canada and the Government of Alberta in 1988. Alberta PCAPs were developed in 1996 and 2001 and continue to focus on the conservation of biodiversity in Alberta's native prairie and parkland landscapes. Information is available through the Prairie Conservation Forum Web site (www.albertapcf.ab.ca).

Alberta's remaining areas of native prairie and parkland have multiple use values (e.g., extensive recreation, hunting) and environmental significance (e.g., habitat, natural landscapes, undisturbed archaeological sites) and provide environmental services (e.g., groundwater recharge, carbon storage). Society values these areas; conserving them is in the public interest.

2 General Guidelines

The principles described in EUB *IL 2002-1*, for which this document details best practices, provides the general guidelines applicable to minimizing disturbance.

It cannot be overemphasized that project planning should take into account the whole development and consider the timing and location of activity. Applicants should try not to locate development activities in native prairie or parkland landscapes wherever possible. If development in a native prairie or parkland landscape is unavoidable, efforts should be made to minimize fragmentation and protect intact portions of native prairie or parkland landscape (e.g., locate development activities at the edge of a native prairie landscape rather than through the middle as much as possible).

On extensive tracts of native prairie and parkland landscape, where the existing footprint of industrial development and other land-use impacts are minimal, applicants may need to adopt special measures to ensure that

- the industrial footprint and associated activities do not cause significant disturbance to the structural and functional integrity of native prairie and parkland ecosystems,
- disturbed areas are restored to an equivalent capability native prairie or parkland landscape, and
- scenic and aesthetic values of the open native prairie and parkland landscape are retained.

Project proponents should continually refer back to the principles identified in *IL 2002-1* to guide them in the planning and implementation of their project design and ongoing operations. Those principles can be used as a tool to measure how successfully the best practices described in this document are being used.

3 Exploration (Seismic/Geophysical) Programs

Petroleum exploration activity is legislated under the Exploration Regulation of the Mines and Minerals Act (Part 10). The Environmental Protection and Enhancement Act (EPEA) covers only exploration as related to coal and oil sands.

Proper planning of oil and gas exploration programs will minimize the potential for adverse environmental effects on native prairie. Exploration programs, especially 3D programs, are increasing in size and may potentially affect large areas of land, although only for a short period of time. All programs in which environmental sensitivity is a factor should ensure that field crews receive adequate education and training and that their work is monitored during operations. The three key components of a successful exploration program are

1) environmental planning,
2) field operations, and
3) reclamation.

3.1 Key Contacts

Exploration activity is legislated under the Exploration Regulation of the Mines and Minerals Act and administered by Alberta Sustainable Resource Development, Land Administration Division (LAD). The one-window contact number is (780) 427-3932 or e-mail <LFS.Seismic@gov.ab.ca>. There are two main groups of land managers that should be contacted to discuss seismic programs on public land: Alberta Sustainable Resource Development (ASRD) Public Lands Division (White Area) and Land and Forest Division (Green Area). The Special Areas Board (SAB) and municipalities should be contacted regarding proposed exploration programs. In addition to being the land managers, these agencies may also conduct exploration-related inspections on public land.

Exploration activity on private land and surveyed road allowances is monitored by the geophysical inspector group of the Land and Forest Division. Although the SAB has no legislated mandate under the Exploration Regulation at this time, they are considered the land manager and exploration inspector for public land within the "Special Areas." The Fish and Wildlife Division of ASRD may review programs to evaluate any fish and wildlife concerns. Landowner approval is required to gain access for exploration programs on private land. Alberta Community Development may also review programs to evaluate any parks and protected areas concerns or potential impact to significant historical resources.

3.2 Environmental Planning

Location and spacing of exploration program lines usually determines the potential and scope for environmental damage. Impacts can be minimized through careful, thorough planning. As part of planning, applicants are advised to complete an environmental screening to identify any environmental sensitivities or historical resources. For most exploration projects, baseline environmental screening can be done quickly and effectively by referencing current critical wildlife referral maps (e.g., for critical wildlife habitat, environmentally sensitive areas).

A geophysical field report (GFR) must be attached to all applications for exploration programs that include some or all public land (except public land within the Special Areas). (The GFR guidelines and form can be found under Exploration at <www.gov.ab.ca/env/land/LAD/index.html>.) As part of the requirements for the GFR, the applicant needs to check for any known areas of concern on the land, such as wildlife constraints. In addition, any identified interests in the land need to be checked through the Land Status Automated System (LSAS). For lands within the Special Areas, applicants should check the Special Area's Management System (SAMS).

Applicants can obtain advance information on important prairie features and assistance with planning and mitigation measures through discussions with land managers, landowners and, in some cases regional wildlife biologists. Before a letter of approval is issued, Fish and Wildlife Division may review the proposed exploration program for any fish and wildlife or water management concerns and provide comments to the appropriate land management agency.

In all cases, landowner consent is required to gain access for exploration on private land, and leaseholder consent is required for access onto leased land. The letter of approval will contain the operating conditions from the land management agency. The landowner or leaseholder may require additional operating conditions through the permitting/consent process, but these must not contravene the Exploration Regulation (Mines and Minerals Act).

Access to the program area should be selected carefully, usually in consultation with the land manager(s) or landowner/occupant. Key considerations include the volume and type of equipment, time of year, repeated trips versus one pass through, and any requirements from other identified land interests. Access for exploration should use existing access whenever possible. Development of new access must be minimized and existing road allowances used as much as possible.

3.2.1 Areas of Concern for Mitigation

There are several known areas of concern that need to be identified and mitigated in the native prairie and parkland:

Environmentally Significant Areas (ESAs) and Special Features

In some cases, these features may require avoidance or implementation of special planning and mitigation efforts. Wherever possible, lines should be located on less sensitive areas. Exploration activity is not allowed in municipal parks and may be restricted in certain areas with unique, sensitive, or protected areas designations. Both legislation and management plans need to be consulted with respect to these activities on a case-by-case basis. Information on how to acquire ESA reports is available on the Prairie Conservation Forum Web site at <www.albertapcf.ab.ca/esaIntro.htm>.

Terrain and Soils

Where possible, mechanical cutlines should avoid sensitive terrain or soil conditions (e.g., steep, erosive slopes; sand dunes; coulee complexes; wet soils).

The applicant is advised to consult with the land manager or landowner/occupant where site alternatives are limited.

Drainage Systems and Wetlands

Drainage systems include all permanent and intermittent channels, coulee systems, and riparian zones. In addition to drainage systems, wetlands are also highly sensitive to disturbance from exploration activities. Wetlands are considered to be the area within the high-water mark of permanent and intermittent water bodies, including dry lake beds. Wherever possible, exploration activities should be planned to avoid drainage systems and wetland areas.

Where crossing these areas cannot be avoided, applicants should consult the land manager(s) to discuss mitigation methods (Water Act). Mechanical equipment used for access that may cause surface disturbance is not allowed in coulees or through river benchland areas. Narrow (maximum 1.5 metres wide), hand-cut lines are generally allowed through tree and shrub communities. Conventional seismic drilling is not allowed within the historic bank of dry lake beds in Special Areas and generally is not allowed in the White Area. Where allowed, it is subject to surface and groundwater protection restrictions. Vibroseis (in dry conditions) and hand-placed geo-phones may be allowed within high-water-mark areas.

Vegetation

The ANHIC database should be reviewed for an initial determination of whether or not rare plants are a concern in the area proposed for exploration (see ANHIC Web site <www.gov.ab.ca/env/parks/anhic/anhic.html>). Where practical, rare plants or sensitive vegetation communities should be avoided. In cases where avoidance is not feasible, reference should be made to the Alberta Native Plant Council's *Guidelines for Rare Plant Surveys*, available on its Web site <www.anpc.ab.ca>.

Wildlife

Wildlife issues are mainly related to disturbance of sensitive features (e.g., denning or nesting sites, important winter range) and timing (disruption of wildlife during critical periods; e.g., mating, nesting). Applicants should contact regional wildlife biologists to check for concerns over specific species or habitats and discuss avoidance or mitigation procedures. (See Appendix 3 for further information regarding sensitive wildlife.)

Historical Resources

The *Listing of Significant Historical Sites and Areas* (Alberta Community Development, 2001) is to be reviewed to determine if any designated historic sites (i.e., Provincial Historic Resources, Registered Historic Resources) or other significant historical resources are situated within the exploration area. The Cultural Facilities and Historical Resources Division may also review 3D programs located within buffer zones adjacent to significant historical resources and those 3D programs that may impact other previously recorded historical resources located on lands described in the *Listing of Significant Historical Sites*

and Areas. (See Appendix 5 for further information regarding the historical resources management program for the petroleum industry.)

Proposed Shot Hole Depth

In areas where there is a risk of encountering saline water near the surface, the proposed drilling depth should be reduced to avoid subsurface saline water. Shot hole drill cuttings should be replaced and any additional drill cuttings spread to a thickness that will not negatively impact vegetation growth. If the latter is not possible, the additional drill cuttings will need to be removed and disposed of in an acceptable manner out of the program area.

3.3 Field Operations

With appropriate planning, the potential negative environmental impacts can be minimized. Operational guidelines that should be used to reduce the risk of short- and long-term impacts are given below.

3.3.1 Access Management

Vehicles and equipment with the least potential for surface disturbance should be selected early in the planning stage. Off-road access is usually permitted only during dry or frozen ground conditions. Access through areas that require clearing (e.g., trees, shrubs, and vegetation) should be minimized as much as possible. Access across wet areas should be avoided entirely. Access routes should observe suitable setback distances and timing restrictions associated with sensitive wildlife and features (see Appendix 3).

3.3.2 Scheduling of Operational Passes

Careful scheduling of exploration activities is necessary to minimize the potential for adverse impacts, such as soil erosion or rutting, disturbance of wildlife, or conflicts with grazing or recreation activities.

Operators causing impacts may face penalties or project shutdown. Timing constraints for the protection for specific wildlife species should be observed, and applicants should consult the regional wildlife specialist (see Appendix 3). Applicants should endeavour to consult with land managers, occupants, and landowners to minimize disruption to cattle grazing and any other land-use activities. Typically activities scheduled during dry and frozen ground conditions have the least potential for impact. Activity during wet conditions should be avoided where that activity will result in breaking of turf.

3.3.3 Soil and Vegetation Management

Exploration activities typically have a limited effect on soils. Even so, equipment travel in an area should be minimized, and low ground pressure equipment should be used to reduce the potential for excessive rutting, pulverization, and compaction of the soil. Snow ploughing and any other surface stripping or scalping techniques may result in irreparable damage to native prairie, so care is required to minimize this risk.

Exploration activities should be conducted in a manner that minimizes clearing of vegetation; where possible, hand-cut lines should be used in sensitive areas. Cottonwood trees should be protected from removal or damage in river valleys and on floodplains.

3.3.4 Wildlife

All operations should observe suitable wildlife timing restrictions and setback distances identified and agreed upon during the planning phase (see Appendix 3). Vehicles and equipment should observe low speed limits to minimize the risk to wildlife. The presence of dogs or firearms should not be permitted at the job site. Harassing wildlife is prohibited.

3.3.5 Historical Resources

Exploration programs must not impact significant historical resources (Historical Resources Act). Generally, exploration activities have a limited effect on historical resources, and in certain circumstances the hand placement of geophones will be considered for significant historical sites and areas. Snow ploughing and any other surface stripping or scalping techniques may result in impacts to historical resources, and applicants may be required to conduct historical resources impact assessments. Shot holes must avoid obvious stone features (e.g., tipi rings) (see Historical Resources Act).

3.3.6 Drainage and Other Watercourse Crossings

When exploration operations must cross drainages, wetlands, or other watercourses, the mitigation measures identified during planning should be observed. Lightweight portable drilling equipment and/or hand-laid lines are required for operations on steep coulees and in riparian areas.

3.3.7 Materials Handling

Fuel and explosive materials must be stored in an area not accessible to wildlife or livestock (Wildlife Act). Fuelling areas should be located off native prairie as much as possible and must be located away from drainage and wetland areas (Water Act).

3.3.8 Field Crews

Communication, education, and training of field crews is critical to the success of an exploration program. If field staff are concerned and aware of the operational restraints for the program, planning and operational guidelines will more likely succeed.

3.4 Reclamation

Reclamation must occur for all exploration programs on public land. If reclamation is found to be acceptable, a letter of clearance is issued. Minimizing surface disturbance will mitigate most revegetation and reclamation concerns. Natural revegetation is preferred where there is no concern of soil erosion or weeds. (See Section 6 for further details.)

4 Drilling and Production

The drilling and production of oil and gas well sites can minimize environmental impacts if adequate predevelopment planning and ongoing environmental protection measures are implemented. Environmental impacts can be avoided through planning of facility locations, access, and associated infrastructure, proper site construction, and the prevention of spills and releases of harmful materials during operations. Managing development from project conception to reclamation is the key to minimizing environmental liability.

4.1 Key Contacts

Drilling activities are regulated primarily under the acts and regulations administered and managed by the Alberta Energy and Utilities Board (EUB), Alberta Environment (AENV), and Alberta Sustainable Resource Development (ASRD). Applications for well licences must be submitted to the EUB (Oil and Gas Conservation Act). On White Area public lands, companies require a Mineral Surface Lease (MSL) for surface development and a Licence of Occupation (LOC) for an access road (Public Lands Act). Since November 1, 2001, a Siting Information Report is also required on White Area public lands. Environmental Field Reports (EFRs) are required for lands within the Green Area of Alberta. Land managers will review MSL and LOC requests to evaluate any environmental and land-use concerns. Areas with specific wildlife concerns are referred to the Fish and Wildlife Division of ASRD and parks and protected areas concerns are referred to the Parks and Protected Areas Division of Alberta Community Development (ACD). Historical resource issues are referred to the Cultural Facilities and Historical Resources Division of ACD. Companies developing on private lands must obtain a surface lease agreement with the landowner or occupant, or both (Oil and Gas Conservation Act).

Production activities are regulated mainly by the EUB through the Oil and Gas Conservation Act. Production activities must also meet any relevant conditions of the Environmental Protection and Enhancement Act (EPEA) and the Water Act, administered by AENV.

4.2 Environmental Planning

Predevelopment planning and design, will, if properly done, help to minimize environmental impacts, reduce costs for site reclamation, and decrease the risk of acquiring environmental liability. Site and route selection, scheduling of activities, construction and drilling practices, and operational activities should all be considered early in the planning process. Applicants should check for any notations (e.g., Protective Notations [PNTs] and Consultative Notations [CNTs]) on the land base using such tools as Land Status Automated System (LSAS) and the Special Areas Management System (SAMS). Applicants should also consult with land managers or landowners regarding siting options. An environmental screening program can be used to identify environmental or social sensitivities and to determine the scope of environmental assessment that may be needed for the proposed project.

In the early planning stages, applicants are expected to consider the needs and implications of their whole project. While full program details may not be

available at the exploratory or delineation stages of a development, they should be anticipated. Thus, placement of the "first footprint" should be done in a manner that will minimize the risk of environmental and social impacts if additional well sites and infrastructure are later required. In particular, the need for a pipeline should be considered in association with even a single well site. See Section 5 for details relating to pipelines.

4.2.1 Site and Route Selection

Development within native prairie and parkland should preferentially use any previously disturbed sites or areas of tame pasture or cultivation. The level of disturbance can also be minimized by using methods such as directional drilling, horizontal drilling, slant-hole drilling, or multiple well pad sites. Infrastructure (e.g., access, pipelines, power lines) should typically be consolidated into a single utility corridor. Where endangered or rare plant or animal communities or historical resources are likely to be affected, detailed surveys may be required to identify these sensitive resources and to complete the fine tuning of a well site and access location.

Applicants and land managers must consider the impacts of the proposed development in the context of preserving the structural and functional integrity of native prairie and parkland ecosystems. Specifically, consideration should be given to wildlife habitat, riparian zones, soil resources, water resources and drainage patterns, wildlife and fisheries resources, and aesthetics. Addressing these issues throughout the planning and development stages will reduce maintenance and reclamation costs.

Environmentally Significant Areas (ESAs) and Special Features

Applicants should check ESA documents and consult with land managers and regional wildlife specialists for areas in which they propose development. On public lands the public land manager or the Special Areas Board (SAB) must be consulted with respect to potential development in environmentally sensitive landscapes (e.g., floodplains, and dunes) (Special Areas Act). Drilling on private land is subject to EUB *Guide 56: Energy Development Application Guide*. Applicants must notify AENV's inspectors prior to applying for a well licence when drilling in environmentally sensitive areas, as outlined in the guide. Adjusting the location of well sites and associated infrastructure to avoid sensitive areas and special features is preferred. Where endangered or rare plant or animal communities or historical resources are likely to be affected, surveys may be required to identify these sensitive resources and to develop effective avoidance or mitigation strategies. Information on Alberta species at risk can be found at <www3.gov.ab.ca/srd/fw/riskspecies/>. Habitat loss should be avoided in environmentally sensitive areas. Information on how to acquire ESA reports is available on the Prairie Conservation Forum Web site at <www.albertapcf.ab.ca/esaIntro.htm>.

Terrain and Soils

Well sites and associated infrastructure should be located as much as possible in subdued terrain where limited grading is required. Well sites should not be located on erosive slopes or slope break locations or in areas with wet or

otherwise sensitive soil conditions. Consideration should be given to minimizing the need for associated access or pipelines to cross such areas.

Drainage Systems and Wetlands

Well sites and access roads should avoid coulee complexes, river benches, wetlands, dry lake beds, and riparian areas. A setback distance should be determined from all coulee breaks and the high-water mark of all wetlands, including dry lake beds, through consultation with land managers, AENV regional inspectors responsible for the Water Act, or ASRD Public Lands Division personnel (refer to Alberta Agriculture, Food and Rural Development's August 1993 *Slope and Break Setback Guidelines for Wellsites and Associated Infrastructures on Public Land in the White Area*). For development of access roads or pipelines across drainage channels, applicants should consult the Water Act Codes of Practice (Alberta Environment, 2000) to determine acceptable methods.

Vegetation

Well sites and associated infrastructure should be positioned or routed to minimize disturbance to sensitive or unique vegetation communities and rare plants. If such areas cannot be completely avoided, use of special mitigative measures is required. Applicants should consult the ANHIC database <www.gov.ab.ca/env/parks/anhic/anhic.html> for an initial determination of whether or not rare plants are present. In cases where avoidance is not feasible, reference should be made to the Alberta Native Plant Council's *Guidelines for Rare Plant Surveys*, available on its Web site <www.anpc.ab.ca>.

Wildlife

Wildlife issues are related to physical loss of habitat and to sensory disturbance during construction, drilling, and operations. Applicants should contact regional wildlife specialists to determine concerns over species or habitats. Sensitive features (e.g., denning or nesting sites) can be avoided through observation of suitable setback distances for particular species. Limiting the timing of specific activities may also be required during critical periods (e.g., mating, nesting seasons). Further information can be found in Appendix 3.

Historical Resources

Applicants must check the *Listing of Significant Historical Sites and Areas* (Alberta Community Development, 2001) for an initial determination as to whether the well site lease is targeted for lands described within the listing (EUB *Guide 56: Energy Development Application Guide*). Well site leases and access roads must avoid significant historical resources (Historical Resources Act). Applicants should contact staff of the Cultural Facilities and Historical Resources Division to determine specific concerns and requirements. A historical resources impact assessment may be required.

4.2.2 Access Management

Access during the drilling phase should use existing trails or temporary access across the prairie. Timing of activities to ensure dry or frozen ground conditions is essential. Access routes should observe suitable setback distance and timing

restrictions associated with sensitive wildlife (see Appendix 3) and features (e.g., coulee complex). Where alternative routing is available, existing access through sensitive areas will not guarantee future access for industrial development.

All-weather access roads may be required during the production period of a development. Production access should also use existing access routes whenever possible. Where the development of new access is required, it should be carefully planned to

- minimize the level and extent of disturbance,
- avoid sensitive areas, such as wet soils and erosive slopes,
- avoid the need for clearing trees and shrubs,
- use areas such as municipal road allowances as much as possible, and
- observe relevant setback distances from sensitive wildlife habitat, parks, and protected areas.

Access management through the use of fencing and gates may be required to protect sensitive areas, as well as for the protection of the public. Access management issues should be discussed with the land manager and other affected parties.

4.2.3 Scheduling

Effective scheduling of construction, drilling, and operational activities can minimize the potential for environmental impacts and land-use conflicts. Ideally, all activities should be timed to

- accommodate landowner/occupant use of the land and minimize disruption of grazing activities,
- observe restrictions due to wildlife concerns (e.g., nesting, migration),
- observe restrictions due to drainage crossing concerns, and
- ensure construction and access during dry or frozen ground conditions.

For timing issues related to spring breakup or adverse weather conditions, operators should refer to AENV's *Conservation and Reclamation Information Letter (IL) 98-4: Voluntary Shut Down Criteria for Construction Activity or Operations* for further guidance.

4.3 Construction

Construction involves development of road access and pad site preparation. Applicants should consider weather conditions, duration of drill, etc., and make every effort to ensure that all construction and drilling activities can be completed during the period of frozen or dry ground conditions. Rigs may need to be left on site where wet conditions limit mobilization off site.

4.3.1 Access Management

Access routes should be selected to minimize the need for any terrain modifications, either during temporary access or when more permanent access is required. In the event that any cut and fill is required, erosion control measures must be implemented (EPEA).

Typically permanent all-weather roads will not be bladed or built for the drilling phase. In areas where access cannot avoid soft or sensitive terrain, measures such as the use of geotextiles or the limited application of gravel should be considered to minimize impacts such as rutting.

In the construction of all-weather roads, applicants are required to salvage and conserve topsoil resources, design the road bed and install structures to maintain local drainage patterns, install erosion control measures, and revegetate disturbed lands (Environmental Protection and Enhancement Act, Water Act). Weed control is essential (Weed Control Act).

4.3.2 Well Site

The need for cut and fill at well sites can be reduced largely through careful site selection, altering the size and shape of pad sites, and the use of self-levelling rigs. In the event that some terrain modifications are needed, back sloping should be compatible with the surrounding landscape and contoured to prevent erosion.

All efforts must be made to minimize disturbance, taking into consideration the size of rig, duration of drilling, terrain, and soil conditions. Where soil handling is required, topsoil must be appropriately stripped and stored for future reclamation (EPEA). “No-stripping” can be considered for drilling of shallow gas wells on a site-specific basis. Soil handling should only be undertaken when the ground is dry or frozen. Stripping when the ground is frozen may require extra care and specialized equipment. Soil-handling equipment should be clean and free of weeds. If natural recovery is planned for revegetation, consideration should be given to salvaging the sod layer (seed bank) separate from the topsoil layer. Soil resources must be protected from wind and water erosion during the construction period and throughout the production period (EPEA).

4.4 Drilling Operations

4.4.1 Access Management

Access management during the drilling phase is important to minimize impacts, particularly to temporary or existing access. Efforts should be made to minimize the number of vehicle passes required to mobilize and demobilize equipment and associated with the day-to-day drilling operations (e.g., worker access, movement of drilling fluids). Access may need to be temporarily suspended in the event of short-term wet ground conditions.

4.4.2 Drilling Fluids

Temporary licences for withdrawing water are issued by AENV personnel. Vehicles used for water withdrawal should avoid driving onto stream bank and shoreline areas, potentially damaging them. Water trucks should be clean and free from leaking fluids.

Applicants are encouraged to recycle drilling fluids to minimize water volume requirements and subsequent impacts to the prairie. Fluids associated with drilling systems should be managed to prevent contamination to surface water,

groundwater, or soil resources. The use of portable flare pits, berms, clay pads, catchment pans, and filter fabric are options that can be considered to reduce potential impacts. Except where full site stripping has occurred, only aboveground sumps (tanks) or remote sumps (off native prairie) are allowed on native prairie and parkland areas on public lands.

The handling of drilling fluid is subject to EUB *Guide 50: Drilling Waste Management*. The method of drilling waste disposal must be considered prior to starting the drilling program. Ideally, new or additional surface disturbance would not be undertaken to facilitate fluid disposal. Consideration should be given to the use of fluid formulations that lessen the impact on vegetation, wildlife (including invertebrates), and soil and increase the success of reclamation techniques. Often disposal problems associated with drilling fluids are related to salinity or sodicity from make-up water. Testing of make-up water sources can minimize disposal problems later on.

Disposal of waste by land spraying while drilling (LWD) is limited to freshwater-base gel drilling mud systems and should be targeted for cultivated land first, then tame hay land, and finally native prairie as a last resort where allowed. LWD is not allowed on native prairie in the Special Areas. In situations where long-haul distances are involved to reach nonprairie lands for LWD, applicants should consider the overall impacts of hauling. An LWD location on a nearby native prairie site may be preferred. Written permission is required from the land manager for LWD on public land, and permission from private landowners is required for their land.

4.5 Production Operations

4.5.1 Long-term Access

Long-term access is required during the production phase and, depending on environmental conditions and access requirements (frequency and equipment), may be facilitated by using existing or temporary access routes. If operators continue to use existing or temporary access, there may be limitations, such as during wet ground conditions or critical wildlife periods. Operators are expected to monitor for impacts such as erosion and rutting, and if impacts are noted, it may be necessary to upgrade access as a means of environmental protection. Non-permanent access to remote wells should be considered, especially in sensitive areas.

4.5.2 Site Management

Waste and spill management programs should be developed for sites taking into consideration environmental sensitivities. The use of aboveground tanks and dikes is encouraged for containment and spill control, as this minimizes the need for surface disturbance. Operators should consult EUB *Guide 55: Storage Requirements for the Upstream Petroleum Industry* and *Guide 58: Oilfield Waste Management Requirements for the Upstream Petroleum Industry*.

Managing vegetation on producing sites may be a particular challenge. All steps possible should be taken to minimize the introduction of weed species into native

prairie and parkland areas. Mowing before seed set should be the first choice to control undesirable plants (e.g., crested wheat grass). Spot spraying with herbicides may be used as necessary to control invasive weeds and agronomic species. Soil sterilants may be prohibited from use in vegetation control. The land manager should be consulted in this regard.

Regular site inspections and monitoring should be undertaken to ensure that impacts to soil and vegetation are not occurring over the life of the project. In particular, erosion and weed control are necessary.

4.5.3 Interim Reclamation

Typically the perimeter areas of an operating well site are reclaimed, leaving only a "teardrop" working area around the wellhead. Perimeter areas should be contoured to the surrounding landscape condition, have topsoil reapplied, and be seeded to a suitable vegetation cover. Topsoil from the teardrop area should be feathered onto the immediately adjacent reclaimed area and stored there as a reserve for final reclamation. Revegetation should be done with compatible native species to minimize the need to rid sites of undesirable vegetation when final reclamation is undertaken. (See Section 6 for further details.)

4.5.4 Completions and Workovers

The movement of vehicles and equipment and the presence of fluids during well completions and workovers can result in environmental impacts. Except in genuine emergency situations, mobilization and demobilization should be done when soils are dry or frozen. Water use and fluid disposal should follow the guidelines set for drilling fluids in Section 4.4.2. The disposal of oilfield wastes is regulated by the EUB (*Guide 58*). The necessary surface tanks and secondary containment systems are required.

Where interim reclamation has been completed at a site, it is important that subsequent work not cause negative impacts to soil resources. Operators should ensure that the working area is sufficient for all equipment and operations. Movement of vehicles and equipment should be limited to designated areas. If redisturbance of previously reclaimed land is required, further reclamation activities are necessary (EPEA). Applicants should be aware that with each disturbance of a site they may face increasingly difficult reclamation challenges; thus every effort should be made to minimize multiple disturbances of the land base.

5 Pipelines

The potential for environmental impacts associated with pipelines can be largely addressed through predevelopment planning and implementation of appropriate construction and reclamation methods. Further, pipelines are typically associated with a very short-term impact due to reclamation following immediately after construction. However, regular operations and maintenance, emergency situations during the operating life of a pipeline, and discontinuance and abandonment processes also have the potential to generate impacts. Applicants are reminded that while the immediate postconstruction reclamation is critical, there is also an obligation at abandonment to ensure that "final" reclamation is complete.

The following guidelines should be applied to all pipelines, including tie-ins/flowlines, regardless of diameter or length.

5.1 Key Contacts

Activities related to the planning, construction, operation, and abandonment of oil and gas pipelines are regulated by the Alberta Energy and Utilities Board (EUB) (Pipeline Act). In addition, Alberta Environment (AENV) regulates conservation and reclamation activities on private and public land within the Special Areas (usually gathering, transmission and distribution pipelines). Operators are required to notify AENV of proposed pipelines. Notification requirements vary, depending on the size of the line. Operators should refer to AENV *Conservation and Reclamation Information Letter 00-7*: *Notification for Class II Pipelines on Private Land* for further guidance.

A Pipeline Agreement (PLA) is required on public lands (Public Lands Act). Approvals from federal authorities such as Environment Canada and the Department of Fisheries and Oceans may also be involved, depending on the type of activity. Operators must also obtain landowner consent for construction of new pipelines across private lands: from Alberta Sustainable Resource Development (ASRD) (Public Lands) for construction on White Area public land, from Land and Forest Division (ASRD), for construction on Green Area lands, and from the Special Areas Board (SAB) for projects scheduled within the Special Areas (Public Lands Act, Special Areas Act).

5.2 Environmental Planning

As with other development activities, predevelopment planning and design can help to minimize environmental impacts and social concerns and ensure that successful reclamation is achieved. Route selection should be undertaken early in the planning stages to identify any concerns or sensitivities and ensure that specific construction and reclamation objectives can be met. Environmental screening can be used to identify environmental and social issues and direct the scope of any further environmental assessment work.

Applicants should check for any notations (e.g., Protective Notations [PNTs] and Consultative Notations [CNTs]) on the land base using such tools as the Land Status Automated System (LSAS) and the Special Area Management Systems

(SAMS). Applicants should also consult with land managers or landowners regarding siting options. Additionally, the *Code of Practice for Watercourse Crossings* (Water Act) (AENV, 2000) should be consulted to determine any water-crossing requirements that need to be considered.

5.2.1 Route Selection

Pipelines should be preferentially routed through existing disturbed lands, especially rights-of-way (ROWs), or areas of tame pasture or cultivation (with the possible exception of twinning of old pipelines already seeded to undesirable vegetation [e.g., crested wheat grass, smooth brome grass]). Where new disturbance is necessary, pipelines should be placed in common utility corridors, such as with new access to a well site.

Impacts on rare plants, unique or sensitive vegetation, animal communities, or historical resources can often be avoided through careful route planning and minor rerouting of the ROW prior to construction.

There is considerable benefit when engineers and environmental planners work together to determine the best route, particularly where rerouting of the ROW may be required as an integral part of protection planning.

Environmentally Significant Areas (ESAs) and Special Features

Applicants should check ESA documents and consult with land managers and regional wildlife specialists to identify areas of concern along a proposed pipeline route. On White Area public lands, Public Lands Division or the SAB must be consulted with respect to potential development in environmentally sensitive landscapes (e.g., floodplains, sand dunes) (Public Lands Act, Special Areas Act). On Green Area public lands, ASRD's Land and Forest Division (LFD) must be consulted (Public Lands Act). On private lands where environmental sensitivities exist (e.g., floodplains, sand dunes), applicants should notify the local AENV Reclamation Inspector. Generally, sensitive features should be avoided; however, companies may opt to employ suitable mitigative measures. Information on how to acquire ESA reports is available on the Prairie Conservation Forum Web site at <www.albertapcf.ab.ca/esaIntro.htm>.

Terrain and Soils

Where possible, pipelines should be routed around sensitive terrain or soil conditions (e.g., steep, erosive slopes; sand dunes; coulee complexes; wet soils). However, where routing alternatives are limited, operators should consult with the land manager or landowner/occupant before planning activities.

Drainage Systems and Wetlands

Coulees, wetlands, river benches and breaks, dry lake beds, and riparian areas should be avoided wherever possible. Applicants should observe setback distances of 100 metres from all coulee breaks or high-water marks of permanent or intermittent water bodies or alternative setback distances as determined through consultation with land managers, AENV inspectors responsible for the Water Act, or ASRD regional Public Lands Branch personnel. Where pipelines will cross riparian areas, special planning may be required to minimize

disturbance to important wildlife habitat and rare plant communities (Environmental Protection and Enhancement Act [EPEA]).

If a drainage crossing is required, applicants must consult the *Code of Practice for Watercourse Crossings* (AENV, 2000) and determine appropriate crossing methods (Water Act). Crossing locations should be selected to minimize the risk of gully erosion (e.g., Red Deer River bentonite areas). Riparian areas frequently have a higher proportion of rare plants and vegetation diversity, and thus may require special planning.

It is important that applicants consider the cumulative effects of decisions regarding drainage crossings and ensure that the project has the least overall impact to native prairie and parkland landscapes. While minimizing disturbance to riparian zones is important, it is also important that focus on the drainage crossing not result in unacceptable additional impacts to upland areas.

Vegetation

The ANHIC database <www.gov.ab.ca/env/parks/anhic/anhic.html> is a valuable source of information on rare plants (and other elements) in the province and may be used as a tool to identify areas of concern. In cases where avoidance is not feasible, reference should be made to the Alberta Native Plant Council's *Guidelines for Rare Plant Surveys*, available on its Web site <www.anpc.ab.ca>.

Wildlife

Wildlife issues are related to the physical loss of habitat and to sensory disturbance during pipeline construction. Applicants should contact regional wildlife specialists to determine whether concerns exist about specific species or habitats. Avoidance of sensitive features (e.g., denning or nesting sites) may be required through observation of suitable setback distances for particular species (see Appendix 3). The timing of construction activities may also be limited to avoid critical periods (e.g., mating, nesting).

Historical Resources

Applicants should check the *Listing of Significant Historical Sites and Areas* for an initial determination as to whether or not the pipeline is targeted for lands that are described within the listing. Significant historical resources are to be avoided (Historical Resources Act). Applicants should contact staff of the Cultural Facilities and Historical Resources Division to determine specific concerns and requirements. A historical resources impact assessment may be required.

5.2.2 Access Management

Access along the pipeline ROW must be considered as part of route planning for the pipeline project. Access for pipeline construction is typically along the working side of the ROW. However, in some instances alternative access is required to minimize impacts to sensitive areas (e.g., crossing steep coulee areas) or to facilitate access needs on a long pipeline project. In such circumstances use of existing trails or other access is preferred. Applicants should consider the volume and nature of traffic that must use alternative access and the time of year of construction, and then determine suitability of the existing trails or the need

for upgraded or new access. Timing of activities to ensure dry or frozen ground conditions is essential. Applicants should take steps to minimize impacts such as compaction, rutting, and damage of vegetation. When seeking alternative access, operators should consider the same environmental components as identified in Section 5.2.1.

5.2.3 Scheduling

Due to their linear nature, pipelines have the potential to affect many landowners and environmental settings. Effective scheduling of construction, including reclamation, can minimize the potential for undue land-use conflicts and environmental impacts. More specifically, pipeline activities in the native prairie and parkland landscape should ideally be timed to

- accommodate landowner/occupant use of the land and minimize distruption of grazing activities,
- observe restrictions due to wildlife concerns (e.g., nesting, migration),
- observe restrictions due to drainage crossing concerns, and
- ensure construction and access during dry or frozen ground conditions.

For timing issues related to spring breakup or adverse weather conditions, operators should refer to AENV's *Conservation and Reclamation IL 98-4: Voluntary Shut Down Criteria for Construction Activity or Operations*, for further guidance.

5.3 Construction

Pipeline construction involves all construction and reclamation activities associated with the placement of pipe in the ground. The time frame associated with pipeline construction is short and each activity takes place in a single pass. Preconstruction environmental orientations are recommended for all personnel to identify both standard operating practice and any special issues associated with the particular project (e.g., rattlesnake protection). Industry is encouraged to apply the smallest equipment possible for completing construction. Environmental inspections and as-built reporting are important to ensure that the practices outlined in a protection plan are adequately undertaken during construction.

5.3.1 Access Management

The impacts of pipeline construction can be reduced by developing a traffic control plan that addresses restriction of movement, speed limits, alternative access, designated turnaround areas, use of multiple passenger vehicles and all-terrain vehicles (ATVs) to minimize vehicle passes, and education of staff.

Carefully placed trench plugs and associated breaks in topsoil, spoil materials, and strung pipe can assist greatly with allowing access by landowners, livestock, and wildlife across the pipeline ROW during construction.

5.3.2 Soil Handling

The principal objective of soil handling for pipeline projects is to disturb the smallest amount of area to get the pipeline in the ground. However, a balance is needed between minimizing the area of disturbance and minimizing the intensity of disturbance. Applicants should select construction procedures (e.g., plough in, ditching) and equipment that cause the least overall disturbance to the surface and ensure that conservation requirements can be met. They should discuss their proposed methods with the appropriate land manager or provincial reclamation inspector.

Soil-handling methods used for pipeline construction in native prairie and parkland landscapes must maximize soil conservation, ensure that erosion is controlled, and facilitate adequate reclamation (EPEA). This is particularly relevant in areas where topsoil is shallow. The best method for soil handling is dictated mainly by the pipe diameter and environmental factors such as topography, topsoil depth and texture, subsoil conditions, time of construction, and proposed revegetation objectives and methods. The width of topsoil stripping should consider issues such as trench-wall sloughing in areas with loose, sandy soil and the need to feather excess soil where bulking has occurred in association with construction of a large-diameter pipeline. Due to the lack of topsoil resources in many native prairie and parkland landscapes, it is particularly important that topsoil stockpiles be adequately stabilized (e.g., with tackifiers) to prevent erosion. Soil stripping should proceed in conjunction with other operations (e.g., trenching) to prevent long-term stockpiling and subsequent erosion. A wide variety of standard best practices may be particularly appropriate in native prairie and parkland landscapes, including the following:

- Spoil may be spread (thinly) on areas wider than the trench over which an even distribution of prestripped topsoil can be replaced, provided that it will not have a negative impact on surface soil conditions or revegetation efforts.

- Particularly when topsoil has been stored on native prairie, specialized equipment (e.g., prairie protector blades) should be used to minimize scalping during topsoil replacement.

- Topsoil and root zone material should be conserved at grade crossings.

- Soil pulverization and erosion on the work side of the ROW should be controlled by minimizing the type and frequency of traffic.

- Surface grading can be minimized by not grading the work side of the ROW for general convenience. Rough microtopography can be graded when there is a safety concern.

- Some soil conditions (e.g., salt, gravel) may require that three-lift stripping procedures be used, as outlined in the *Guidelines for Alternative Soil Handling Procedures During Pipeline Construction* (Alberta Pipeline Environmental Steering Committee, 1996).

- Where soil handling is required and natural recovery is planned for revegetation, consideration should be given to salvaging the sod layer (seed bank) separate from the topsoil layer. At reclamation, replace the topsoil layer first and then replace the sod layer.

5.3.3 Drainage Crossings

Crossing methods used must be consistent with the requirements of the Water Act and associated Codes of Practice (AENV, 2000). Where steep, erosive slopes are affected by construction or access activities, suitable erosion control practices must be implemented (EPEA).

5.3.4 Reclamation

Within the native prairie and parkland landscape, the method of revegetation selected for reclamation must be considered during the planning stages and may influence decisions on construction methods and equipment. Natural recovery may be considered (i.e., no seed) in areas of contiguous native prairie vegetation, where the risk of soil erosion and unacceptable long-term weed problems are low. Various other methods of revegetation may be more appropriate where erosion control or other objectives must be met. (See Section 6 for further details.)

5.4 Abandonment

In native prairie and parkland landscapes, applicants should consider their preferred abandonment approach during route selection, construction, and reclamation planning, particularly where pipelines will cross highly erosive slopes.

In cases where pipelines are to be removed during abandonment, the practices outlined for construction and reclamation apply. Applicants should consider assessing the soil resources on the ROW prior to removal so they have an accurate record of their pre-second-disturbance soil conditions. Revegetation of the ROW to a suitable native species mix is expected.

6 Reclamation

The goal of successful reclamation on native prairie and parkland is to establish equivalent capability on the landscape. Planning prior to construction is essential for successful reclamation of any surface disturbance. Identification of potential soil, landscape, and vegetation issues, communication with landowners or occupants and government agencies, locating sites to minimize impact, careful scheduling of activities, and educating on-site personnel about native prairie and parkland issues all contribute to successful reclamation.

For developments such as well sites, batteries, access routes, and compressor stations, final reclamation occurs at the "end of life" of the project. In these cases, much of the reclamation work is done at this time, following abandonment and decontamination procedures. Typically in the case of pipelines, the equivalent to final reclamation is undertaken immediately following construction or interim disturbances associated with the operational period of the line. Regardless, reclamation certificates are required at closure for the above-mentioned activities (Environmental Protection and Enhancement Act [EPEA]). Exploration programs are closed using the Letter of Clearance process (see Section 6.1).

6.1 Key Contacts

Reclamation certificates are issued by the Alberta Sustainable Resource Development's (ASRD) Public Lands Division on public lands in the White Area, by ASRD Land and Forest Division in the Green Area, and AENV on deeded lands and lands within the Special Areas. Letters of Clearance are issued by both White and Green Area managers.

6.2 Recontouring and Soil Replacement

Recontouring of a disturbed site must be completed, as required, to match the predisturbed landscape and/or blend with the surrounding topography (EPEA). Slope steepness and contour should consider the potential for erosion. Subsequently, stripped topsoil should be replaced as closely as possible to the predisturbance state. If three-lift soil handling or a separate sod salvage program was undertaken at construction, then soil replacement occurs in two phases. Practices to reduce soil profile compaction on disturbed areas (e.g., subsoil ripping prior to topsoil replacement) assist in root penetration and soil moisture intake and should be considered. However, it may not be necessary or appropriate to alleviate compaction in areas where disturbance has been minimized and where native vegetation growth is not adversely affected.

6.3 Erosion Control

Wind and water erosion must be controlled to protect topsoil resources (EPEA). The need for erosion control may dictate methods used for construction (e.g., machinery, soil-handling practices), interim stabilization and reclamation (e.g., contouring, seeding soil stockpiles), and final reclamation (e.g., contouring, soil handling practices, seed mix selection).

Straw crimping is frequently used for erosion control but may be a source of problem plant species. In native prairie and parkland landscapes alternatives such as native hay, applying tackifiers, lightly seeding a cover crop (e.g., with appropriate certified annuals), installing snow fencing (small areas/high erosion), or installing diversion berms should be considered as preferred alternatives to using straw. Where straw crimping is to be used local sources are preferred and must be carefully inspected for weeds (Weed Control Act). Applicants should discuss the use of straw with landowners/occupants and land managers to identify any concerns. Straw crimping may be banned in some jurisdictions due to weed introduction concerns.

6.4 Revegetation

Revegetation programs that maximize the re-establishment of native species (trees, shrubs, forbs, grasses, etc.) should be used. Native species must be seeded on public prairie land in Special Areas or White Area prairie disturbed after September 1992 or prior to that date if required by disposition conditions or in the EPEA approval on large pipelines and mines. The use of nonnative species should only be considered where justified by site-specific conditions or reclamation needs. For example, using a nonpersistent, nonnative seed mix may be appropriate on a steep, erosive slope where the principal objective is to establish a vegetation cover to facilitate erosion control. To promote revegetation and reduce erosion, seeded areas may be protected during establishment.

Reclamation planners should select seed mixes and plant materials that allow re-establishment of the complete range of native species. To ensure compatibility with surrounding areas, available native plant materials adapted to local growing conditions may be required to approximate the predisturbance diversity of the prairie vegetation. (See Appendix 4 for reference guidelines). Revegetation planning should consider use of lower seeding rates to promote encroachment/re-establishment of native species. Plant distribution should simulate off-site occurrence as much as possible. For example, shrubs may be planted in clumps, depending on the site plan.

Under certain circumstances, natural recovery (no seeding) may be appropriate, giving consideration to topography, soils, moisture, range condition and grazing pressure, weed sources, and construction timing. Questions to be considered include the risk of erosion, whether there is an adequate adjacent seed source, and whether the site is a sufficient distance from sources of problem plant species. The condition of the prairie around the site should be good (lots of seed) and the potential for erosion low. Further information regarding natural recovery may be found in the educational document (Sinton, 2001).

For prescribed seed mixes, there should be no substitutions without prior consultation with the appropriate regulatory agency and landowner/occupant. To ensure species compatibility and identify the presence of problem species, the company must obtain a copy of the certificate of seed analysis for each seed lot (prior to mixing) (Weed Control Act). If a problem species is identified, the seed lot may not be suitable for use.

Persistent weeds should only be controlled by mechanical (i.e., mowing) or limited chemical (i.e., spot spraying) practices. Nonpersistent annual weeds should be controlled *only* if they affect the establishment of desirable species. If control is necessary, it should be by mowing.

The Weed Control Act requires the prevention of both the establishment and the spread of weeds (Weed Control Act). Accordingly, all equipment and materials used in native prairie and parkland areas should be cleaned to reduce the transportation of restricted or noxious weed seeds or other problem species (see the *Native Plant Revegetation Guidelines for Alberta*, Native Plant Working Group, 2000).

6.5 Wildlife

Reclamation activities could affect wildlife, particularly during the breeding season. Therefore, as with other activities, regional wildlife specialists should be contacted to determine whether any concerns over specific species or habitats exist (see Appendix 3). The timing of reclamation, as with construction, may be limited to avoid critical periods (e.g., mating, nesting).

6.6 Livestock and Access Management

Reclamation programs often require the short-term protection of soil and vegetation resources from impacts due to livestock, wildlife, and vehicles. Ultimately, however, reclaimed sites must be proved sustainable under the intended land use (e.g., grazing) (EPEA).

Livestock access to newly reclaimed areas may result in pulverized soil and overgrazed vegetation, thus leading to a higher risk for erosion and reducing the success of revegetation programs. Livestock management, such as temporary or permanent fencing, planned stock rotation, or strategic placement of water and salt sources away from sensitive areas may be required to minimize impacts and enhance the success of reclamation efforts. Grazing of reclaimed lands should be avoided until plants are fully established. This requires a minimum of one full growing season, but many species mixes may require a longer period. Once revegetation has been achieved to a suitable level, moderate grazing should be introduced to ensure the sustainability of the reclamation program.

Livestock and wildlife impacts to reclaimed lands may also be reduced by selecting less palatable species for revegetation programs. However, discussions with landowners/occupants or land managers should be undertaken to ensure that species selected for revegetation meet the desired end land use.

Access management may also be required to temporarily or permanently control or eliminate ATV/vehicle access across reclaimed areas.

6.7 Monitoring and Management

An effective monitoring program should be undertaken to ensure that reclamation objectives are met. The nature and duration of such a program depend on the methods used for reclamation and the end land-use objectives. However, erosion

control, revegetation success and sustainability, and weed control are considered key components of any monitoring program.

Long-term monitoring of the revegetated areas should be conducted until the native species community has been restored. If revegetation objectives are not being achieved in a reasonable time frame, the program should be evaluated and implementation of alternative or additional methods may be necessary.

Monitoring and adaptive management programs should be developed for pipeline rights-of-way so that, over time, the best methods for a variety of development types and environmental settings can be determined.

Appendix 1 Contacts and Selected References

For more information about these guidelines or to discuss the possible presence of native grassland in specific areas, please contact the appropriate agency regional office.

1 Regulatory Offices

1.1 Alberta Community Development (ACD)

Cultural Facilities and Historical Resources Division: Responsible under the Historical Resources Act for the preservation of historical resources on both deeded land and public land.

Telephone (780) 431-2300
Fax (780) 427-3956

Parks and Protected Areas Division: Responsible for parks and protected areas, including provincial parks, provincial recreation areas, ecological reserves, wilderness areas, and natural areas.

Telephone (780) 427-7009
Fax (780) 427-5980
E-mail <env.infocent@gov.ab.ca>

1.2 Alberta Energy and Utilities Board (EUB)

The EUB is the principal regulatory agency for the development of energy resources in the province. Its scope covers both deeded and public lands. It is responsible for well and pipeline licensing, production and completion, abandonment, and general environmental issues.

Midnapore	(403) 297-8303	Wainwright	(780) 842-7570
Medicine Hat	(403) 527-3385	Web site <www.eub.gov.ab.ca>	
Red Deer	(403) 340-5454		

1.3 Alberta Environment (AENV)

Carries responsibilies under the Environmental Protection and Enhancement Act (EPEA) and the Water Act. Its scope includes deeded land and public land within the Special Areas and provincial parks. AENV's responsibilities include land conservation and reclamation requirements, water management, and the issuance of temporary licences for withdrawing water.

Head Office
Telephone (780) 427-5883
Fax (780) 422-4192
E-mail <land.management@gov.ab.ca>

Southern Region	(403) 297-7602	Central Region	(403) 340-7052
Northern Region	(780) 624-6167	Web site <www.gov.ab.ca/env/>	

1.4 Alberta Sustainable Resource Development (ASRD)

Public Lands Division: Responsible for the management of public land in the White Area covered under the Public Lands Act, including managing surface dispositions, such as Mineral Surface Leases, pipeline agreements, and Licences of Occupation. The Division identifies lands where seismic activity is permitted through regulation, policy, and referral. Public Lands also has officers who are responsible for conservation and reclamation requirements of surface disturbances on public land.

Calgary	(403) 297-6426	Ponoka	(403) 783-7090
Lethbridge	(403) 381-5487	Red Deer	(403) 340-5451
Medicine Hat	(403) 529-3677	Wainwright	(780) 842-7548
Peace River	(780) 624-6114	Web site <www.agric.gov.ab.ca>	

Fish and Wildlife Division: Responsible for the conservation of fish and wildlife resources, including definition of habitat needs associated with prairie species.

Southern Region	(403) 382-4254	Northern Region	(403) 340-5022
	or (403) 678-5508	Central Region	(403) 340-5022

Land and Forest Division (LFD): Responsible for the management of public land in the Green Area covered under the Public Lands Act. LFD is responsible for managing surface dispositions, including Mineral Surface Leases, pipeline agreements, and Licences of Occupation, as well as other dispositions. It identifies lands where seismic activity is permitted through regulation, policy, and referral. LFD also has officers who are responsible for conservation and reclamation requirements of surface disturbances on public land.

Southern Region	(403) 562-3126	Northern Region	(780) 624-6540
	or (403) 297-8800	Central Region	(403) 845-8347

Land Administration Division (LAD): Responsible for issuing and administering contracts for use of public lands under authority of the Public Lands Act.

Edmonton Head Office (780) 427-3570.

Note that seismic activities are regulated under the Exploration Regulation of the Mines and Minerals Act, also administered by LAD.

To discuss seismic issues on public lands, land managers from the local offices of the Public Lands Division (White Area) and Land and Forest Division (Green Area) should be contacted.

Edmonton Head Office	Telephone	(780) 427-3932
		(780) 422-2587
		(780) 422-4871
	E-mail	<Lfs.seismic@gov.ab.ca>
	Web site	www.gov.ab.ca/env/land/LAD/index.html>

The Special Areas Board (see Section 1.5 below) and municipalities should also be contacted regarding proposed seismic exploration programs.

1.5 Special Areas Board (SAB)

The SAB, a Crown agency that operates under the authority of the Public Lands Act, the Special Areas Act, and the Municipal Government Act, has combined municipal and public land responsibilities. It represents the landowner for public lands within the Special Areas and is therefore responsible for issuing and monitoring surface dispositions. The SAB operates in place of the AFRD Public Lands Division within the Special Areas.

Hanna (403) 854-5600
Web site <www.specialareas.ab.ca>

2 Other Useful Web Sites

Alberta Native Plant Council
<www.anpc.ab.ca>

Alberta Natural Heritage Information Centre (ANHIC)
<www.gov.ab.ca/env/parks/anhic/anhic.html>

Prairie Conservation Forum
<www.albertapcf.ab.ca>

Queen's Printer (for copies of the acts cited in text)
<www.gov.ab.ca/qp/index.html>

3 Selected References

Alberta Agriculture, Food and Rural Development, 1996, *Weed Seedling Guide,* 62 p.

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Alberta Environment, 2000, *Code of Practice for Watercourse Crossings* (Water Act, Water [Ministerial] Regulation).

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Canadian Association of Petroleum Producers, *CAPP Public Involvement Guidelines*, ID:1995-0012.

Canadian Association of Petroleum Producers, May 1999, *Environmental Operating Practices for the Upstream Petroleum Industry – Alberta Operations* (Campbell & Associates Ltd., 1-888-244-4905, <camp@camp-assoc.com>, <www.camp-assoc.com>).

Dimensions Planning, Western Environmental and Social Trends Inc., 1989, *Public Consultation Guidelines for the Canadian Petroleum Industry* (Canadian Petroleum Association 1989-0022), 96 p.

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Appendix 2 Native Prairie and Parkland Remaining in Alberta

Grassland Natural Region

A baseline reconnaissance level inventory of native vegetation in the Grassland Natural Region has been conducted, based on interpretation of 1991-1993 1:30 000 aerial photography. The percentage of native vegetation has been estimated in every quarter section for each of six cover classes to the nearest 5 per cent. The six cover classes are shrubland, graminoid, lake, riparian, trees, and wetlands. Information about this inventory and the database can be viewed on the Prairie Conservation Forum's Web site at <www.albertapcf.ab.ca>. Details for individual quarter sections may be queried.

Maps and the spatial database are available in Arc/Info Export format (file suffix .e00) and on CD-ROM. They may be purchased from

Data Distribution Unit
Resource Data Division
Alberta Sustainable Resource Development
12th Floor, Oxbridge Place
9820 - 106 Street
Edmonton, AB T5K 2J6

Parkland Natural Region

A baseline inventory similar to that undertaken for the Grassland Natural Region is being completed by ASRD. Contact the Resource Data Division (see address above) for further information.

Other Areas

Native grasslands are found in various locations in the province, notably in the Foothills, Parkland and Montane, with remnant sites in the Peace River Parkland, Kleskun Hills, and the Peace River Valley.

The same level of detail as the information available from the Grassland Natural Region database has been produced by AENV for the foothills and eastern slopes south of Kananaskis Country and is available from

Resource Information Unit
Southern Region
Alberta Environment
2nd Floor, Provincial Building
200 - 5 Avenue South
Lethbridge, AB T1J 4L1

Environmentally Significant Areas

Environmentally Significant Areas (ESAs) inventories are another key information source for industry. ESAs are landscape elements vital to the long-term maintenance of biological diversity, soils, water, and other natural processes. They are classified at local, regional, provincial, national, and

international levels of significance based on representativeness, diversity, naturalness, and ecological integrity. The existence of native flora and fauna are prerequisites to the identification of the ESAs.

In addition to identifying valuable site information, ESA information is especially valuable to industry in planning avoidance (site impacts and pipeline rights-of-way. Information about ESAs in the Grassland and Parkland Natural Regions may also be found on the Prairie Conservation Forum Web site at <www.albertapcf.ab.ca>.

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Appendix 3 Recommended Land Use Guidelines for Protection of Selected Wildlife Species and Habitat within Grassland and Parkland Natural Regions of Alberta

The guidelines for selected wildlife species and habitat were developed by the Fish and Wildlife Division (Appendix 1) based on what experts believe the disturbance threshold to be before site abandonment results in remote situations. The guidelines are based on research data obtained from studies of various wildlife species' breeding, nesting, and rearing characteristics and also accommodate the effects of annual climatic variations. The guidelines are subject to ongoing revision based on new research into the effects of development on wildlife and their habitats. Readers are strongly encouraged to check the Alberta Sustainable Resource Development Web site at <www3.gov.ab.ca/srd/fw/landuse> for the most recent version of these guidelines and additional information about them.

These guidelines are used by wildlife managers in the referrals process to make recommendations regarding surface access approval conditions. They are planning guidelines only and will be modified based on the degree of existing development in an area, seasonal variances, and more detailed site-specific information. The guidelines provide industry with valuable information to take into account during the planning stages of industrial activity. The final decision on the use of these or any other guidelines will be made by the land manager in the form of operating conditions for approval. Land managers will consult proponents and consider site-specific circumstances when changes to the planning process are recommended.

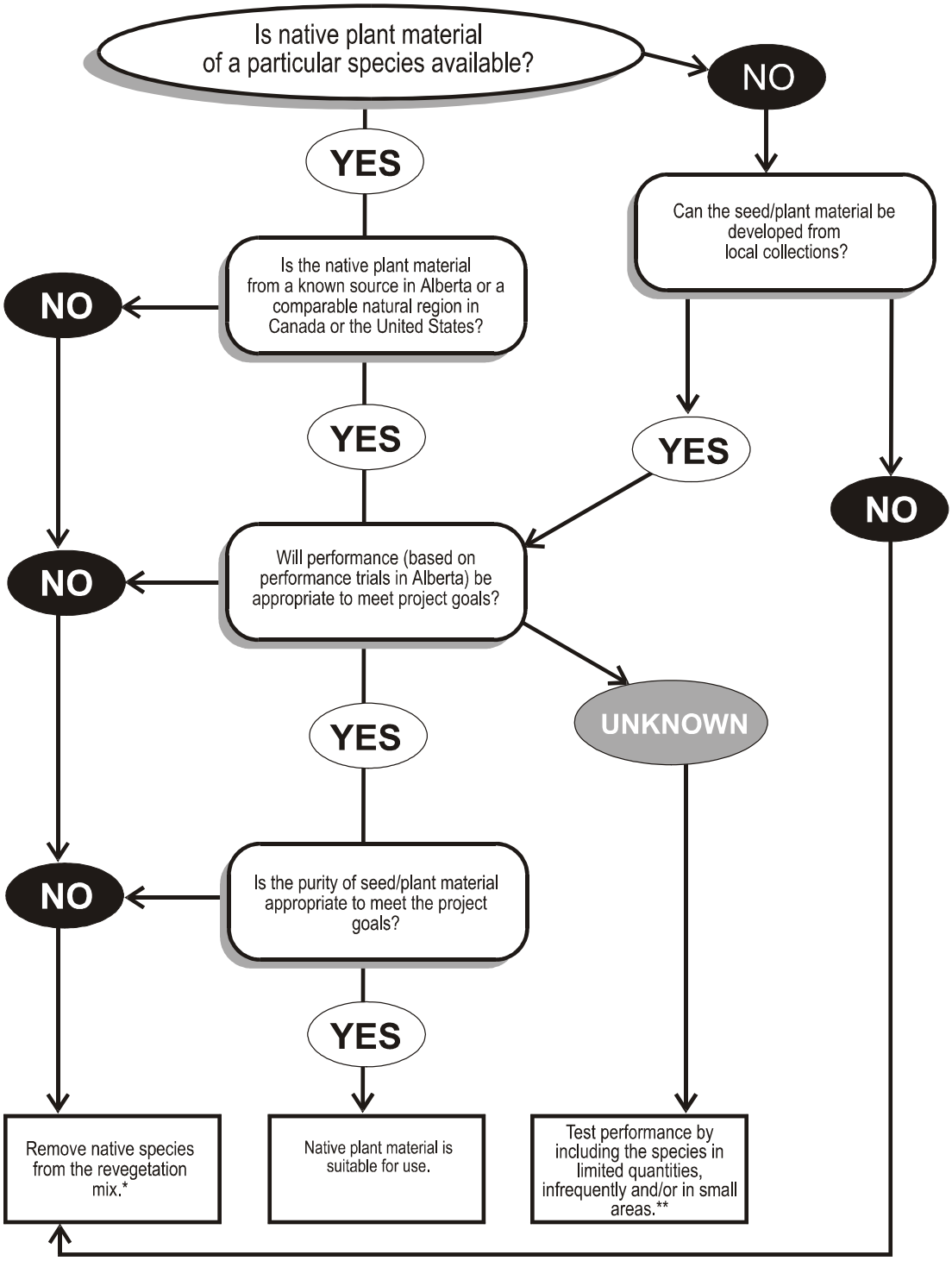
Additional Information Source

In 2000, D. Scobie and C. Faminow published a document aimed at standardizing guidelines for the petroleum industry across the prairie provinces for activities affecting COSEWIC (Committee on the Status of Endangered Wildlife in Canada) Prairie and Northern Region vertebrate species at risk (see Selected References in Appendix 1). This approach combined input from industry with expert knowledge on species and formulated guidelines based on the type of disturbance, the magnitude of disturbance, the risk associated with the activity, and the time of year. The aim is that a consistent methodology be used to determine appropriate guidelines for each particular circumstance.

As with the Fish and Wildlife Division guidelines, this process recommends that the appropriate regulatory agency be consulted to determine appropriate timings and setback distances.

In all cases, the Fish and Wildlife Division must be consulted regarding sensitive wildlife species and habitat protection restrictions. Refer to the Wildlife Act for further details on legislated requirements where wildlife species are concerned available at the Web site <www.gov.ab.ca/qp/index.html>.

Appendix 4 Decision-Making Chart: Sourcing Native Plant Material[1]



Notes:
* Prior to removing species from the revegetation mix, multiple attempts to secure alternative sources are recommended.
** Records of procedures and results should be maintained and made generally available.

[1] From the *Native Plant Revegetation Guidelines for Alberta*.

Appendix 5 Information Sources on Significant Historical Resources

Historical resources are defined within the Historical Resources Act as "any work of nature or of man that is primarily of value for its palaeontological archaeologist, prehistoric, historic, cultural, natural, scientific or aesthetic interest." Generally the implementation of the Historical Resources Act and its regulations has focused upon archaeological resources, palaeontological resources, and historic period sites.

The historical resources management program for petroleum industry activity is the subject of the document titled *Cultural Resource Management and the Energy Industry: New Perspectives and Partnerships Report* (Alberta Community Development, 1998). This program has two phases. The first involves those petroleum industry activities situated on lands upon which Alberta's most significant historical resources are located and buffer zones adjacent to these lands. These lands are identified in the second edition (effective January 1, 2001) of the *Listing of Significant Historical Sites and Areas* (Alberta Community Development, 2001). The implementation of the first phase is nearly complete.

The second phase will involve those petroleum industry activities affecting lands considered highly likely to have historical resources. The Cultural Facilities and Historical Resources Division of ACD is currently involved in pilot studies to determine the most effective means to implement the second phase.