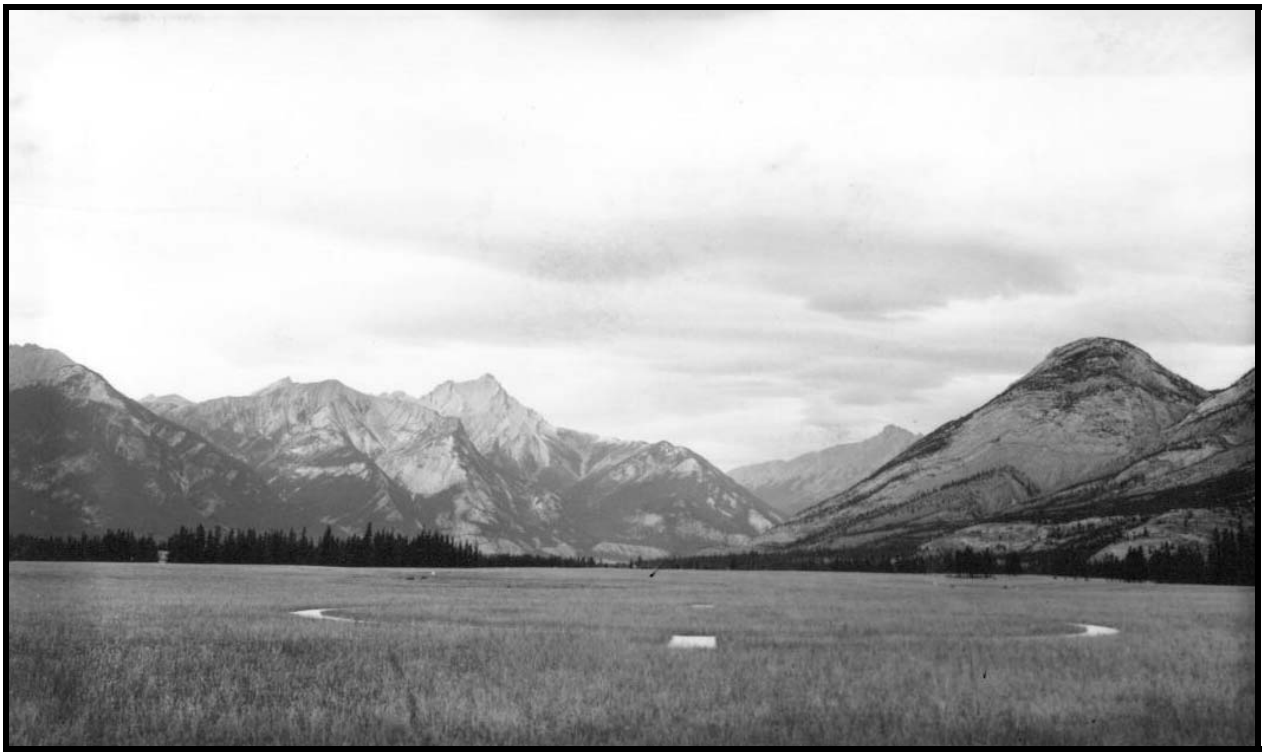
JASPER AIRSTRIP DECOMMISSIONING

COMPREHENSIVE STUDY



HIGHWOOD
Environmental Management

COMPREHENSIVE STUDY REPORT

FOR THE

DECOMMISSIONING OF THE AIRSTRIP

IN

JASPER NATIONAL PARK

FINAL DRAFT

Prepared for:

Parks Canada

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Project No. 0011
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EXECUTIVE SUMMARY

This Comprehensive Study Report evaluates the environmental impacts likely to occur as a result of decommissioning the airstrip in Jasper National Park (JNP). Parks Canada's intentions to close and decommission the airstrip are long standing, and founded in the 1988 JNP Management Plan. Routine aircraft operations at the airstrip have been legally prohibited since the enactment of the 1997 *National Park Aircraft Access Regulations*. In 1997, an environmental screening was conducted under the *Canadian Environmental Assessment Act (CEAA)* to evaluate the environmental effects of closure. The airstrip was subsequently closed. However, before decommissioning could be initiated, airstrip users challenged Parks Canada's decision process in court. Subsequently, Justice Campbell (1997) directed that a Comprehensive Study be conducted under *CEAA* prior to a decision to decommission the airstrip.

Parks Canada retained Highwood Environmental Management Ltd. to prepare a Comprehensive Study report to evaluate the potential effects from decommissioning, pursuant to the requirements of the *CEAA* and directions from Justice Campbell (1997). The assessment evaluates the potential impacts that may occur as a result of the airstrip being decommissioned consistent with *Canadian Aviation Regulations* (JNP 2001). The issue of closure is not addressed.

Legislation, regulations and policy documents relevant to the Jasper airstrip decommissioning were reviewed. Continued unauthorized aircraft landings on the airstrip are contrary to the policy and legislation of Parks Canada, as defined in *Canada National Parks Act, National Parks Aircraft Access Regulations,* and the JNP Management Plan.

The scope of the project of decommissioning the airstrip includes the following:

- Removal of all built structures (including runway markers, tie downs, windsock, shelter building, outhouses, telephone and power connections, underground fuel storage tank and accessories, concrete fuelling pad, concrete runway midpoint marker, and vehicle parking barriers);
- Installation of closure markings (placement of three "X" markings on runway);
- Rehabilitation of the physical area affected by airstrip activities as required, including the grass runway and taxiways, remediation of contaminated soils, if any found, associated with fuelling, and determining the future requirements for vehicle parking and access;
- Maintenance or relocation of the existing gate to control access to the adjacent picnic area access road; and
- Administrative actions for the necessary notifications and publication amendments.

The scope of the assessment considers the environmental effects of the project, consistent with Section 16 of *CEAA*. Judicial hearings concluded that 'environmental effect', for the purposes of this Comprehensive Study Report, encompasses the effect of any change in health and socio-

economic conditions in the Visual Flight Rules (VFR) flight corridor as a result of decommissioning (Campbell 1997). Therefore, in addition to the factors listed in *CEAA*, the assessment examines aviation safety in terms of public health and safety of VFR pilots and passengers who use the JNP VFR route.

The purpose of the project is to fully implement the *National Parks Aircraft Access Regulations*. The purpose of the Comprehensive Study Report is to evaluate the impacts of decommissioning the airstrip and returning the area to as close to its natural state as possible. The need for the project has been identified by the Responsible Authority, Parks Canada, and through the judicial process. Decommissioning of the airstrip is necessary to remove the physical aspects of the airstrip, to provide the required visual markings of a decommissioned airstrip, and to ensure that pilots are aware that the airstrip is no longer open to routine aircraft movements.

It is not within the Terms of Reference for this study to consider 'alternatives to' decommissioning the airstrip. The Comprehensive Study, however, considers 'alternative means' of carrying out the project in accordance with *CEAA*. Parks Canada considers that the potential alternative means of carrying out the project that are technically and economically feasible are limited to the following options:

- Installation and maintenance of closure markings;
- Reclamation and rehabilitation; and
- Maintenance or modification of a gate to control road access

Alternative locations, or landing sites, are not considered. A landing site within JNP would contravene the *National Parks Aircraft Access Regulations*. It was determined that other project activities, such as removing facilities, do not have practical alternative means.

Parks Canada will make a final decision on the preferred alternative means for closure markings, in consultation with Transport Canada. The preferred alternative means for reclamation of the airstrip includes fencing larger revegetation sites until plants have well-established root structures and the soil is stabilized, and seeding in areas affected by decommissioning to encourage native species growth and to prevent non-native species invasion. Parks Canada wishes to retain access to the picnic area, therefore the gravel road will remain open. Access will continue to be controlled through the use of a locked gate between the parking lot and the roadway.

The Terms of Reference for this assessment identify the scope of the Valued Ecosystem Components to be considered, including:

- Carnivores, their habitat use and habitat effectiveness, habitat fragmentation and travel corridors;

- Public safety, including aviation safety matters, emergency and precautionary diversion, search and rescue, medical evacuation, and aircraft use for park management purposes;

- Vegetation and soils, predator-prey dynamics, habituation to humans, and the context of the elk management strategy;
- Ungulates, primary elk; herbivory, predator-prey dynamics, habituation to human and the context of the elk management strategy;
- Breeding birds, breeding bird habitat effectiveness as an ecological indicator; and
- Cultural resources, a summary of historic land uses in the vicinity of the airstrip.

In addition to identified VECs, potential effects on hydrology and human recreational use were considered. Potential impacts were identified by assessing interactions between decommissioning activities and VECs. Mitigations to minimize predicted impacts were identified for each environmental resource. Residual impacts remaining once mitigation measures are applied were assessed and rated for significance using impact ratings, including:

- Direction indicates a positive, negative or neutral impact on the VEC;
- Duration refers to the period over which the impacts will occur;
- Geographical extent is considered local if the impact is limited to the local study area, regional if the impact extends within the Lower Athabasca River Valley, and extra-regional if it extends beyond the Lower Athabasca River Valley;
- Frequency refers to the incidence of occurrence of the impact and can either be once, intermittent, or continuous. The term 'once' refers to the decommissioning period, which will be approximately five days;
- Reversibility assesses whether the impact can be reversed when the activity ceases or over time; and
- The magnitude of the residual impact combines all attributes and is assigned based on professional judgement.

For this study, Parks Canada as the Responsible Authority, assigns significance to the impacts. Impacts are considered significant if the magnitude of the impact is either medium or high, and the duration of the impact is greater than short-term. Only adverse residual impacts are rated.

The assessment focuses on issues and VECs identified in the Terms of Reference and in a scoping process with project scientists and Parks Canada representatives. It focuses on potential environmental impacts resulting from all project activity likely to occur during decommissioning activities, and as a result of decommissioning the airstrip. A summary of the impact assessment is provided below.

With appropriate mitigation measures, no residual impacts were identified for hydrological resources. Potential impacts to soils and terrain from decommissioning activities include:

- Erosion of disturbed areas during decommissioning;

- Weed invasion during decommissioning;
- Dust during excavation activities;
- Compaction of sub-soil from heavy equipment;
- Soil contamination from accidental spills; and
- Decreased soil erosion as a result of cessation of maintenance activities after decommissioning.

Residual impacts that may remain after mitigation measures are applied are positive.

Potential effects of decommissioning on the vegetation VECs can be summarized into three general categories:

- Loss of vegetation resources, including rare plants and plant communities;
- Change in vegetation composition and structure, including rare plants and plant communities;
- Introduction or removal of exotic plant species.

The overall impact on vegetation resources after decommissioning is positive, provided maintenance activities cease.

Potential effects of decommissioning activities on wildlife can be summarized into three general categories:

- Increased risk of mortality from project activities;
- Direct loss or change in habitat quality resulting from physical alteration;
- Habitat alienation or disruption of traditional movement patterns from anthropogenic sensory disturbance.

Overall, the project has the potential to have negative or neutral effects on wildlife during decommissioning activities. Post-decommissioning, the effects on wildlife will be positive.

Decommissioning activities should have no impact on the recreational activities that are currently occurring on the airstrip. There will be a reduction in aesthetics during decommissioning, but proper reclamation and site clean-up will ensure the impact is only temporary. For safety purposes, the public will not be permitted to be close to heavy machinery engaged in decommissioning work.

As no known cultural sites of significance have been recorded on the Jasper airstrip, there are no potential impacts of the project on known sites. Unknown buried archaeological sites may be exposed and impacted during the proposed rehabilitation activities that have subsurface impacts, such as the removal of contaminated soil or asphalt from the paved section of the parking lot.

There are identified cultural sites in proximity to the airstrip but they will not be impacted by project activities.

The potential impact to aviation safety includes the elimination of a potential landing area for emergency/diversionary landings along the Jasper VFR Route, which could result in an increased risk for VFR aviators. It is predicted that the residual effect on aviation safety is negligible to low. The Responsible Authority (Parks Canada) will conduct a risk assessment as a separate process to confirm this rating.

In response to the direction from Justice Campbell (1997), continuation of maintenance of the Jasper airstrip after decommissioning was considered and evaluated. Continued maintenance of the airstrip includes mowing the runway in summer and ploughing the snow off the runway in winter. In accordance with environmental objectives, policies and legislation that govern Jasper National Park, it is concluded that continuation of maintenance does not meet the objectives of the project. Continued maintenance is not the chosen option for carrying out the project for several reasons:

- It does not meet the objectives of reclamation, namely to rehabilitate the physical area of the airstrip, including the grass runway and taxiways;
- It does not meet the Jasper National Park Management Plan objective of restoring the area to its natural montane ecoregion; and
- It is contrary to the policy and legislation of Parks Canada, as defined in the Jasper National Park Management Plan, the *Canada National Parks Act,* and the *National Parks Aircraft Access Regulations.*

In addition to addressing project VECs, the Comprehensive Study addresses malfunctions and accidents, sustainable use of resources, and the effects of the environment on the project. Potential accidents that may affect the environment during these activities are limited to accidental spills during on-site decommissioning, which can be easily mitigated. There are no renewable resources likely to be affected in a significant way by the project. During the removal of infrastructure and placement of closure marking, heavy rainfall and wildfire are the two environmental conditions that may affect the project. All construction activities will be halted during wet conditions (i.e., heavy rainfall and runoff events, or high winds). The airstrip was burned in June 2001 and so it is highly unlikely that fire will affect the decommissioning activities.

There are two areas where impacts from decommissioning may combine with effects from other existing activities or planned projects to incrementally contribute to cumulative effects. These areas are:

- Impacts to wildlife from other activities presently occurring along the Athabasca River floodplain and terrace, which likely serves as an important diurnal movement corridor for large mammals (combined effects); and
- Impacts to aviation safety from decommissioning the airstrip.

While the predicted project-specific impacts to both of these VECs are negligible, the potential for combined impacts from other existing uses (for wildlife movement) and future trends in air traffic (for aviation safety) may incrementally contribute to cumulative environmental effects. Overall, the cumulative effects from airstrip decommissioning on wildlife are anticipated to be neutral to negative and negligible. Post decommissioning, the effect will be positive.

Increasing aviation traffic potentially elevates risk to aviation safety as the likelihood of a mishap such as unforeseen bad weather or equipment failure becomes more likely over time. The cumulative effects from decommissioning the Jasper airstrip on aviation safety are negligible to low. The Responsible Authority (Parks Canada) will conduct a risk assessment as a separate process to confirm this rating.

Decommissioning is not anticipated to have significant adverse impacts on the project VECs. Monitoring is recommended to ensure mitigation measures are effective. In particular, vegetation monitoring to evaluate success of the rehabilitation plan in this montane setting is recommended. A risk assessment will be carried out by Parks Canada to confirm the level of risk to aviation safety as a result of decommissioning the airstrip.

Public consultation for the Comprehensive Study focuses on matters pertaining to decommissioning. The purpose of public consultation is to inform members of the public who may be affected by the proposed decommissioning, and to provide opportunities for individuals or groups to express their interests and concerns. The public involvement process involves public consultation on the draft Terms of Reference, informal meetings with key stakeholders during preparation of the Comprehensive Study Report, planned public input on the draft Comprehensive Study Report, and the public comment period managed by the Canadian Environmental Assessment Agency after the report is officially submitted by Parks Canada.

The Canadian Environmental Assessment Agency will use the information in this study to make a recommendation to the Minister of the Environment, who makes a determination on the need for further assessment. If the Minister concludes the project is not likely to cause significant adverse environmental effects, the project will be referred back to Parks Canada, the Responsible Authority, to decide whether the project will proceed.

1.0 INTRODUCTION

This Comprehensive Study Report evaluates the environmental impacts likely to occur as a result of decommissioning the airstrip in Jasper National Park (JNP) (Figure 1). The Jasper airstrip is an unlicensed grass facility located within the Athabasca Valley of JNP. The airstrip has been located at its present location since 1922, and is situated along the Yellowhead Pass Visual Flight Rules (VFR) Corridor.

Parks Canada's intentions to close and decommission the airstrip are founded in the 1988 JNP Management Plan. Routine aircraft operations at the airstrip have been legally prohibited since the enactment of the 1997 *National Park Aircraft Access Regulations*. In 1997, an environmental screening was conducted under the *Canadian Environmental Assessment Act (CEAA)* to evaluate the environmental effects of closure. The airstrip was subsequently closed. However, before decommissioning could be initiated, airstrip users challenged Parks Canada's decision process in court. Subsequently, Justice Campbell (1997) directed that a Comprehensive Study must be conducted under *CEAA* prior to a decision to decommission the airstrip.

Parks Canada retained Highwood Environmental Management Ltd. to prepare a Comprehensive Study Report to evaluate the potential effects from decommissioning, pursuant to the requirements of *CEAA* and directions from Justice Campbell (1997). The assessment evaluates the potential impacts that may occur as a result of the airstrip being decommissioned consistent with *Canadian Aviation Regulations* (JNP 2001). This includes the removal of all built structures and related infrastructure that makes the area look like an operational airstrip (e.g., windsocks, runway markers, tie downs etc.), the installation of closure markings (three "X" markings on the runway) and rehabilitation of the physical area affected by airstrip activities. The project also addresses administrative actions such as formal notification to pilots in the Canada Flight Supplement of the change in status to the airstrip.

Parks Canada, as the Responsible Authority, believes the Comprehensive Study meets all *CEAA* requirements. The assessment evaluates potential social and environmental impacts that may result from the decommissioning of the airstrip including accidents and malfunctions and cumulative effects. As directed by Justice Campbell in 1997, the assessment considers social effects in a broader sense than required under *CEAA* by addressing the issue of aviation safety. In response to Justice Campbell's direction, the report also evaluates the option of continued maintenance to facilitate diversionary and emergency landing opportunities subsequent to decommissioning (Campbell 1997). Highwood Environmental worked with Parks Canada to undertake public consultation to address stakeholders concerns, to identify appropriate mitigation measures, and to recommend follow-up requirements such as monitoring programs.

The issue of closure is not addressed in this Comprehensive Study Report. The decision to close the airstrips has been taken by Parks Canada, and was evaluated in an environmental screening in 1997. Despite its closure, however, aircraft continue to land at the Jasper airstrip. Decommissioning of the airstrip is needed to remove the physical aspects of the airstrip, and to provide the required visual markings of a closed and decommissioned airstrip that are universally recognized by pilots.

The purpose of the environmental assessment process under *CEAA* is to ensure environmental effects receive careful consideration prior to any decisions on the project. The Canadian Environmental Assessment Agency will use the information in this study to make a recommendation to the Minister of the Environment, who makes a determination on the need for further assessment. If the Minister concludes the project is not likely to cause significant adverse environmental effects, the project is referred back to Parks Canada, the Responsible Authority, to decide whether the project will proceed.

Figure 1. Site Plan for the Jasper Airstrip

2.0 PROJECT APPROACH

The following approach was used to complete this report:

- Review of Parks Canada regulations, policy and guidelines in Jasper National Park as they apply to the project (Section 3);
- Review of the regulations for Parks Canada as they relate to the presence and decommissioning of airstrips in national parks (Section 3);
- Identification of project scope, scope of assessment, project purpose and need, as well as alternative means of carrying out the project (Section 4);
- Identification of the project activities involved in the decommissioning (Section 4);
- Description of the environmental setting in which the decommissioning activities occur (Section 5);
- Prediction of the probable environmental and aviation safety impacts of the project activities including impacts from upset events such as accidents and malfunctions (Section 6);
- Identification of the appropriate mitigations to reduce potential impacts (Section 6);
- Description of residual impacts (Section 6);
- Evaluation of the impacts of continuation of maintenance activities on the airstrip after decommissioning (Section 6);
- Evaluation of the cumulative effects of the project (Section 7);
- Identification of follow-up or monitoring programs required (Section 8);
- Description of consultation process with the public and other federal authorities (Section 9); and
- Conclusions and recommendations (Section 10).

3.0 REGULATORY REVIEW

Legislation, regulations and policy documents relevant to the proposed Jasper airstrip decommissioning were reviewed to ensure all requirements were identified and addressed. The following documents were reviewed:

- *Canadian Environmental Assessment Act*;
- *Canada National Parks Act* and *National Parks Aircraft Access Regulation*;
- Parks Canada Guiding Principles and Operational Policies (1994);
- Jasper National Park Management Plan (2000) and associated policy documents;
- Judicial decisions surrounding the proposed decommissioning; and
- Unimpaired for Future Generations? Conserving Ecological Integrity with Canada's national parks. Report of the Panel on Ecological Integrity of Canada's National Parks (2000).

3.1 Canadian Environmental Assessment Act

CEAA is a federal, legislated environmental assessment process designed to integrate environmental considerations in project planning. Airstrip decommissioning is an undertaking related to a physical work, and thus constitutes a "project" under *CEAA*. It must be assessed under *CEAA* because Parks Canada is the project proponent, triggering Section 5 of the Act. In response to a federal court decision, the environmental assessment will be considered at the Comprehensive Study level (Campbell 1997).

Under the requirements of *CEAA* as outlined in Section 16 of the Act, a Comprehensive Study must consider:

- Project purpose and need;
- Technically and economically feasible alternative means of carrying out the project;
- Requirements for follow-up monitoring programs;
- The capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future; and
- Public comments and formal public consultation.

3.2 Canada National Parks Act (2000)

Jasper National Park is managed under the *Canada National Park Act*. While national parks in Canada have been dedicated to the people of Canada for their benefit, education and enjoyment,

recent amendments to the Act confirm that maintaining or restoring ecological integrity and resource preservation are the first consideration of management decisions in national parks.

Section 16.1 (x) of the *Canada National Parks Act* gives Parks Canada jurisdiction over control of access to national parks by air, including take offs and landings within the Parks. Section 16.3(a) states that that the superintendent of the Park may vary the requirement of the regulations under the *Canada National Parks Act* for purposes of aviation safety or the conservation of natural resources.

3.2.1 National Parks Aircraft Access Regulation (1997)

The *National Park Aircraft Access Regulations*, enacted in 1997, control aircraft access in all Canadian national parks. These regulations prohibit take off and landing of aircraft in Jasper National Park, unless authorized by the superintendent. Under Section 6 (c) of the Regulation, the superintendent may authorize take offs and landings on an airstrip for the purposes of public safety. Despite closure of the airstrip, aircraft continue to contravene this regulation and land illegally without the required authorization of the superintendent.

Alternative landing sites to the decommissioned airstrip are not considered in this Comprehensive Study, as a landing site within JNP would contravene these regulations. Parks Canada does not have the authority to consider alternate locations outside of JNP.

3.3 Parks Canada Guiding Principles and Operational Policies (1994)

This policy document states that access by private aircraft within a national park will not be allowed, except to remote areas where reasonable travel alternatives are not available, or where authorized through the management and planning process and specified by regulation.

The guiding principles further state that Parks Canada "recognizes the need for control and management of appropriate activities. Public demand alone is not sufficient justification for provision of facilities and services in support of appropriate activities. Services, facilities and access for the public must directly complement the opportunities provided, be considered essential, take account of limits to growth, and not compromise ecological and commemorative integrity nor the quality of experiences. They must be consistent with approved management plans" (Parks Canada 1994).

3.4 Jasper National Park Management Plan and Associated Policy Documents

One of the objectives of the Jasper National Park Management Plan (Parks Canada, 2000*a*) is to preserve and strengthen the ecological integrity of the park in a way that integrates ecological, social and economic values and to establish clear limits to development associated with appropriate activities (Section 1.2). Many activities sanctioned by former policies are no longer considered appropriate in a national park. Parks Canada Guiding Principles and Operational Policies identify visitor access by commercial or private aircraft as a permissible activity in remote areas where reasonable access alternatives do not exist. The presence of national road and rail transportation corridors and the proximity of airports on adjacent lands preclude the need to

provide visitors with aircraft access to Jasper National Park (Section 6.1). The continued routine landings on the airstrip despite closure of the airstrip in 1997, contravene the JNP Management Plan.

The Management Plan states the impact of aircraft and their associated facilities on ecological integrity must be minimized (Sections 1.3 and 6.2). Key actions to achieve this goal include the development of a Comprehensive Study with the intention of decommissioning the airstrip (Parks Canada, 2000*a*).

In addition to the JNP Management Plan (Parks Canada, 2000*a*), the following management and policy documents specific to Jasper National Park were reviewed:

- Vegetation Management Strategy for Jasper National Park (2000);
- Vegetation Management Guideline; Parks Canada Mountain District (1997);
- An Initial Assessment of Wildlife Movement Corridors in the Three Valley Confluence of Jasper National Park (2000);
- Parks Canada Management Directive 2.4.1; Integrated Pest Management.

Table 3.1 summarizes the management objectives of these policies and documents.

3.5 Summary of Judicial Hearing

The decision to close the Banff airstrip was announced by the Minister of Canadian Heritage on October 7, 1996, as recommended in the 1996 Banff Bow Valley Study (BBVS 1996). The Regulatory Impact Analysis Statement for the *National Park Aircraft Access Regulations* applies this decision to the Jasper airstrip by stating "Since the rationale to close the Banff airstrip applies equally to the Jasper airstrip, the latter will be closed as well". A 1997 judicial hearing addressed whether a legal error was made in the implementation of the decision to close the airstrip through a lack of public consultation. Justice Campbell concluded: "there has been an overwhelming mass of consultation in the decision to close the airstrips and there is no point in having more" (Campbell 1997).

Justice Campbell (Campbell 1997) also concluded the decision to close the airstrips was a land use matter and not related to a physical work, and therefore was outside the scope of *CEAA*. Decommissioning the airstrip, on the other hand, is a physical work, and therefore requires an environmental assessment under *CEAA*. In addition, Justice Campbell found that decommissioning the airstrip is contrary to the 1988 JNP Management Plan, which stated the airstrip would be retained for emergency diversion landing purposes until a review was completed. A joint Transport Canada- Parks Canada monitoring program concluded the airstrip was no longer required for emergency purposes (Transport Canada 1994).

Table 3.1 Management Objectives and Directives in Jasper National Park

Objective/Principle
General
To recognize biological diversity exists at a variety of scales-genetic, species, community, and landscapes
To manage developed areas to promote the use of native species and communities.
Vegetation
To prevent the introduction of non-native plants and to eliminate or control them as practical where they already exist, in support of maintaining native plant diversity.
To protect, maintain or restore rare, vulnerable, threatened or endangered genetic resources, species, and biotic communities.
To ensure that natural disturbances (e.g. wind, floods, avalanches, grazing) and their effects function unhindered.
To focus on maintaining or restoring the compositional, structural and functional integrity of the montane ecoregion.
To build relationships and share information among the agencies, individuals and interest groups in the regional ecosystem.
To maximize retention of biomass, nutrients and ecological roles within the ecosystem in cases where vegetation must be removed from the site by an approved project; to restore, as closely as possible, the composition, structure and dynamics of native communities to human disturbed sites; and to minimize future disturbance.
To identify previously disturbed sites, and to restore a native plant community as closely as possible.
Wildlife
To maintain and where feasible, restore habitat quality and connectivity for wildlife in the park and on surrounding lands.
To restore long-term patterns of behaviour, distribution and abundance of ungulates.
To reduce human-caused mortality that threatens the viability of wildlife populations in the park and regional ecosystems.
To restore wildlife movement corridors to improve corridor function and where possible, make gains in both habitat security and effectiveness.

Justice Campbell's ruling established the requirement to complete a Comprehensive Study before a decision to decommission the airstrip can be reached. He further concluded that a liberal interpretation be given to health and socio-economic factors in the assessment with direct reference to aviation safety. In particular, he posed the question "if the grass fields which have been used as active airstrips are now taken out of service by regulatory change but left undeveloped for other purposes as expressly intended, what harm would be caused by keeping them in a condition that would allow them to be used, within the Superintendent's discretion?"

Continued maintenance of an airstrip is required for it to be safely used for emergency or diversionary landings. The comparison of continuation of maintenance of the airstrip in order to ensure it is in suitable condition for emergency landings, as opposed to the stated project purpose of reclaiming the site to its natural state, is addressed in Section 6.3 of this report. Further details regarding judicial review are presented in the Terms of Reference (see Appendix A).

3.6 'Unimpaired for Future Generations?' Conserving Ecological Integrity with Canada's National Parks. Report of the Panel on Ecological Integrity of Canada's National Parks (2000)

The Report of the Panel on Ecological Integrity of Canada's National Parks states to successfully manage the national parks with a conservation focus, Parks Canada must establish a clear vision around the primary objective of protecting ecological integrity (Parks Canada, 2000*b*). Jasper National Park was found to have major impairment to ecological integrity as a result of impacts from internal and external sources and cumulative impacts of all stressors (Parks Canada 1997*a*). The report calls for active management and challenges Parks Canada to translate policies into plans and plans into action. The Minister of Canadian Heritage responded to the report with an Action Plan that accepted the findings and set in place a process to implement its recommendations.

The panel also recommended that human use in the national parks must pass the dual test of allowability and appropriateness (Parks Canada, 2000*b*). Allowable use/activity is defined as one which does not contravene the *Canada National Parks Act and Regulations* and which may be appropriate to the conditions in a specific heritage area (State of the Parks 1997 Report).

3.7 Summary

Parks Canada, as the project proponent of the airstrip decommissioning, triggers Section 5 of the *Canadian Environmental Assessment Act*. In response to federal court decision, the environmental assessment will be considered at a Comprehensive Study level.

A review of the *Canada National Parks Act* and *National Parks Aircraft Access Regulations* indicated that Parks Canada has jurisdiction over control of aircraft access in national parks, and that take offs and landings are prohibited within JNP unless authorized by the superintendent. Parks Canada policies support the restoration of the compositional, structural and functional integrity of the montane ecoregion, and the restoration of key wildlife corridors.

Continued unauthorized aircraft landings on the airstrip are contrary to the policy and legislation of Parks Canada, as defined in *Canada National Parks Act, National Parks Aircraft Access Regulations,* and the JNP Management Plan

4.0 PROJECT DESCRIPTION

4.1 Project Scope

4.1.1 Scope of the Project

The scope of the project refers to "those components of the decommissioning that should be considered part of the project for the purposes of the environmental assessment" (JNP 2001). According to Section 15 of *CEAA,* the Responsible Authority shall determine the scope of the project. The Terms of Reference prepared by Parks Canada for this assessment stipulate the scope of the project, and include the expectations from Justice Campbell's ruling, including consideration of aviation safety (see Appendix A). Section 15 (3) of *CEAA* states: Where a project is in relation to a physical work, an environmental assessment shall be conducted in respect of every construction, operation, modification, decommissioning, abandonment or other undertaking in relation to that physical work that is proposed by the proponent or that is, in the opinion of…the responsible authority likely to be carried out in relation to that physical work.

Parks Canada has determined the scope of the project includes the following:

- Removal of all built structures (including runway markers, tie downs, windsock, shelter building, outhouses, telephone and power connections, underground fuel storage tank and accessories, concrete fuelling pad, concrete runway midpoint marker, and vehicle parking barriers);
- Installation of closure markings (placement of three "X" markings on runway);
- Rehabilitation of the physical area affected by airstrip activities as required, including the grass runway and taxiways, remediation of contaminated soils, if any found, associated with fuelling, and determining the future requirements for vehicle parking and access;
- Maintenance or relocation of the existing gate to control access to the adjacent picnic area access road; and
- Administrative actions for the necessary notifications and publication amendments.

Parks Canada concluded there are no additional projects or activities that are accessory or related to the principal project described above.

4.1.2 Scope of the Assessment and Factors to be Considered

The scope of the assessment includes "a determination of the factors to be considered, the scope of the environmental effects to be assessed, and the effects to be considered in making decisions regarding the project" (JNP 2001).

Section 16 (1) of *CEAA* states: every screening or comprehensive study of a project…shall include a consideration of the following factors:

(a) The environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;

(b) The significance of the effects referred to in paragraph (a);

(c) Comments from the public that are received in accordance with this Act and the regulations;

(d) Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and

(e) Any other matter relevant to the screening, comprehensive study, mediation or assessment by a review panel, such as the need for the project and alternatives to the project, that the responsible authority or, except in the case of a screening, the Minister after consulting with the responsible authority, may require to be considered.

In addition to the above factors, Section 16 (2) of *CEAA* states: every comprehensive study of a project and every mediation or assessment by a review panel shall include a consideration of the following factors:

(a) The purpose of the project;

(b) Alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;

(c) The need for, and the requirements of, any follow-up program in respect of the project; and

(d) The capacity of renewable resources that is likely to be significantly affected by the project to meet the needs of the present and those of the future.

Environmental effects of the project are changes in the biophysical environment caused by the project, as well as certain effects that flow directly from those changes, including effects on:

- Human health;
- Socio-economic conditions;
- Physical and cultural heritage, including effects on things archaeological, paleontological or architectural significance;
- The current use of lands for traditional purposes by aboriginal persons; and
- Any changes to the project that may be caused by the environment.

The judicial hearings also concluded that 'environmental effect' encompasses the effect of any change in health and socio-economic conditions in the VFR flight corridor as a result of decommissioning (Campbell 1997). In addition to the factors listed above, the assessment examines aviation safety, which includes the public health and safety of VFR pilots and passengers who use the JNP VFR route.

It is not within the Terms of Reference for this study to consider 'alternatives to' decommissioning the airstrip. 'Alternatives to' the project are defined as "functionally different ways of achieving the same end" (CEAA 1994). Law prohibits routine aircraft operations at the Jasper airstrip. The project now is to decommission the infrastructure associated with the former airstrip, and reclaim the site to parkland. Parks Canada is not aware of an alternative legal and regulative acceptable way of achieving this end, other than to undertake the project pursuant to the guidance provided in the *Canadian Aviation Regulations*. That is, remove the features normally associated with an open airstrip and install features normally indicative of a closed airstrip (JNP 2001).

The Comprehensive Study, however, considers 'alternative means' of carrying out the project in accordance with *CEAA*. For example, various approaches to installing "X" closure markings, and reclamations techniques are considered.

The Terms of Reference for this assessment identify the scope of the Valued Ecosystem Components to be considered, including:

- Carnivores, their habitat use and habitat effectiveness, habitat fragmentation and travel corridors;
- Public safety, including aviation safety matters, emergency and precautionary diversion, search and rescue, medical evacuation, and aircraft use for park management purposes;
- Vegetation and soils, predator-prey dynamics, habituation to humans, and the context of the elk management strategy;
- Ungulates, primary elk; herbivory, predator-prey dynamics, habituation to human and the context of the elk management strategy;
- Breeding birds, breeding bird habitat effectiveness as an ecological indicator; and
- Cultural resources, a summary of historic land uses in the vicinity of the airstrip.

The spatial and temporal boundaries assessed vary for each VEC, and are further delineated in Section 5.1.

4.2 Project Purpose and Need

The project being assessed is the proposal to decommission the Jasper airstrip. The purpose of the project is to fully implement the *National Parks Aircraft Access Regulations*. These

regulations prohibit take off and landing of aircraft in Jasper National Park. Although the Jasper airstrip is closed, there are still unauthorized routine landings at the site. The airstrip must be marked with appropriate closure markings to ensure pilots know the airstrip is closed. Decommissioning activities will install these markings (see Section 4.3).

The purpose of this study is to evaluate the environmental effects associated with decommissioning the airstrip and returning the area to as close to its natural state as possible. The Canadian Environmental Assessment Agency will use the information in this study to make a recommendation to the Minister of the Environment, who makes a determination on the need for further assessment. If the Minister concludes the project is not likely to cause significant adverse environmental effects, the project is referred back to Parks Canada, the Responsible Authority, who decides whether the project will proceed. The Minister may also refer the project to a mediator or review panel.

The need for the project has been identified by the Responsible Authority, Parks Canada, and through the judicial process. The decision to close the Jasper airstrip was initially announced in 1996, and subsequently enforced by the 1997 *National Park Aircraft Access Regulations*, which prohibit routine aircraft operations on the airstrip. According to the final Terms of Reference for the Comprehensive Study (JNP 2001), Parks Canada's strategy to close the airstrips without decommissioning has been unsuccessful. The lack of physical elements on the airstrip to indicate the runway is closed, such as "X" markings, and the presence of infrastructure give the appearance that the airstrip is still open. This appearance has resulted in illegal landings under the *National Park Aircraft Access Regulations*. Decommissioning of the airstrip is necessary to remove the physical aspects of the airstrip, to provide the required visual markings of a decommissioned airstrip, and to ensure pilots are aware the airstrip is no longer open to routine aircraft movements.

4.3 Project Activities

This assessment will focus on the activities involved in the decommissioning of the Jasper airstrip, including the requirements for reclamation. Figure 1 shows a site plan of the airstrip, and identifies all of the facilities that will be decommissioned.

To decommission the airstrip, the following activities will occur:

- Removal of all infrastructure which makes the area look like an operational airstrip;
- Installation and maintenance of closure markings;
- Reclamation and rehabilitation of the physical area affected by airstrip activities (as required);
- Maintenance or modification of a gate to control road access;
- Cessation of maintenance activities on the runway; and
- Airstrip closure notification in the Canada Flight Supplement.

4.3.1 Removal of All Infrastructure

Table 4.1 identifies the facilities located at the site, and describes the activities involved in removal of the facility. Figure 1 shows the site plan of the facilities.

4.3.2 Installation and Maintenance of Closure Markings

According to Transport Canada, to fully decommission an airstrip, closure markings are required to alert pilots to the fact the airstrip is no longer available for use. This requires three "X" markings on the runway that are 7.25 m wide and 18 m long. Each of the two arms that make up the "X" must be 0.9 m wide by 19.4 m long. Parks Canada will seek guidance from Transport Canada regarding material to be used.

4.3.3 Reclamation and Rehabilitation

Reclamation and rehabilitation will be required for the physical area currently affected by airstrip activities. Sites that require rehabilitation/reclamation in whole or in part include:

- Grass runway;
- Taxiway;
- Potentially contaminated sites (associated with fuelling areas);
- Areas where shelters were once located; and
- Informal trail running parallel to the airstrip, between the airstrip and Highway 16. The trail appears to have been formerly graded to approximately 2 m wide and 8 to 10 cm below grade.

Reclamation will occur after removal of all structures and other material has occurred. Reclamation activities include:

- Addition of fill to cleared areas;
- Grading; and
- Restoration of site including spreading of soil, scarifying, seeding with native species, planting and integrated pest management, as required.

Appendix B provides a rehabilitation plan for the Jasper airstrip.

Table 4.1 Decommissioning activities related to airstrip facilities

Structure	Description	Activity
Tie downs	Concrete blocks with a metal loop imbedded in concrete. A metal cable (approximately 120 m long) runs between three wooden platforms that are flush to ground and approximately 1 m by 2 m. (photo 1)	Wooden planks and cable will be removed. The current condition of the wooden planks (some broken or oil stained) precludes their use as salvage material. The metal cable will be pulled up and disposed of at an approved facility (the waste transfer station).
Runway markers and cones	Large plastic orange/red/white cones. (photo 2)	Plastic cones and triangles will be collected and disposed of at an approved facility (waste transfer station).
Windsock	Metal pole painted red and white embedded in the ground with a square concrete slab (approx . 1 m diameter). Orange windsock is attached to the pole. (photo 3)	Some demolition and excavation of concrete footings will be required to remove the metal pole from its current location. The pole, and rubble will be collected and trucked an approved facility (the waste transfer station).
UST +accessories	Green metal box, Alberta Environment (AENV) groundwater inspection well	Fuelling facilities will be dismantled and removed according to federal and provincial guidelines. Prior to or during excavation and facilities removal, a Phase I/II site assessment will be undertaken. The UST must be tested and removed in accordance with the Canada-Wide Standards for Petroleum Hydrocarbons by the Canadian Council for Ministers of the Environment (CCME 2001).
Concrete fuelling pad	Rectangular concrete slab. (photo 4)	Demolition and removal of asphalt surfacing requires demolition, stripping, excavation and transport to the waste transfer station. Any material visibly stained will be excavated and moved to an approved facility.
Centre "button"	Circular concrete apron (approximately 1m wide) with rectangular extensions indicating the orientation of the airstrip. (photo 5)	Removal of the concrete apron demolition, stripping, excavation and transport to the waste transfer station. The area will be decompacted, filled and reclaimed. For details on proposed reclamation techniques refer to Appendix B.
Vehicle parking barriers	Metal gate set in concrete into the ground. Large boulders set approximately 0.6 m apart.	The existing gate prevents vehicle access onto the airstrip. Minor adjustment of boulder perimeter to prevent access onto former airstrip may be required.
Paved section of the parking lot	A section of the Jasper airstrip parking area has asphalt surfacing that must be removed. (photo 6)	Removal of any asphalt surfacing associated with the parking area requires materials stripping, excavation and transport to the waste transfer station. The area will be filled with gravel and graded to allow parking for visitors using the picnic area.
Outhouses	Two wooden outhouses.	Removal and reuse at alternate location, if possible. If not, demolition and transport to the waste transfer station.
Registration shelter	Wooden log shelter (approximately 2 m x 2.6 m) on six concrete piles. (photo 6)	This small building is in fairly good condition and could be easily moved to another site managed by Parks Canada for a similar purpose or could be considered for salvage material.
Buried telephone and power connections	Buried telephone and power connections.	Underground cables and pipe shall be left *in-situ*; protruding wire will be cut to a minimum of 5 cm below ground level.
Stone circle	A circle has been created around the base of the windsock (approx. 30 m in diameter) using large rocks. (photo 3)	Stones will be piled and removed.
General	Cessation of maintenance activities	Maintenance activities include mowing, ploughing in winter, maintaining runway markers and windsock.

4.3.4 Maintenance of Road Access

A series of large boulders will be maintained around the perimeter of the picnic site parking lot to prevent public vehicle access onto the airstrip. The gravel access road to the picnic area will remain accessible to Parks Canada staff and continue to be maintained.

4.3.5 Cessation of Maintenance Activities on Runway

Currently, the maintenance on the airstrip is minimal. The airstrip was mowed once in 1999 and ploughed three times that winter. During the 2000-2001 winter, no ploughing was required.

Once the decommissioning is complete, the airstrip will no longer be maintained. Mowing in the summer and snow ploughing in winter will no longer be required. However, in addition to cessation of maintenance activities, Justice Campbell (1997) directed the assessment to consider the effects of continued maintenance after decommissioning and rehabilitation of the site. This is addressed in Section 6.3.

4.3.6 Notification in Canada Flight Supplement

Formal notification (e.g., NOTAMS) of the change in airstrip status in the Canada Flight Supplement shall be required upon completion of the above decommissioning activities. This will inform pilots that the airstrip is closed and decommissioned, and no longer available for landings.

4.4 Alternative Means of Carrying out the Decommissioning

The final Terms of Reference for this Comprehensive Study state the assessment must consider alternative means of carrying out the project, as per Section 16 of the *CEAA*. According to the Canadian Environmental Assessment Agency's *Operational Policy Statement (OPS)*, "alternative means" can be defined as various ways that are technically and economically feasible in which the project can be implemented or carried out (CEAA 1998). The OPS further suggests that this could include alternative locations, routes and methods of development, implementation and mitigation. Parks Canada proposes to meet Transport Canada's requirements for decommissioning airstrips, in accordance with the *Canadian Aviation Regulations.* Parks Canada considers that the potential alternative means of carrying out the project that are technically and economically feasible are limited to the following options:

- Installation and maintenance of closure markings;
- Reclamation and rehabilitation; and
- Maintenance or modification of a gate to control road access.

Alternative locations, or landing sites, will not be considered as an alternative means in this Comprehensive Study, as a landing site within JNP would contravene the *National Parks Aircraft Access Regulations.* Other project activities, such as removing facilities, do not have practical alternative means.

4.4.1 Closure Markings

The *Canadian Aviation Regulations* stipulate that decommissioned airstrips must have three "X" markings on the runway. The materials may be a conspicuously coloured dye or may be constructed from a suitable conspicuously coloured material or product. Possible alternative materials for the installation of these markings include:

- Plastic lattice held in place with rebar, or similar metal pins;
- Chalk;
- Excavating sod in an "X" shape and backfilling with crushed white rock; and
- Blazing any of the above materials orange.

Parks Canada reviewed alternative materials to construct the "X" markings, and concluded that white gravel flush with topsoil would be the most practical because it is a natural substance, is resilient under environmental conditions and will require minimal maintenance, and will eventually become grown over by grasses when the runway is no longer recognizable as an airstrip. This alternative is preferred to other substances which may be toxic or long lasting, may damage underlying vegetation, or may be subject to damage by elk, wind or sun.

The materials will not cause significant environmental impacts. Parks Canada will consult with Transport Canada regarding an appropriate material for the "X" markings prior to making a final decision on the preferred alternative means for closure markings.

4.4.2 Reclamation and Rehabilitation

The overall goal of vegetation management in Jasper is to maintain or restore natural composition, structure and processes of vegetation representative of the Rocky Mountain Natural Region. Reclamation activities will strive to accomplish that goal through the restoration of montane native grassland on the site (AT3 ecosite phase). The recent prescribed burn on the site will aid in this goal, as 90% of the pine trees were killed.

Reclamation techniques discussed in Appendix B, Rehabilitation Plan, are proven technology and the best alternative, given conditions at the Jasper airstrip. Alternative means considered for reclamation were:

- To allow vegetation to come back naturally;
- To scarify, seed, and not fence areas affected by decommissioning; and
- To scarify, seed, and fence areas affected by decommissioning.

The first alternative of natural regeneration was not appropriate for the airstrip given its close proximity to the Yellowhead Highway (Highway 16) and the potential for non-native species invasion. The goal of the revegetation is to reclaim the site with native species. While natural invasion of native species into the reclaimed areas and the area surrounding disturbed patches is

encouraged, it will not discourage invasion of the areas from non-native species (weeds). Seeding is recommended in areas affected by decommissioning to encourage native species growth and to prevent non-native species invasion.

The second alternative considered was to reseed decommissioned areas with native seed mix recommended by Parks, and to leave the newly revegetated sites unfenced. This alternative was deemed impractical given the high level of herbivory on the airstrip by elk (see Section 5.6.4). Recent experience in the Park with similar revegetation methods indicates that elk will damage or prevent revegetation efforts by trampling and grazing on newly established plants.

The third alternative is recommended in Appendix B, and includes fencing larger revegetation sites until plants have well-established root structures and the soil is stabilized (A. Westhaver, pers. comm.).

4.4.3 Access Control

Access to the airstrip is currently blocked by large boulders set approximately 0.6 m apart. Minor adjustments to the boulder perimeter and/or signage restricting vehicle access to the airstrip may be required if the boulders prove ineffective. The road to the parking lot from the highway will remain open. No other alternative materials for access control to the airstrip are necessary.

Access to the picnic area is controlled by a gate at the parking lot. Parks Canada wishes to retain access to the picnic area, therefore the gravel road will remain open. Access will continue to be controlled through the use of a locked gate between the parking lot and the roadway.

5.0 BIOPHYSICAL SETTING

5.1 Study Areas

The study area includes the maximum extent within which environmental impacts from project activities may occur, and beyond which effects are predicted to be negligible. The temporal scope of the project is determined by the time frame in which project impacts may occur. Based on the nature of the proposed decommissioning activities, the study area and temporal scope varies for each component as follows:

- The study area for groundwater, vegetation, terrain and soils, cultural resources and human use/recreation is generally limited to the area immediately affected by project activities, as shown on the Site Plan, Figure 1. The temporal scope of the study for these environmental components is restricted to the duration of the project (5 days), and post decommissioning (10 years).

- The wildlife study area includes the Athabasca River floodplain and associated glacial terraces and channel banks surrounding the location of the current airstrip (Figure 2). The temporal scope for the wildlife study includes the duration of the project (5 days) and post decommissioning (10 years).

- The aviation safety study area includes the VFR flight path between Edson Airport and Valemount, through the mountains as shown on Figure 3. The temporal scope for the aviation safety study includes past, current, and future trends in flight frequency, and the completion of all project activities. Project activities include successful reclamation so the runway is no longer discernable. (10 years).

5.2 General Environmental Context

The Jasper airstrip is located in the montane ecoregion in the Athabasca Valley (Figure 2), the most biologically diverse and ecologically important area in JNP. The montane is also the least extensive ecoregion in JNP, covering only 7% of the Park, and is confined to the bottom of river valleys.

The montane ecoregion is considered prime wildlife habitat and is critical for wildlife movement throughout the Park. The Athabasca Valley is a critical link for the movement of animals through the Central Rockies Ecosystem. Assemblages of terrestrial fauna include white-tailed deer (*Odoicoileus virginianus*), mule deer (*O. hemionus*), elk (*Cervus elaphus*), moose (*Alces alces*), and bighorn sheep (*Ovis canadensis*). Carnivores include pine marten (*Martes americana*), grizzly bear (*Ursus arctos*), coyote (*Canis latrans*), wolf (*C. lupus*), lynx (*Lynx canadensis*), cougar (*Felis concolor*), black bear (*Ursus americanus*) and wolverine (*Gulo gulo*) (see Appendix C for a complete species list). Current land use pressures are highest in this region of the Park (Cardiff 2000).

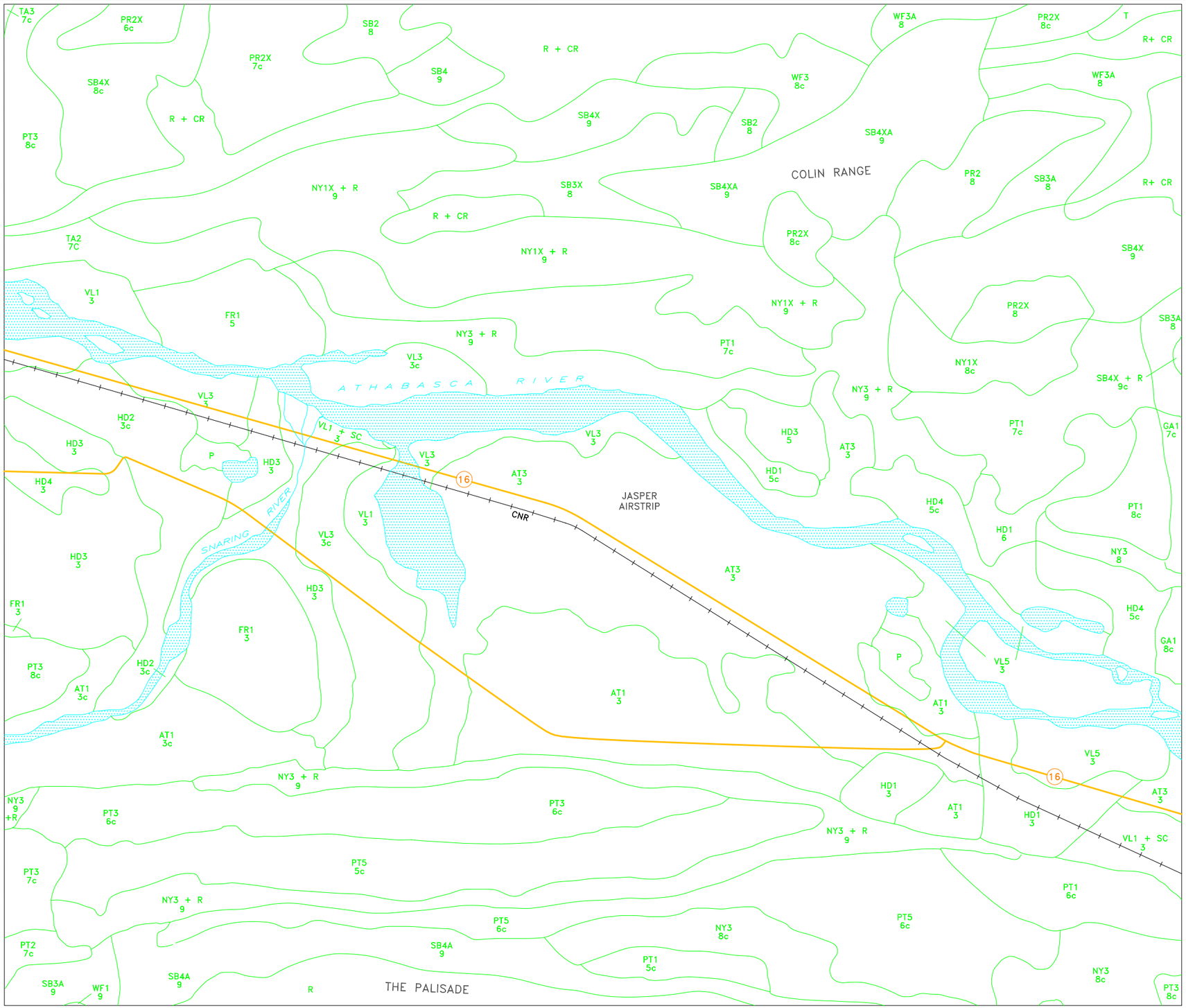
Protecting secure travel corridors allow wildlife to move freely between areas that provide habitat for various seasons or life stages (including feeding, denning, resting, mating etc.) and are a critical component of a balanced ecosystem. Protecting functioning wildlife corridors will:

- Reduce numbers of habituated animals and thus human-wildlife encounters;
- Help restore predator prey relationships;
- Lessen the chance of producing an environment where habituated common species (such as elk) dominate the system; and
- Help restore natural variability and successional stages of vegetation complexes; the increase in the habituated ungulate populations has had a negative impact on natural grasslands in the valley.

The airstrip is bound to the west by the Yellowhead Highway and by the Athabasca River to the east. Highway 16, the Celestine lake road and the Canadian National Railway run north-south through this area (Figure 1). All ungulates use this corridor as well as coyote, marten, lynx, wolf, cougar, grizzly bear and black bear. Wildlife such as wolf and elk move south along the Snaring River and then continue along the Athabasca Valley towards the airstrip and the Jasper townsite. Due to human activities near the Jasper Townsite, this movement has become threatened by fragmentation. While the Three Valley Confluence, where the Athabasca, Miette and Maligne rivers converge, has the highest habitat potential in JNP, it has the lowest habitat effectiveness.

Vegetation in the montane ecoregion is dominated by three main vegetation types: Douglas fir (*Pseudotsuga menziesii)* and white spruce (*Picea glauca*); aspen poplar (*Populus* spp.); and grassland at dry sites. The two ecological processes that exert the greatest influence on vegetation structure and composition in the montane ecoregion of the Jasper Athabasca River valley are fire and herbivory (grazing and browsing by ungulates, particularly elk) (see photos 7 and 8). Both of these processes result in reductions in the cover and height of woody browse species, and generally lead to increases in the abundance of graminoid cover (White 1985, Achuff *et al*. 1986, White *et al*. 1998). High levels of herbivory and related trampling (soil disturbance) can also lead to invasion by agronomic plant species (Achuff *et al*. 1990, Willoughby *et al*. 1997). Fire and herbivory are intricately related and are linked to other natural processes such as predation by wolves. Human actions such as fire suppression, elk management and infrastructure development all serve to modify natural ecological processes and resultant vegetation structure and composition (Rhemtulla 1999).

Fire suppression in the montane ecoregion of the mountain national parks has led to reductions in the area of grasslands, young open shrubby conifer and deciduous stands and increases in the amount of dense, tall coniferous forest with high moss cover (White 1985, Van Wagner 1995, Kay *et al.* 1999, Rhemtulla 1999). JNP's prescribed fire program included burning the airstrip in June 2001 (Westhaver pers. comm.).



LEGEND

- Main Road/Highway
- Railway
- River/Creek
- Lake

ECOSITES

AT1 –ATHABASCA ECOSITE 1
AT3 –ATHABASCA ECOSITE 3
FR1 –FIRESIDE ECOSITE 1
GA1 –GARONNE ECOSITE 1
HD1 –HILLSDALE ECOSITE 1
HD2 –HILLSDALE ECOSITE 2
HD3 –HILLSDALE ECOSITE 3
HD4 –HILLSDALE ECOSITE 4
NY1 –NORQUAY ECOSITE 1
NY3 –NORQUAY ECOSITE 3
PT1 –PATRICIA ECOSITE 1
PT3 –PATRICIA ECOSITE 3
PT5 –PATRICIA ECOSITE 5
PR2 –PANORAMA RIDGE ECOSITE 2
SB2 –SAWBACK ECOSITE 2
SB3 –SAWBACK ECOSITE 3
SB4 –SAWBACK ECOSITE 4
TA2 –TALBOT ECOSITE 2
TA3 –TALBOT ECOSITE 3
VL1 –VERMILION ECOSITE 1
VL3 –VERMILION ECOSITE 3
VL5 –VERMILION ECOSITE 5
WF1 –WILDFLOWER ECOSITE 1
WF3 –WILDFLOWER ECOSITE 3
CR –COLLUVIAL RUBBLE
T –TALUS ECOSITE
R –ROCKLAND ECOSITE
A –AVALANCHED
P –PITS
X –LITHIC

SLOPE CLASS

SYMBOL	% SLOPE
3	0–5
5	5–15
6	15–30
7	30–45
8	45–70
9	>70

MAP SYMBOL CONVENTION

ECOSITE SYMBOL
VL3
3
SLOPE CLASS

Scale (km)
0.3 0 0.3 0.6 0.9 1.2

SOURCE: JNP ELC JASPER–ECOSITES

FIGURE 2 ECOSITE CLASSIFICATION AROUND THE JASPER AIRSTRIP

HIGHWOOD Environmental Management

Figure 3. Visual Flight Corridor through Jasper National Park

The Jasper airstrip lies on a terrace of coarse textured calcareous glaciofluvial level material immediately adjacent to the Athabasca River approximately 12 km north of the Jasper townsite (Figure 1). The airstrip is located entirely within the AT3 (Athabasca Terrace 3) ecosite (Holland and Coen 1982). Several additional montane ecosites occur contiguous with or in the immediate vicinity of the AT3 unit. Although none of these additional ecosites will be directly affected by airstrip decommissioning activities, they lie within the pathway of past and current air traffic. A summary of the biophysical characteristics typically associated with these ecosites is presented in Table 5.1. Soils in the AT3 ecosite are dominated by Eutric Brunisol soil. Vegetation in AT3 ecosites ranges from dry grasslands to forests of lodgepole pine. The grasslands typically consist of junegrass, sage and blue flax. The trees and understory are generally lodgepole pine, juniper and bearberry. AT3 sites are suitable for wildlife due to the low snow accumulations and warmer temperatures.

The airstrip itself is primarily dry montane grassland with some tree and shrub encroachment on the outer boundaries. The soils east of the airstrip were found to be highly permeable and moderately permeable to the west. Due to the coarse sands and gravels in the terraces, the soils are very well drained. The runway (50 m wide and 1050 m long) is situated on dry level grassland that may have been seeded, and is regularly graded and mowed to maintain safe conditions for plane take-off and landing (Wilkinson 2000). The unfenced Yellowhead Highway borders the west side of the airstrip (Figure 1). At its closest, the highway is located 225 m from the centre of the runway, and at its furthest is 350 m distant. The Canadian National Railway line parallels the Yellowhead Highway 30 m to the west. The Athabasca River flows along the eastside of the airstrip at a distance ranging from 350 to 580 m. A gravel access road leads through lodgepole pine forest to a parking lot that is located 150 m southwest of the south end of the runway. A less well-developed gravel road continues in an arc to the northeast across the grassland terminating at a small picnic area with a picnic shelter in a spruce forest beside the Athabasca River. The nearest area of concentrated human use is the Snaring River campground situated 2.3 km to the north, across the Yellowhead Highway.

Table 5.1 Ecological Characteristics and Occurrence of Ecosites in the Vicinity of the Jasper airstrip

Ecosite	Ecoregion	Slope Angle	Landform	Dominant Soil	Dominant Vegetation Cover
AT1	Montane	1% - 15%	Glaciofluvial	Eutric Brunisol	Lodgepole pine forest
AT3	Montane	0% - 5%	Glaciofluvial	Eutric Brunisol	Grassland/Lodgepole Pine Forest
FR1	Montane	2% - 30%	Fluvial	Eutric Brunisol	Lodgepole Pine forest
GA1	Montane	15% - 45%	Landslide	Eutric Brunisol	Lodgepole Pine Forest
HD1	Montane	1% - 15%	Fluvial	Regosol	Aspen Forest
HD2	Montane	1% - 15%	Fluvial	Regosol	White Spruce Forest
HD3	Montane	1% - 15%	Fluvial	Regosol	White Spruce/Douglas Fir Forest
HD4	Montane	1% - 15%	Fluvial	Regosol	Grassland/Lodgepole Pine Forest
NY3	Montane	45% - 70%	Stratified Drift	Eutric Brunisol	White spruce/Douglas fir Forest/Grassland
VL1	Montane	0% - 2%	Fluvial/Fen	Gleysol/Organic	Sedge Fen/Wet Shrubby Meadow
VL3	Montane	0% - 2%	Fluvial	Gleysol	Wet White Spruce Forest/Wet Shrub Meadow
VL5	Montane	0% - 2%	Fluvial	Gleysol/Regosol	Wet Shrub Thicket

5.3 Climate and Weather Conditions

The climate of the project area is continental, with long cold winters and short summers that are cool with occasional hot spells. Environmental data collected at the Jasper townsite (1061 m asl; 52°31'N and 118°04'W) can be used to characterize the project site. Mean daily temperatures range from –10.5°C in January to 15.0°C in July, with the mean annual temperature registering at 2.2°C. The total annual precipitation for the last year averages 393.7 mm, with 143.7mm of that falling as snow (Environment Canada 2001). The wettest months are June and August, during which an average of 54 mm of precipitation falls. Substantial precipitation also occurs during the winter (November to February inclusive) with monthly rates ranging from 17.4 to 31.1 mm. The lowest precipitation occurs during the spring (March and April) and fall (September) transition seasons (Holland and Coen 1982).

The Weather Observing site used by pilots is automated and located at the JNP Warden compound, 25 km from the airstrip. According to Maqbool (2001), "weather observations that arise from the Banff and Jasper *Automatic* and *Off-site* Weather Observing locations are not indicative of the actual weather occurring at these respective airstrips" (p. 19).

The airstrip is located in mountainous terrain with complex ambient wind flow patterns, precipitation, clouds and visibility. The airspace is at the transitional boundary of Mountain Weather and Foothill's/Prairie's Weather (Maqbool 2001). Major changes in weather occur at or on either side of this boundary. The most notable changes in pressure, moisture and temperature occur within the troposphere at a vertical height of 3 km asl, which is within the airspace of small aircraft (Maqbool 2001).

The mountainous terrain results in rapid changes in wind speed and direction. At Jasper, winds are predominantly from the southwest/south and northeast directions, which indicate a channelling influence by the northeast-southwest valley of the Athabasca River. The annual mean wind speed is 9.4 km/h at Jasper (Rudolph 2001). The annual frequency of occurrence and wind speeds are shown in Figures 4 and 5.

According to Maqbool (2001), the mean surface wind speed in the predominant west and southwest wind directions is not strong in the mountains surrounding the Jasper airstrip. In general, small aircraft experience stronger winds at the mountain peaks than within the valleys. During the summer, warm northeasterly winds coming from Jasper Lake will create cumulus clouds over the Athabasca River Valley and the Jasper airstrip.

The relatively good weather is the original reason for the location of the airstrip, and the Visual Flight Rules (VFR) route through the mountains. VFR conditions based on visibility occur from 93% of the time (January and December) to 99% (June). VFR conditions based on cloud height occur from 79% of the time in August to 87% in March (Rudolph 2001; Figure 6). The high frequency of VFR conditions means the airstrip is well suited for inexperienced pilots who are not skilled in instrument approaches. However, unpredictable and complex weather can occur in the mountain ranges, and wind flow within local pockets can vary based on solar heating and nocturnal cooling.

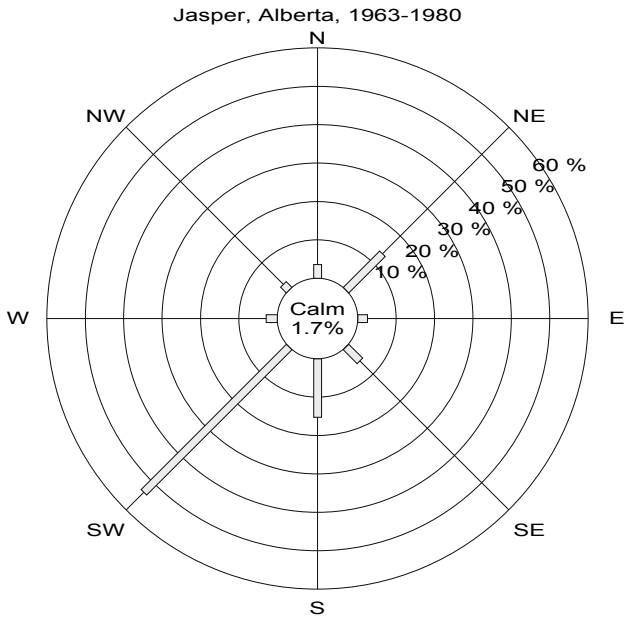


Figure 4. Annual Wind Frequency Distribution at Jasper airstrip
Source: Rudolph (2001).

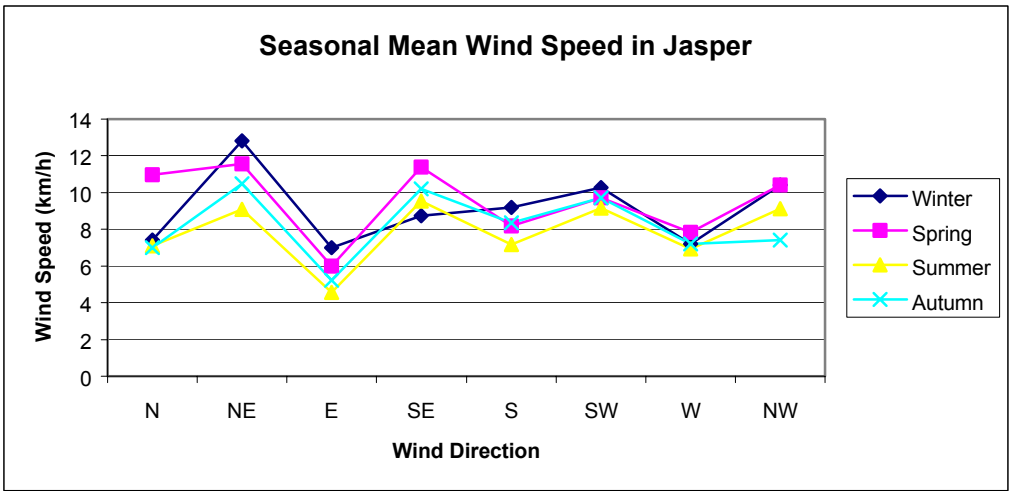


Figure 5. Seasonal Mean Wind Speed by Direction at Jasper
Source: Rudolph (2001).

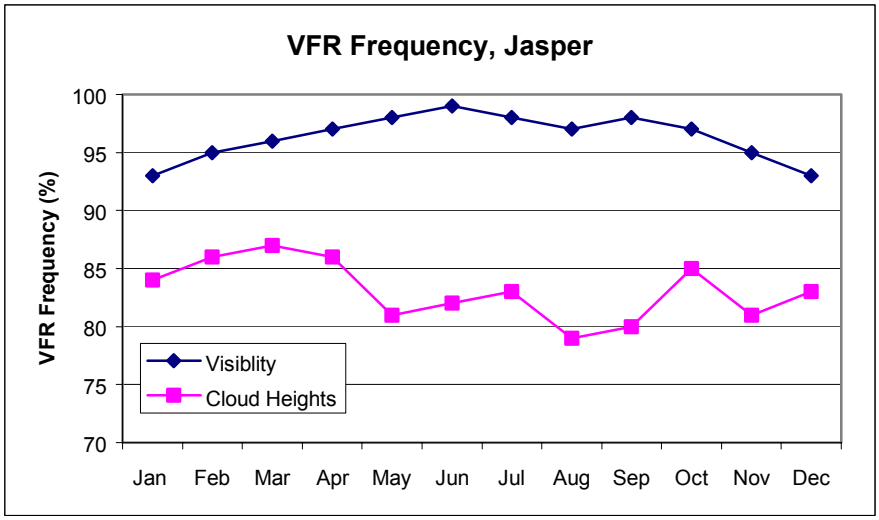


Figure 6. VFR Frequency Based on Visibility and Cloud Height Criteria
Source: Rudolph (2001).

5.4 Hydrological Resources

The Jasper airstrip is situated on a relatively level glaciofluvial terrace deposit in close proximity to the Athabasca River. The Athabasca River headwaters begin from melting ice and snow from the Columbia Icefields on the Continental Divide. The river heads north towards the town of Jasper then turns east towards Hinton. Many rivers such as the McLeod, Pembina and Lesser Slave Rivers are part of the Athabasca River basin. The river drains into the Athabasca Lake on the Alberta and Saskatchewan borders. The river is a total of 1,231 km long and drains an area of 74,600 km^2. Barnes (1978) states the terrace is composed primarily of coarse sands and gravels that are very well drained. Topography falls within slope Class 1 (less than 1% slope), although the terrain does begin to exhibit some micro-variation as it slopes gently toward Highway 16 to the northwest, i.e. small scattered depressions.

An Alberta Environment (AENV) groundwater monitoring well is located in the trees approximately 8 m from the aircraft refuelling pad. While installed in 1993, no data have been collected from this well (Marciniuk, Cable and Deemter, pers. comm.), and it provides no information on the surficial geology and groundwater characteristics at the site.

While groundwater data are not available for the airstrip itself, there is an extensive volume of information on record for the Trade Waste Pit located approximately 1.5 km south of the strip on similar surficial deposits (I.D. Systems, 1993; 1994 and AGRA, 1995). In the absence of direct site information it is suggested that, since the airstrip and waste pit are situated on the same geomorphic feature (a fluvial terrace), the hydrological characteristics and groundwater regimes are likely to be similar. Borehole logs at the trade waste pit (AGRA 1995) indicate a range of silt to sands and fine gravels in the upper metre overlying mainly sands and, near the 10 m depth, coarser sands and gravels typical of sorted fluvial deposits. The depth of the water table is difficult to determine due to the varying completion depths of the wells but it appears to vary between 2 and 8.6 m below the surface in August and 3 and 9.5 m in October 1995. During

periods of high water table the groundwater flows northward parallel to and eventually returning to the Athabasca River. In contrast, when levels fall the flow shifts to the east toward the river. The major source of recharge for the aquifer is from the Athabasca River east of the airfield. The velocity of the groundwater is approximately 0.5m/day (I.D. Systems 1993).

No information is available regarding possible contamination from the un-used underground storage tank (UST). However, the AENV groundwater well may still be serviceable for gathering groundwater data before excavating the UST (Deemter, pers. comm.). The UST at the airstrip contains, or has contained, liquid aviation fuel. Therefore a Phase I and II site assessment must be carried out and all CCME/AENV procedures for UST removal followed by the contractor. At the time of the site visit, there were no observable impacts to the vegetation around the refuelling pad, such as bare ground or yellowing/dead areas.

No information is available for the pit outhouses although they appear to be frequently used. There is always potential for outhouse waste to leach into groundwater if they have not been properly contained.

5.5 Terrain and Soils

The Jasper airstrip is situated in a confined valley bottom location between the Athabasca River and Highway 16, and is included in the Athabasca (AT3) ecosite classification. Holland and Coen (1982) describe AT3 as situated on terrace formations of glaciofluvial origin, which is corroborated by Barnes (1978). The predominant composition of these terraces is calcareous, with coarse sands and gravels. Recent (and current) additions of eolian sediments are found specifically in the vicinity of the airstrip. The terraces are quite level and due to their coarse textured composition, are very well drained. This high permeability increases the potential for soil and groundwater contamination should the UST have leaked or spilled in the past.

The AT3 soils likely developed initially under a forest vegetation typical of AT1; however drier climatic conditions and fire subsequently removed the forest cover and opened the area to eolian deposition and the establishment of grasslands, resulting in soils that are not typical of either grassland or forest environments. Soils of the AT3 ecosite are classified as either an overblown phase (i.e. recent wind deposits) of an Orthic Eutric Brunisol or an Orthic Melanic Brunisol (Holland and Coen 1982). Holland and Coen (1982) provided a diagnostic profile for the overblown Orthic Eutric/Orthic Melanic Brunisol at Henry House, near the airstrip. This profile is very similar to the profiles revealed during site inspections at the airstrip on April 18, 2001.

Site inspection of the soils at nine locations (see Figure 1) on and adjacent to the Jasper airstrip found topsoil depths ranging between 0 and 9 cm. The study site soils were dry to slightly moist when examined and were characterized by a dark black colour, generally loamy textured. Where no topsoil existed, it appeared to be the result of either blow-outs (i.e., possible wind erosion of topsoil on bare spots), maintenance activities, or heavy grazing and pawing. Elk were sighted to the south of the airstrip during the soil survey. The average topsoil depth within the airstrip was 3 cm, compared to a depth of 7 cm off the strip. The variance is attributed to past grading of the airstrip and noticeable areas of combined human and animal use. The latter is particularly

evident in the tie-down area and end of the strip near the parking lot where there are extensive bare patches.

5.6 Vegetation Resources

5.6.1 Valued Ecosystem Components

The Terms of Reference for this study proposed the following Valued Ecosystem Components (VEC) concerning vegetation resources.

- Ecosite/species representation;
- Ground cover;
- Forage condition and biodiversity;
- Herbivory and Fire inclusion/exclusion (Ecological processes)

However, as some of these are causes of impacts (i.e. ecological processes) or specific elements of broader vegetation features (i.e. changes in ground cover or forage condition), the following VECs relating to vegetation resources have been selected for the impact assessment:

- Rare and representative plant species; and,
- Rare and representative plant communities.

The following sections provide baseline information on the current condition of vegetation on the airstrip, including potential for plant species or communities with special conservation status and the influence that shifts in ecological processes have had in the study area.

5.6.2 Airstrip Vegetation Status

The airstrip is located entirely within the AT3 ecosite (Holland and Coen 1982). Characteristic native vegetation of the AT3 ecosite includes a matrix of dry grassland (H6) interspersed with patches of sub-xeric Lodgepole Pine forest (C3). The H6 vegetation type is classified as junegrass-pasture sage-wild blue flax, while the C3 vegetation type is classified as lodgepole pine/juniper/bearberry. In JNP AT3 is restricted to the Athabasca River valley floor and lower benchland between Jasper townsite and the Snake Indian River. There are 5 tracts of AT3 found in JNP totalling 574.1 ha, which is 0.05% of the total land area in JNP. The AT3 ecosite is the tenth rarest of the 137 ecosites in JNP, in terms of land area. All locations occur in the montane ecological region, and in the 3-Valley Confluence and Lower Athabasca River watersheds.

Wilkinson (2000) conducted a detailed vegetation survey of the Jasper airstrip and immediate environs during the summer of 2000. Twelve vegetation plots were sampled in the study area including three in the middle of the runway, six at approximately 25 m adjacent on either side of the runway, and three in the nearby forests and shrub meadows to the west, east and south of the runway. All vascular plants within 5 x 5 m (grassland) and 20 x 20 m plots (forest) were identified and their abundance (% cover) recorded. Dominant and characteristic plant species were also recorded and described in areas surrounding facilities such as plane tie-downs,

washrooms, registration/phone booth, and fuelling areas. Rare plants were searched for on the runway, in adjacent areas 50 m to the east and west of the runway, approximately 50 m north and south of the airstrip, and immediately adjacent to facilities. A zig-zag traverse pattern was used in early June, early July and early August. Plant communities observed in and surrounding the study area were assessed for botanical significance.

Some of the principal findings and conclusions by Wilkinson (2000) were as follows:

- The runway is a mosaic of dry, montane native grassland interspersed with areas dominated by agronomic (non-native) grass species.

- The centre of the runway to near the south end is dominated by large amounts of agronomic *Agropyron pectiniforme* (Crested Wheatgrass).

- Additional common agronomic plant (grass) species on the runway include *Bromus inermis, Poa pratensis, Festuca rubra,* and *Poa compressa.*

- Large sections of the north end of the runway are dominated by a wide variety of native plant species. Common and widespread native grass species were *Koeleria macrantha, Calamagrostis montanensis, Elymus trachycaulus, E. lanceolatus* and *Carex stenophylla, C. siccata.* Locally common forbs were *Antennaria parviflora*, *Astragalus striatus*, *A. dasyglottis*, and *Artemisia frigida*.

- Plant species diversity and herbaceous cover are considerably lower, and amount of bare ground (15 – 55%) is higher on the runway than in the surrounding (50 m to the east, west and north) plant communities. Reduced diversity is likely due to grading under low snow conditions, and plane takeoff and landing.

- Areas adjacent to but 25 m off of the runway are characterized by good condition grassland that has predominantly healthy native species and minimal weed cover. These areas generally have a higher ratio of native to non-native species, higher species diversity, less bare ground (0 – 8%), taller and denser vegetation and more irregular topography. Characteristic plant communities are: *Antennaria parviflora-Elymus lanceolatus-Carex filifolia*; *Calamagrostis* spp.*-Koeleria macrantha-Astragalus striatus*; *Elymus lanceolatus-Calamagrostis montanensis-Antennaria parviflora; Elymus lanceolatus-Antennaria parviflora;* and, *Oxytropis sericea-Carex filifolia-Antennaria parviflora.*

- Agronomic species, notably *Bromus inermis* and *Agropyron pectiniforme* with lesser amounts of *Poa pratensis* and *Poa compressa*, have invaded some small areas adjacent to the runway, and have originated from the runway itself. *Bromus inermis* and *Agropyron pectiniforme*, in particular, are of significant concern to JNP and should receive a high priority for eradication (A. Westhaver pers. comm.).

- Weeds are very sparse on the runway, with minor amounts of *Taraxacum officianale* (dandelion) occurring locally.

- Vegetation within 3 m of either side of the gravel access road at the southern end of the airstrip is in primarily native condition with characteristic plant communities similar to those identified above for areas adjacent to the runway. Introduced plant species are uncommon and limited to small amounts of *Taraxacum officianale*, *Poa pratensis* and *Bromus inermis*.

- Forest vegetation surrounding the paved access road from Highway 16 is in excellent native condition and characterized by the *Pinus contorta-Populus* spp.-*Shepherdia canadensis/Elymus innovatus* (C3) plant community (see photo 9). The ditch adjacent to this road is dominated by native invader plant species such as *Shepherdia canadensis, Betula occidentalis, Salix* spp., *Elymus innovatus, Astragalus tenellus, Soilidago missiourensis, Elymus trachycaulus* spp. *subsecundus, Epilobium angustifolium, Viola adunca,* and *Dryas drummundii*. Some agronomic species (*Bromus inermis, Agropyron pectiniforme, Poa pratensis,* and *Melilotus alba)* are present in the ditch where the paved road meets the highway.

- Vegetation in plane tie-down areas is largely indistinguishable from the surrounding native vegetation, with small amounts of non-native *Bromus inermis* and *Poa pratenis* occurring.

- The registration and phone booth are located at the edge of an open C3 (*Pinus contorta-Juniperus communis-Arctostaphylus uva-ursi)* forest community. This community is in near native condition with more weedy vegetation occurring near the road including *Poa pratensis, Taraxacum officianale, Sonchus* sp., and *Bromus inermis*.

- The vegetation in the vicinity of the garbage bin and fuelling areas has been previously disturbed and supports abundant introduced plant species such as *Trifolium repens, Festuca rubra, Poa pratensis, Bromus inermis,* and *Taracacum officianale*.

Appendix C provides an index of Latin and common species names.

5.6.3 Rare Plants and Botanically Significant Communities

Ten plants of the rare species *Potentilla hookeriana* were found on the runway approximately 150 m from the north end of the airstrip (Wilkinson 2000). This species is currently designated status S2, indicating that it has 6 to 20 occurrences in Alberta or has many individuals in few occurrences. The observed plants were vigorous and found within a dry, native plant community – *Calamagrostis* spp.-*Koeleria macrantha-Antennaria parviflora*. They were found near the centre of the runway and as such are considered to be at risk of damage from unauthorized plane takeoff and landing (Wilkinson 2000). In JNP there have been three confirmed and one unconfirmed record of this plant species. One of these was located near Lake Edith, in the montane ecoregion 10 km to the south of the airstrip.

The montane AT3 ecosite (Holland and Coen 1982) was identified as a special feature by Achuff *et al*. (1986) because of its importance as habitat for ungulates, wolves and several bird species.

Two montane vegetation plant communities found on the airstrip (H6 – *Koeleria macrantha-Artemesia frigida-Linum lewisii* and H13 – *Stipa richardsonii-Koeleria macrantha-Antennaria parviflora*) are considered to be botanically significant (Achuff *et al.*1986, Allen 2000). Both of these types are ranked and described as possibly being rare and local throughout their range or found locally, even abundantly, in a restricted range (Allen 2000).

5.6.4 Ecological Processes Affecting Vegetation

As discussed in Section 5.2, the two ecological processes that exert the greatest influence on vegetation structure and composition in the Jasper airstrip are fire and herbivory. A shortage of fire in recent history in the montane ecoregion of the Athabasca River valley has reduced the extent of grasslands and is likely exerting a negative effect on grassland-obligate wildlife species (Kay *et al*. 1994, Achuff *et al*.1986, Rhemtulla 1999). Until 1913, the mean fire return interval in the montane ecoregion of JNP was between 17 and 26 years (Tande 1977). Recently, natural fire has occurred within the AT3 ecosite that encompasses the airstrip, and there was a prescribed fire on the airstrip on June 23, 2001 (MacCallum 1989, A. Westhaver, pers. comm. See photo 10). This prescribed fire met the objectives by causing a high degree of mortality of overstory pines and opening the canopy to promote the growth of native grassland species (Westhaver, pers. comm.).

Long-term trends in elk numbers are not available for JNP (G. Mercer pers. com.). Comparison of April 2001 elk pellet group densities to previous regional pellet group data from Holroyd and Van Tighem (1983) indicate elk use of the AT3 ecosite on and surrounding the airstrip is approximately 50% higher than it was in the late 1970s (Table 5.2). The exception was the middle of the runway, which supported significantly less elk use than average values 20 to 25 years ago. The relative contribution and extent of the effects of this increased elk grazing use on the grasslands typical of the airstrip are not clear, although extensive areas of mineral soil were evident off the runway, apparently the result of grazing pressure. On the runway itself, unauthorized plane landings most likely have a greater effect than elk grazing.

It is difficult to determine whether the combined effects of fire suppression and elk grazing is currently greater than historic or if it is affecting montane grassland communities.

5.7 Wildlife

5.7.1 Valued Ecosystem Components

Based on the JNP Management Plan, the Terms of Reference for this study proposed the following Valued Ecosystem Components related to wildlife resources:

- Habitat use, effectiveness and fragmentation for carnivores (specifically wolves, coyotes and bears);
- Travel corridors of carnivores (specifically wolves, coyotes and bears);
- Elk herbivory, predator-prey dynamics, and habituation to humans; and
- Breeding bird habitat effectiveness.

Table 5.2 Elk Pellet Group Densities in AT3 Ecosite - Jasper Airstrip Vicinity

Year/Source	Location	# Pellet Groups/ha		
		Winter	***Summer***	***Total***
2001/field survey	On Airstrip Centre (AT3)	880	40	920
2001/field survey	On Airstrip -5 m from West border (AT3)	1640	40	1680
2001/field survey	On Airstrip -5 m from East border (AT3)	2280	0	2280
2001/field survey	Off/parallel to Airstrip – 50 m from West border (AT3)	2360	0	2360
2001/field survey	Off/parallel to Airstrip – 50 m from East border (AT3)	3920	0	3920
2001/field survey	Henry House Flats (AT3)	1800	0	1800
2001/field survey	Prescribed fire area south of airstrip (AT3)	2480	0	2480
1975 –1981 (Holroyd and Van Tighem 1983)	All JNP AT3 transects	1400	<120	1600+/-

Section 5.2 and Table 5.1 describe the geographic context of the airstrip and summarize the vegetation and site conditions in ecosites that occur on and adjacent to the site. A list of wildlife species most likely to be affected by the airport decommissioning (VECs) was developed based on these descriptions, two reconnaissance site visits (April 25 and 29, 2001), the Terms of Reference for the Comprehensive Study (JNP 2001) and reference to intensive wildlife and habitat inventory work conducted in JNP from 1975 to 1981 (Holroyd and Van Tighem 1983). Table 5.3 lists these species and provides rationale for their selection. The following VECs relating to wildlife resources were selected for the project:

- Large-bodied Carnivores (grizzly bear, cougar, and wolf);
- Small to medium-bodied Carnivores (long-tailed weasel);
- Elk; and
- Breeding birds (vesper sparrow).

Table 5.3 Valued Ecosystem Component of Wildlife Species Selected for Jasper Airstrip Decommissioning Comprehensive Study

Species	Status	Abundance	Endangered Status		Confirmed Using Airstrip and Environs ?	Rationale for Selection
			Alberta	COSEWIC		
Mammals						
Elk	R	C	Green	None	Yes	Foraging modifies ecosystem; key prey species
Wolf	R	C	Green	None	Yes	Predation affects elk numbers/ecosystem
Grizzly Bear	R	S	Blue	None	Yes	Listed species; sensitive to sensory disturbance
Long-tailed Weasel	R	R	Yellow A	None	No	Listed species; grassland obligate
Cougar	R	S	Yellow B	None	Yes	Listed species; predation affects elk numbers; sensitive to disturbance
Birds						
Vesper sparrow	R	U	None	None	Yes	Grassland/low shrub specialist

Status

S = summer resident, breeder or visitor
W = winter resident
R = permanent resident

Abundance

C = common (encountered frequently)
U = uncommon (encountered infrequently)
S = scarce (encountered occasionally)
R = rare (unexpected)

The following considerations were given most weight when selecting particular species as VECs:

- The species was likely to reside seasonally or consistently travel on or in the vicinity of the airstrip (all VECs);
- The species relied on early succession grassland or open low shrubland for breeding and/or foraging (elk, long-tailed weasel, vesper sparrow);
- The species was listed as a species of concern by Alberta Environmental Protection (AEP 1996) or the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2001) (grizzly bear, long-tailed weasel, cougar);
- The species was known to be sensitive to sensory disturbance and/or prone to movement obstruction (wolf, grizzly bear, cougar); and
- The species has a strong influence on ecological processes or vegetation structure and composition either directly or indirectly (elk, wolf).

Of the VEC species selected one is a bird and five are mammals. No aquatic species were selected since the habitats affected by airport decommissioning are primarily upland grasslands, shrublands and forest.

5.7.2 Current Status and Ecology of VEC Species

This section of the report summarizes the population status, habitat affiliations, likely status of each VEC species on and adjacent to the airstrip and management considerations. Table 5.4 provides ratings of nil, low, moderate, high or very high habitat suitability of each VEC species for the 12 ecosites on and adjacent to the airstrip. These rating were based on information from Holroyd and Van Tighem (1983) and the author's knowledge of species/habitat relationships.

Precise information on the current population status of wildlife VECs is not available in JNP. Generally, accurate wildlife population census requires intensive research effort over a compressed time period. This would include helicopter surveys for ungulates, trapping/radio-collaring or DNA hair-snagging for carnivores, and grid sampling for breeding birds. These have not been conducted in JNP.

Table 5.4 Habitat Importance Ratings for VEC Wildlife Species and Ecosites in the Vicinity of the Jasper airstrip

Species	Ecosite Type											
	AT1	AT3	FR1	GA1	HD1	HD2	HD3	HD4	NY3	VL1	VL3	VL5
Mammals												
Elk	3	4	3		3	3	3	4	3	3	3	3
Wolf	3	3	3	3	3	3	3	3	3	3	3	3
Grizzly Bear	3	2	3	3	3	3	3	2	3	3	3	3
Long-tailed Weasel	1	4	1	1	3	2	2	4	1	2	1	2
Cougar	3	2	3	3	3	3	3	2	4	3	3	3
Birds												
Vesper Sparrow	0	3	0	0	0	0	0	3	1	1	0	0

(a) ECOSITE SUITABILITY RATING SYSTEM

0 (Nil) The ecosite provides neither food nor cover for the evaluation species in question.

1 (Low) The ecosite could be frequented by the wildlife species in question, however, use is likely limited to travel, resting, loafing or opportunistic feeding.

2 (Moderate) The ecosite is likely to be used by the wildlife species in question sporadically for feeding and/or breeding, but is of marginal quality relative to other more consistently utilized habitats.

3 (High) The ecosite is a preferred regional habitat of the species in question for either feeding or breeding, although other related habitats could sustain long-term populations.

4 (Very High) The ecosite is of critical importance to the species in question for both feeding and breeding on both a regional and local basis. Few other related habitat types can sustain long-term breeding populations.

5.7.2.1 Elk *(Cervus elaphus)*

Population Status and Trend

Elk are listed as Green by Alberta Environmental Protection (1996) and are not listed as a species of concern under COSEWIC (2001). Historically, elk numbers have fluctuated widely in JNP. Stelfox (1964) noted there were very few elk in JNP in the 1890s, likely a result of a series of severe winters and over-harvest (Soper 1964). During 1920, 89 elk were introduced into Jasper from Yellowstone National Park and by the 1940s these elk had multiplied to inhabit all of the areas in which they reside today. A combination of mild winters, reduced hunting mortality, fire-related habitat change and hybrid vigor led to periodic peaks in elk numbers that threatened park habitat quality (Holroyd and Van Tighem 1983). Controlled elk slaughters took place to reduce elk numbers in Jasper from 1945 to 1970 (Holroyd and Van Tighem 1983).

Stelfox *et al*. (1974) estimated the population of elk in Jasper from 1961 to 1973 in the range of 1,975 to 2,375 animals. Holroyd and Van Tighem (1983) observed that elk were widespread during that same time period in JNP. Current population estimates are not available for elk in Jasper (G. Mercer, pers. comm.).

Habitat Requirements

Rocky Mountain elk are primarily grazers and usually winter in low elevation areas with low snow accumulation (Morgantini 1988, Woods 1991). Habitats in the montane receive approximately two to 10 times more use by wintering elk than do similar habitats in the Lower Subalpine and Upper Subalpine, respectively (Holroyd and Van Tighem 1983). The top ten favoured ecosites of wintering elk in JNP are HD4, TA2, DV1, AT3, PP7, HD2, GT2, DV2, NY1, and NY3. Eight of these ecosites occur in the montane ecoregion. The presence of abundant winter forage in the form of dry grassland and shrubby grassland plant communities is a common feature of most of these ecosites. Most elk in the Athabasca River valley are habituated at some level to human presence and as such are generally able to make effective use of the majority of high quality habitat present.

Current Airstrip Status

Four of the top ten ecosites in JNP for wintering elk occur on (AT3) and adjacent to (HD2, HD4, NY3) the Jasper airstrip. Based on pellet group counts, the AT3 ecosite (airstrip) received the fourth highest (of 124 ecosites) winter elk use in JNP from 1975 to 1981. Pellet group counts conducted within the AT3 of the airstrip in April, 2001 indicate considerably higher use in 2001 than the average in the period 1975 to 1981 (Table 5.2). Summer use of the AT3 ecosite of the airstrip was very low (0 to 40 pellet groups/ha), which is consistent with observations by Holroyd and Van Tighem (1983). MacCallum (1989) reported similarly low summer pellet group densities of 69/ha in the AT3 unit of the Henry House Flats nearby the airstrip.

5.7.2.2 Wolf (*Canis lupus*)

Population Status and Trend

The wolf is listed as Green by Alberta Environmental Protection (1996) and as Not at Risk by COSEWIC (2001). Historically, wolf numbers have varied widely in the Rocky Mountain national parks. Wolves were well distributed in JNP by the 1940s. Many wolves were eliminated from the Athabasca and Miette River valleys in Jasper between 1952 and 1956 as part of a broader provincial/federal carnivore reduction campaign that was stimulated by the presence of rabies in red fox and coyote. Resident populations survived in backcountry watersheds and served as a source to re-colonize wolves back into the lower elevation river valleys of Jasper. Holroyd and Van Tighem (1983) recorded wolf trails in every watershed of JNP and noted that wolf numbers were increasing in the late 1970's/early 1980s. Carbyn (1974) estimated that 20 wolves occurred in the lower Athabasca River valley, whereas Holroyd and Van Tighem (1983) reported 30 animals in the same area in 1980. The population status of wolves in Jasper is currently unknown.

Habitat Requirements

Rocky Mountain wolves require landscapes that support abundant ungulate prey and snow depths less than approximately 40 to 50 cm (Carbyn 1974, Paquet 1993, Weaver 1994). In JNP these types of landscapes occur almost entirely within the montane ecoregion at elevations below approximately 1,400 m. Weaver (1994) observed that the primary prey of wolves in the montane of Jasper were elk and deer. Carbyn (1974) observed that deer were the preferred prey of wolves in lower elevation river valleys of eastern portion of Jasper. Elk were less abundant at the time of Carbyn's study.

Wolves are generally adaptable and are more resilient than some carnivores to non-lethal human disturbance (Paquet *in* Bios 1996). Wolves can habituate to human activities provided activities are repetitive and non-injurious (Paquet *in* BIOS 1996). Notwithstanding their general adaptability, wolves can be displaced from high quality habitat, especially in areas with human use levels that exceed 100 to 1,000 people/month (Purves *et al*. 1992; Paquet *in* BIOS 1996). The presence of security cover increases the chance of wolves using habitat in the face of high levels of human activity.

Current Airstrip Status

Holroyd and Van Tighem (1983) rated four (AT3, HD2, HD4, NY3) of the 12 ecosites in the vicinity of the Jasper airstrip as very highly important to wolves during winter. The remaining eight ecosites were rated as highly important winter habitat. The AT3 ecosite on which the airstrip is located was rated as very highly important to wolves in winter and of low importance during summer. There are no systematic data available on the use of the airstrip by wolves, however, it is believed that wolves may travel from the Snaring River valley through the airstrip towards the Three Valley Confluence area (G. Mercer pers. comm.). Given the relatively low levels of human recreational use (101- 1,000 human use events/month; see Section 5.8) and limited fixed-roof accommodation in the area, it is likely that wolves move freely through the

airstrip and vicinity and hunt on the site. Minimum standards for a primary multi-species corridor as set out by the Bow Corridor Ecosystem Advisory Group (BCEAG) (1999) are 350 m in width, one to 8 km in length, flat to 25% topography, 40% vegetation (hiding) cover, and no human use. These standards are exceeded along the Athabasca River valley surrounding the airstrip, with the possible exception of the overall 40% hiding cover. Wolves in Banff National Park have been shown to move through corridors with much greater levels of human use, and a narrower configuration than that of the Jasper airstrip area (Duke 2000).

5.7.2.3 Grizzly Bear (*Ursus arctos*)

Population Status and Trend

Holroyd and Van Tighem (1983) reported grizzly bears to be widely distributed and common in JNP. A precise population estimate for grizzly bears in JNP is not currently available. As of 1980, the warden service estimated that there were 110 grizzlies in JNP (Holroyd and Van Tighem 1983). This was based on population density estimates from a study by Russell *et al*. (1979) in the southeastern portion of the Park. They estimated densities of from 9.8 to 11.7 bears/1000 km^2. Stenhouse and Munro (2000) recently estimated there to be 14.9 bears/1000 km^2 in an area that encompasses much of Russell *et al*'s (1979) study area. Grizzly bear mortality rates (assuming 50% unreported mortality) in JNP are relatively low (2.2%) in recent years (Kansas and Collister 1999).

Habitat Requirements

Grizzly bear use of habitat throughout their range corresponds with the location of concentrations of seasonally favoured and high-energy food sources (Craighead and Mitchell 1982, Hamer and Herrero 1983). Kansas and Riddell (1995) applied a food habits model to rate the seasonal ecosites in Banff, Jasper, Kootenay and Yoho National Parks for grizzly bears. Their results showed that ecosites in the montane, and to a lesser degree lower subalpine ecoregions, consistently supported the highest seasonal plant and ungulate food importance ratings for grizzly bears. This was a result of the greater diversity and abundance of key bear foods in vegetation types that occur at lower elevations, and less harsh winter climate conditions for ungulates (an important prey item of grizzly bears).

The tendency for grizzly bears to occupy areas with concentrations of high quality foods can be modified in areas with high levels of human use (Weaver *et al*. 1986, Mace and Waller 1997). This loss of suitable habitat to sensory disturbance is called effective habitat loss (Weaver *et al* 1986, Gibeau 1998). In JNP there are 33 grizzly bear management units based on topography and watershed. The unit surrounding the Jasper airstrip (Lower Athabasca) has experienced moderate effective loss of grizzly bear habitat according to landscape modeling. The model predicts that grizzly bear will not use an area as permanent home range if habitat effectiveness is below 80%. Habitat effectiveness in the Lower Athabasca is 79% (Parks Canada 2000*a*). Although this does not mean grizzly bears will not inhabit this management unit, it does mean that the likelihood of losing access to high quality habitat and encountering humans is greater (Gibeau 2000). Purves and Doering (2000) calculated that 68% of the Lower Athabasca

management unit is in "secure status" with respect to high use human feature. This level of security is the minimum required by grizzly bear managers (Parks Canada 1999).

Current Airstrip Status

Inherent habitat suitability of the 12 ecosites in the vicinity of the airstrip is generally high to very high (Table 5.4). Six of the ecosites were rated as 10/10 for the early spring (Kansas and Riddell 1995). Habitat quality during the summer months (June-July) is generally lower. Fall (berry season) habitat quality is very high for several ecosites (HD1, FR1, GA1, HD3) that support abundant buffaloberry crops. The AT3 ecosite is poor quality grizzly bear habitat during summer and moderate during fall. The degree to which grizzly bears currently use the airstrip and immediate environs is unknown.

5.7.2.4 Cougar *(Felis concolor)*

Population Status and Trend

The cougar is listed as Yellow B by Alberta Environmental Protection (1996) and is not listed as a species of concern under COSEWIC (2001). Cougars are locally common in JNP occurring at densities of approximately 0.25 animals per 100 km^2 (Holroyd and Van Tighem 1983, Alberta Forestry, Lands and Wildlife 1992). As of the early 1990's an estimated 15 cougars were thought to reside in JNP.

Habitat Requirements

Similar to and perhaps more than wolves, cougars in the Rocky Mountains require areas of abundant ungulate prey and low snow depths. These conditions are met primarily by habitats in the montane ecoregion. Jalkotzy and Ross (*in* BIOS 1996) noted that the Athabasca River valley was preferred habitat for cougars in the Yellowhead region. Holroyd and Van Tighem (1983) rated the importance of ecosites in JNP to cougar using a predictive model based on ungulate abundance. They found that 12 of the top 14 ecosites during the winter were found in the montane. In JNP mule deer, bighorn sheep, and elk were the most frequently documented prey items of cougar (Holroyd and van Tighem 1983, Jalkotzy and Ross 1991). Threshold levels of human disturbance beyond which cougar habitat use is curtailed have not as yet been determined (Jalkotzy and Ross *in* BIOS 1996). These levels likely vary according to local cultural and ecological conditions. In the national parks where hunting is curtailed, cougars are more likely to risk using high quality habitats in spite of high levels of human use. The occasional occurrence of cougars in the townsite of Jasper (Holroyd and Van Tighem 1983) attests to this kind of habituation to human presence.

Current Airstrip Status

Of the 14 top-rated ecosites for cougar winter habitat (Holroyd and Van Tighem 1983), five (AT3, HD2, HD4, NY3, and AT1) are located in the vicinity of the Jasper airstrip. The AT3 ecosite on which the airstrip is located, was rated as very high importance for cougars during winter and low in summer. There is no systematic information regarding use of the Jasper airstrip

by cougars. Minimum standards for a primary multi-species corridor as set out by the Bow Corridor Ecosystem Advisory Group (1999) are 350 m in width, 1 to 8 km in length, flat to 25% topography, 40% vegetation (hiding) cover, and no human use. These standards are generally exceeded along the Athabasca River valley surrounding the airstrip, with the possible exception of the overall 40% hiding cover. Cougars in BNP have been shown to move through corridors with much greater levels of human use, and a narrower configuration than that of the Jasper airstrip area (Duke 2000).

5.7.2.5 Long-tailed Weasel (*Mustela frenata*)

Population Status and Trend

Long-tailed weasel are listed as Yellow A by Alberta Environmental Protection (1996) and as Not at Risk by COSEWIC (2001). This species was considered to be an uncommon resident of JNP (Holroyd and Van Tighem 1983). Long-tailed weasels appear to be more common in the dry Front Ranges of the Rocky Mountains than in the Main Ranges. Insufficient information is available on this species to provide a population status or trend.

Habitat Requirements

The long-tailed weasel is primarily a prairie and parkland species that relies upon open and semi-open grass dominated habitats (Banfield 1974). Its primary prey are ground squirrels, pocket gophers and mice/voles. Their habitat requirements in foothills and mountain environments are poorly understood. It is likely however that favoured habitats are montane grasslands and aspen forest on fluvial landforms, where small mammal prey are most diverse and abundant (Holroyd and van Tighem 1983).

Current Airstrip Status

The current status on the Jasper airstrip is unknown, however, based on habitat availability, this species is a likely resident but at low numbers.

5.7.2.6 Vesper Sparrow (*Pooecetes gramineus*)

Population Status and Trend

The vesper sparrow is not designated as a species at risk provincially or nationally. The most recent Breeding Bird Survey analysis indicates a non-significant positive trend for this species in western Canada (Dunn *et al*. 2000). It is restricted in the Rocky Mountains to montane grasslands, a habitat that is rare and patchily distributed (K. van Tighem, pers. comm.).

Habitat Requirements

The vesper sparrow is a bird of open, dry habitat including grassy margins along roads, railways, fields, fencelines, grassy weedy fields and pastures, meadows, recent burns, and grassy coulee slopes (Semenchuk 1992). In JNP it inhabits dry, sparse grassland, usually where there are scattered pines and spruce (Holroyd and Van Tighem 1983). Nests are placed on the ground

often in a slight depression, usually well-hidden in grass or weeds, or under small trees or shrubs (Semenchuk 1992). This species forages on the ground for insects and weed seeds (Ehrlich *et al*. 1988).

Current Airstrip Status

No quantified information is available on the occurrence of this species in the vicinity of the Jasper airstrip. Based on habitat availability and discussions with Parks Canada personnel, this species is a likely resident of the area.

5.8 Recreational Use and Aesthetics

There are a number of human use activities that take place at the Jasper airstrip in addition to unauthorized private aircraft use. Recreational use includes:

- Hiking along the Athabasca River;
- Access to the group picnic area adjacent to the Athabasca River;
- Staging area for historic canoe trips down the Athabasca;
- Off leash dog walking; and
- Informal golfing.

In 1996, Parks Canada mapped human use in the vicinity of the airstrip using empirical data (trail counts, campsite permits etc.) where possible. Where data were not available, professional opinion was used to rate the following categories:

- 1 = 1-10 events per month
- 2 = 11-100 events per month
- 3 = 101-1000 events per month
- 4 = 1001 - 10000 events per month
- 5 = 10001 - 100000 events per month
- 6 = 100001 - 1000000 events per month.

The types of human use categories that were used in the study included the following. Not all of the uses occur in JNP (e.g., petroleum and mining activity and borough pits).

- motorized use
- hiker/skier
- dog sled
- snowmobile
- horse
- bicycle
- helicopter
- airplane
- camping
- cabin/hut
- day use
- petroleum activity
- mining activity
- park accommodation
- borough pit
- canoe/raft/boat
- grazing
- other

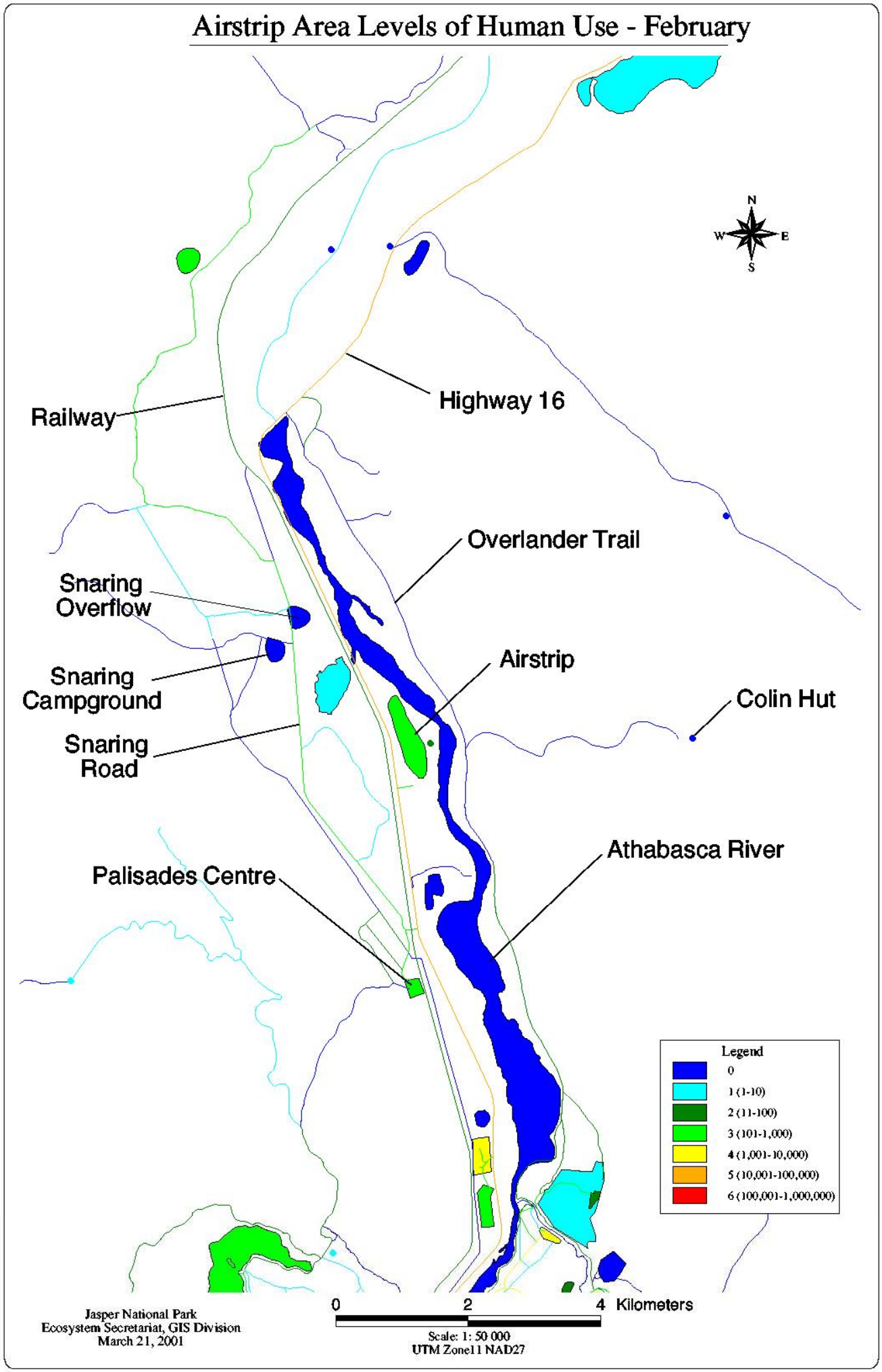
Figure 7 illustrates the levels of human use in the Jasper area for February, 1996. The airstrip falls under category 3, with 101 to 1,000 human use events in that month. Figure 8 illustrates the same level of use for the month of August. It is likely these numbers underestimate the actual level of use since these have been derived primarily from trail counters, and the number of events that may have been missed is unknown. The number of incidents per month is likely higher in the summer when the number of visitors in the park increases, trail riding is more popular, and picnicker, hikers and mountain bike enthusiasts are active.

5.9 Historical Resources

Archaeological inventory work in this section of the Athabasca Valley carried out in the 1980's (Wilson 1991) did not identify any Pre-contact archaeological sites on or in the near vicinity of the Jasper airstrip. That is, there are no known sites that predate the arrival of Europeans to the area. The land is not currently used for traditional purposes by aboriginal persons.

Three recent 20th century sites (FgPm-69, FfQm-104 and 131) were recorded in the general vicinity of the airstrip. FgPm-69 (1034R) consists of a small notched log construction unidentified as to function (possibly a survey/triangulation marker) located 300 m northeast of the airstrip on the front of the third terrace of the Athabasca River. FfQm-104 (1027R), located 100 m south of the south end of the Jasper Airport is described as a "rehabilitated industrial zone" consisting of road scars, borrows, and an associated depression near the front of the terrace overlooking the Athabasca River. FfQm-131 (1057R) is a recent post-WW II dump located 50 m north of a picnic ground south of the south end of the Jasper airfield. Francis (2000:27) revisited these sites in 1999 during an archaeological assessment of the Jackladder II or Airfield Prescribed Burn Unit He could not relocate FfQm-131 and assumed it had been removed and the site area rehabilitated. None of the sites are considered to be of any particular significance. Brideland photos show the likely presence of a former Metis homestead on the southeast periphery of the clearing occupied by the airstrip (S. Cardiff pers. comm.). This area will not be affected by decommissioning activities. Further studies are not recommended.

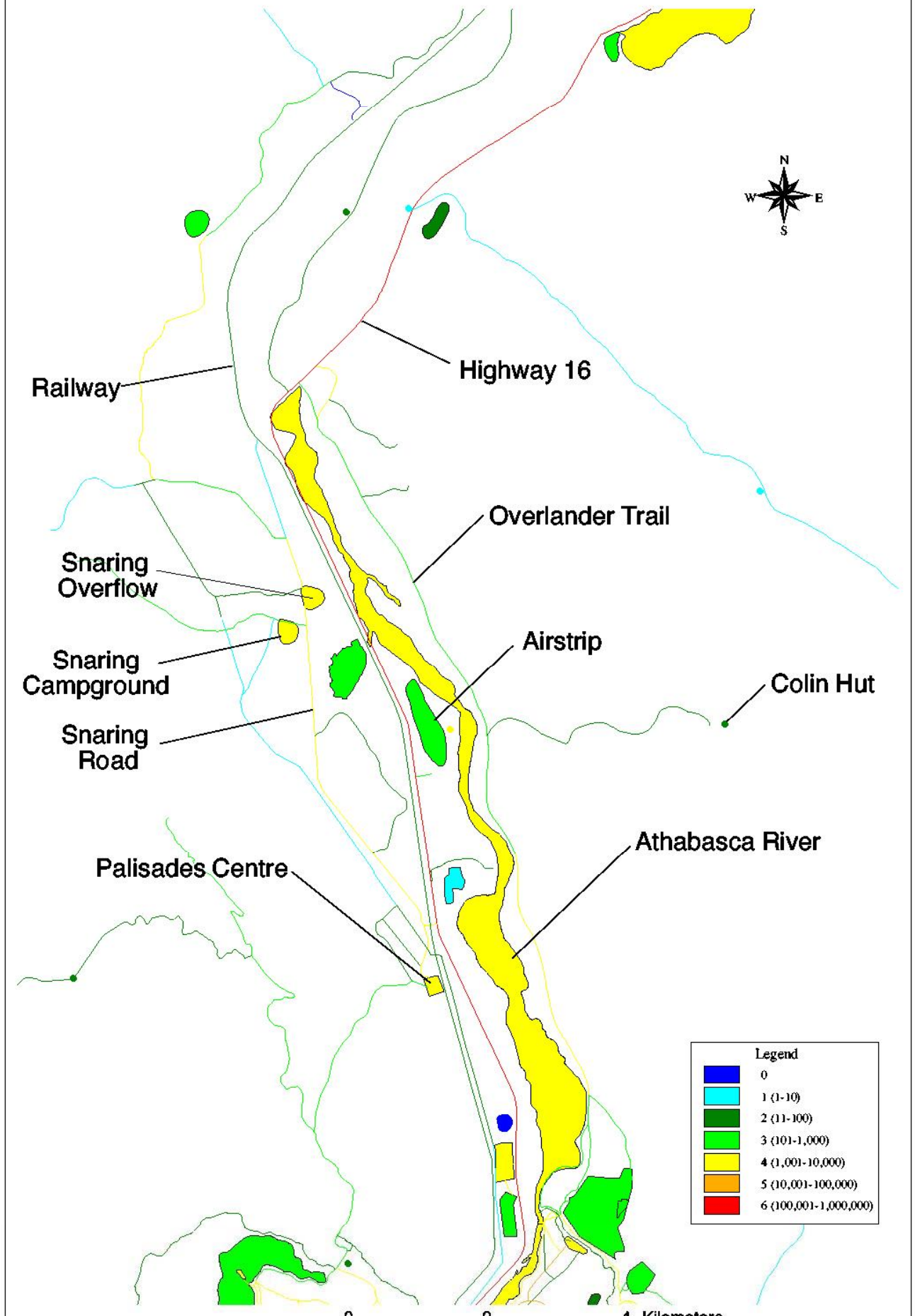
Airstrip Area Levels of Human Use - February



Jasper National Park
Ecosystem Secretariat, GIS Division
March 21, 2001

Scale: 1: 50 000
UTM Zone11 NAD27

Airstrip Area Levels of Human Use - August



Jasper National Park
Ecosystem Secretariat, GIS Division
March 21, 2001

Scale: 1: 50 000
UTM Zone11 NAD27

5.10 Aviation Safety

5.10.1 Background

As outlined in Section 3.5 of this report, the decision to close the airstrip at Banff was announced by the Minister of Heritage on October 7, 1996. The decision to close the Jasper strip was taken in 1997 to ensure management consistency between Banff and Jasper Parks. Parks Canada was subsequently directed by Justice Campbell in 1997 to complete a Comprehensive Study prior to formally decommissioning the airstrip. The Terms of Reference for the Comprehensive Study for Jasper refers to Public Safety (socio-economic) as the "effect of changes in the environment due to airstrip decommissioning on aviation safety matters, including emergency and precautionary diversion, search and rescue; medical evacuation; aircraft use for park management purposes including fire fighting" (see Appendix A).

The *National Parks Aircraft Access Regulations* prohibit the landing and take off of aircraft in JNP, unless authorized by the park superintendent. In addition, the JNP Management Plan (2000) proposed the removal of the infrastructure at the closed airstrip to promote ecological integrity in the Park (see Section 3.4). As the NPAAR effectively prohibits use of the airstrip, it can be concluded that the facility is closed, except with authorization of Parks Canada. However, the lack of a formal decommissioning program for the airstrip has led to confusion in the aviation community.

The aviation safety background review conducted for this Comprehensive Study included information from reports, discussions with local pilots from the Jasper Flying Club, and a variety of other sources and contacts. These are listed below and fully referenced in the bibliography. Accurate flight information for the Jasper airstrip is not available as it is not a serviced aerodrome and there is no formal requirement for pilots to register their flying activities. Therefore much of the aircraft flight information has been obtained from airport registries and anecdotal information.

5.10.1.1 Information Sources

The following is a list of information sources that were used to compile the information presented below:

- 1991 Air Traffic Monitoring; Banff National Park (report has information for both Banff/Jasper);
- 1992 Air Traffic Monitoring; Banff National Park (report has information for both Banff/Jasper);
- 1994 Transport Canada Aviation Analysis; Transport Canada/Parks Canada Joint Study of the Need to Retain the Banff and Jasper Airstrips for Emergency/Diversionary Use;
- Banff and Jasper Airstrips Meteorological Study by D. Maqbool 2001.

- A Response from Mountain Aviators to the Transport Canada/Parks Canada Joint Study of the Need to Retain the Banff and Jasper Airstrips for Emergency/Diversionary Use (August 1994) and the Subsequent Proposed Closure of the Banff and Jasper Airstrips;
- 2000 Jasper Airport Registry, Jasper Flying Club;
- Review of "Banff and Jasper Airstrips Meteorological Study" by R. Rudolph, URS Corporation, Calgary;
- 2000 and 2001 Edson Airport Registry, Town of Edson; and
- 2000 and 2001 Jasper-Hinton Airport Registry, Yellowhead County.

5.10.1.2 Contacts

The following contacts were made to gather additional site-specific information to provide as complete a background review as possible for the aviation safety component of the Comprehensive Study Report:

- Individual Airstrip Operators along the Jasper VFR route (Figure 3), including:
  - Town of Edson: Edson airstrip
  - Yellowhead County: Jasper-Hinton airstrip
  - Village of Valemount: Valemount airstrip
- Local pilots from the Jasper Flying Club;
- Edmonton Flight Services;
- Environment Canada;
- NAV Canada;
- Parks Canada;
- Stats Canada; and
- Transport Canada.

Examples of information requested included airport registries, overflight records, aircraft movement records, and other aviation statistics from airstrips on the Jasper VFR route (Figure 3). VFR routes are suggested flight paths found in VFR Navigation Charts for pilots flying under Visual Flight Rules. Environment Canada was contacted for weather instrument descriptions, and weather data archives at the Jasper airstrip. Official statistics, including Daily Air Traffic Records (DATR) were requested from Stats Canada, Transport Canada and Parks Canada, but were not secured. A complete record of communications is provided in Appendix D.

5.10.2 Setting of Jasper and Surrounding Airstrips

The Jasper Airstrip is located beside Highway 16 in JNP. It is a grass airstrip 1,216 m long at an elevation of 1,021 m. There are no services at this airstrip. The Jasper Airstrip is found along a VFR route that runs from Edson, westerly to Hinton and southwesterly-westerly through JNP along Highway 16 to the intersection of the Fraser River Corridor (Figure 3). Table 5.5 summarizes the airstrips in the general area.

Table 5.5 Summary of Airstrips on Jasper VFR Route

Airstrip	Elevation	Length of Runway	Comments
Jasper	1,021 m	1,216 m, grass	No services are available.
Edson, Alberta	927 m	1,829 m, asphalt	Fuel services are available.
Jasper-Hinton, Alberta	1,052 m	1,372 m, asphalt	Fuel services are available.
Hinton/Entrance	1,052 m	1,128 m, turf	Fuel Services are available
Valemount, British Columbia	797 m.	1,204 m, asphalt	Fuel services are available.
McBride, British Columbia	716 m	823 m, asphalt	No winter maintenance

5.10.3 Weather Reporting Services

There are no local aviation weather reporting services for the Jasper VFR route. Automated weather stations were installed at the Jasper Warden's office in 1996/1997. These stations record hourly, daily and monthly temperature data, air pressure, total precipitation data, and hourly wind speed/direction data. Cloud condition, surface winds at the airstrips and local weather forecasts along the Jasper VFR route is not provided for pilots.

Aviation weather forecasts are done by Environment Canada on a regional/national basis through a "Graphic Forecast Area or GFA" system. This information is based on regional weather trends and is not related to individual aerodromes and/or airstrip facilities. This is done on a national basis and in that context flight planning in the Jasper VFR route has similar levels of information as other regions of Canada.

5.10.4 Summary of Aviation Related Information

5.10.4.1 Airport Registries

Three of the airstrips along the Jasper VFR route maintain airport registries: Edson, Jasper-Hinton, and Jasper airstrips. Pilots are asked to fill out the registry which includes such information as date of landing, owner, type of aircraft, location arriving from, location departing for, and time in and out. The 'location arriving from' and 'location departing for' provides anecdotal information of air traffic along the Jasper VFR route and over the Jasper airstrip.

The following should be noted with regards to airport registries in general:

- Pilots are not formally required to fill out the airport registries;
- A relatively high proportion of the pilots do not log into the registry or provide only partial information. The proportion is estimated by some of the airstrip operators to be as high as 50 to 60%; and
- Some of the information contained in the registries is also illegible.

Based on these points, it can be concluded that airport registries generally under-represent the usage of a given airstrip.

The registry for the Edson and Jasper airstrips were provided to the study team. Information from the Jasper and Edson registries are summarized below.

The Jasper Flying Club forwarded a copy of the Airport Register for the year 2000. It should be noted that this is not regarded as an accurate record as there is no formal requirement for pilots to register their flight activities. However this registry does provide an overall sense of flight activities at the Jasper airstrip and documents two important incidents:

- Search and rescue training activities on August 20, 2000 and;
- Two incidents of diversionary activity on May 6 and 9 due to bad weather.

This register also shows there was a minimum of 46 landings at the Jasper airstrip for the year 2000, and use of the airstrip by two members of the Jasper Flying Club.

The Town of Edson, operator of the Edson airstrip, maintains registration records. The Town provided records for 2000 and 2001 to the study team. The Edson registry includes 'location arrived from' as well as 'location departed for'. To estimate the number of aircraft that have potentially flown over the Jasper airstrip in 2000 and 2001, the registry was reviewed for aircraft arriving from or departing for locations west of Jasper airstrip. The Edson Airport register shows that for the year 2000, at least 40 aircraft potentially flew over the Jasper airstrip, and in 2001 (up to and including July 4) 20 aircraft are estimated to have potentially flown over the Jasper airstrip. This estimate assumes that the pilots used the Jasper VFR route for at least a portion of their flight.

5.10.4.2 Summary of Previous Reports

Air Traffic Monitoring Reports (1991-1995)

Activity on both the Banff and Jasper airstrips was monitored by Parks Canada between 1988 and 1995 to determine the level of use and need for the continued presence of the airstrips. The objectives of the monitoring program included:

- To monitor and evaluate aircraft over-flight and landing activity; and

- To monitor and evaluate emergency/diversionary landing activity.

The information contained in these reports for the Jasper airstrip is limited. However they do indicate that in 1991 there was a total of 2,019 over-flights between both Banff and Jasper and in 1992 there was a total of 880 over-flights in the Jasper area.

The over-flight data was compiled by Transport Canada from radio contact through remote Communication Outlets for both Banff and Jasper.

Transport Canada/Parks Canada Joint Study (1994)

Transport Canada and Parks Canada (1994) completed a report on the "*Need to Retain the Banff and Jasper Airstrips for Emergency/Diversionary Use*". This report addressed the requirement of the Jasper airstrips for emergency and/or diversionary use. The objectives of the study included:

- To monitor and evaluate aircraft over-flight and landing activity;
- To monitor and evaluate emergency/diversionary landing activity;
- To assess the occurrence of weather conditions that might lead to diversionary landings; and
- To make recommendations regarding the need for each airstrip.

With regards to the Jasper airstrip, the report concluded:

- There is little air traffic at the Jasper airstrip.
- The issue of usage of these airstrips for diversionary/emergency usage has not been accurately determined.
- The weather conditions at Jasper are typical for mountain valleys and are good conditions for VFR flying.
- Transport Canada does not have a policy or legislation regarding the provision of emergency or diversionary airstrips for VFR aircraft.

COPA Response to Transport Canada/Parks Canada Joint Study (2001)

In response to the above report, the Canadian Owners and Pilots Association (COPA) compiled comments from experienced aviators on the decommissioning of the Banff and Jasper airstrips (COPA 2001). A total of nine aviators who have extensive flying experience in terms of hours, ratings (e.g. Canadian Airline Transport Rating) and direct experience in the Jasper area provided comments. All of these individuals expressed serious concerns with closing and decommissioning the Jasper airstrip from an aviation safety perspective. Examples of the diversionary use for Jasper (J. Mackay) are summarized in this report. Comments from pilots are further discussed under Section 5.10.5.

DMA Meteorological Study (2001)

A meteorological study for the Banff and Jasper airstrips was completed by Darr Maqbool and Associates (DMA). This work was commissioned by COPA and the Banff and Jasper Flying Clubs. The following are some of the conclusions from this work:

- There is a high frequency of weather suitable for visible flying in and around the Jasper airstrip.
- The Jasper airstrip is located in the transition zone between "Mountain Weather" and "Foothills/Prairie Weather". The Jasper airstrip offers a safety alternative for pilots crossing these zones.
- It is inherently safer for private pilots to follow designated valley bottom VFR routes in mountainous terrain versus traversing upper levels due to weather conditions such as wind shear and turbulence.
- Mountain weather briefings are very important for flight planning purposes. Pilot support services such as Flight Services should be meteorologically trained to an advanced level to provide comprehensive mountain weather briefings for private pilots.

URS Corporation Review of DMA Meteorological Study (2001)

URS Corporation conducted a review of the meteorological study completed by DMA (Rudolph 2001). This report summarizes meteorological baseline conditions for Jasper and provides comments on flight safety from a meteorological perspective. It confirms the frequency VFR conditions in Jasper exceed 75 % in terms of cloud height (on a year round basis) and 90% in terms of visibility (see Figure 6). It also concludes the following:

- The DMA study is a reasonable summary of the weather conditions in mountain valleys near Jasper;
- The greatest impact on visibility is likely to occur from rainfall in early summer and snowfall in mid-winter;
- The flight safety comments throughout the DMA report are based on limited data, and are not substantiated; and
- The aerodrome at Jasper-Hinton might provide a reasonable alternative in terms of search and rescue because it is outside the immediate zone of mountain weather influence and has more complete training and emergency services.

5.10.5 Pilot Issues

Informal meetings and discussions have been held with members of the Jasper Flying Club in an effort to understand the issues and concerns of the local pilots. An informal meeting between

Parks Canada, COPA, and Highwood Environmental Management was also held on May 18, 2001. Pilots raised the following issues during the preparation of the Comprehensive Study:

- Decommissioning the airstrip at Jasper is an aviation safety issue. The combination of unpredictable mountain weather, increasing local aviation traffic and the lack of reliable aviation weather reporting puts aviators at risk. There are few alternate airstrips along the VFR mountain route in the Jasper area. Decommissioning the airstrip elevates risk to human health and safety.

- There are a variety of other uses at the Jasper airstrip that probably have a greater impact on the local wildlife resources. Examples include, the use of Jasper airstrip area for hiking, mountain biking, walking dogs and other recreational activities such as golf.

- Decommissioning the airstrip will have a negative impact on the lifestyle of local private pilots who have used these facilities for many years.

- The Canadian Air Search and Rescue Association (CASARA) utilizes local private pilots who are trained to participate in search and rescue operations. The Jasper Flying Club maintains search and rescue capabilities under CASARA. The availability of local aircraft at the Jasper airstrip allows for a rapid emergency response by pilots who are familiar with the surrounding mountain terrain. The high percentage of VFR weather in the Jasper area also provides for a degree of reliability in terms of response time when dealing with an emergency situation.

- COPA and the Jasper Flying Club believe the airstrips should remain open for recreational use, as well as being available for emergency landings.

5.10.6 Parks Canada Issues

Section 3.0 of this report outlines the background and reasons for decommissioning the Jasper Airstrip. From the Parks Canada perspective, the *National Parks Aircraft Access Regulations* (1997) and the 2000 JNP Management Plan provide the regulatory and management direction to decommission the facility.

Parks Canada's goal is to decommission the airstrip at Jasper upon the completion of this Comprehensive Study, provided the residual impacts of decommissioning are not significant. This goal has been widely known by pilots in Jasper for many years and will formalize a long published desire of Parks Canada to decommission the facility consistent with the JNP Management Plan.

The markings to designate an active airstrip (e.g. wind sock, runaway markers) will be removed during decommissioning, and will be replaced with appropriate markings to indicate a closed and decommissioned facility. It is anticipated there will be no maintenance requirements of the closure markings. Furthermore, a NOTAM will be issued in the Canada Flight supplement advising the aviation public of the change in status at the Jasper airstrip.

6.0 IMPACT ANALYSIS AND BEST MANAGEMENT PRACTICES

6.1 Assessment Approach

This environmental assessment identifies potential impacts to existing conditions resulting from the decommissioning activities described in Section 4.0 (Project Description). It also includes mitigation measures that may be appropriate to reduce the predicted impacts.

The assessment focuses on issues and Valued Ecosystem Components identified in the Terms of Reference and through discussions with project scientists, Parks Canada and COPA representatives. Based on these, the major environmental and social/economic issues addressed in this assessment include:

- Aviation safety issues associated with decommissioning of the airstrip;
- Wildlife habitat effectiveness in the vicinity of the Jasper airstrip as a result of decommissioning activities at the airstrip; and
- Preservation of natural soil and vegetation during decommissioning.

The assessment focuses on potential environmental impacts resulting from all project activity likely to occur:

- During decommissioning activities, and
- As a result of decommissioning of the airstrip.

Potential effects on hydrology, human recreational use, and historical resources were also considered. Potential impacts were identified by assessing interactions between decommissioning activities and VECs. Mitigations to minimize predicted impacts were identified for each environmental resource.

Residual impacts remaining after mitigation measures are applied were assessed and rated based on terms defined in Table 6.1. Only adverse residual impacts are rated. The impact ratings used in Table 6.1 include:

- Direction indicates a positive, negative or neutral impact on the VEC;
- Duration refers to the period over which the impacts will occur;
- Geographical extent is considered local if the impact is limited to the local study area, regional if the impact extends within the Lower Athabasca River Valley, and extra-regional if it extends beyond the Lower Athabasca River Valley;
- Frequency refers to the incidence of occurrence of the impact and can either be once, intermittent, or continuous. The term ‘once’ refers to the decommissioning period, which will be approximately five days;

- Reversibility assesses whether the impact can be reversed when the activity ceases or over time; and

- The magnitude of the residual impact combines all attributes, and is assigned based on professional judgement.

For this study, Parks Canada as the Responsible Authority will assign significance to the impacts.

Cumulative effects, which are impacts from this project overlapping in time and space with impacts from other existing and planned developments, are addressed in the Cumulative Effects Assessment, Section 7. Future monitoring requirements are discussed in Section 8.

6.2 Impacts and Mitigation Measures

6.2.1 Hydrological Resources

Potential Impacts

Potential impacts to groundwater arise from the possibility of soil contamination in the area of the UST. The soils are highly permeable, which could result in potential contamination of groundwater resources if significant soil contamination exists. Although there are no surface water bodies on-site, groundwater flows towards the Athabasca River and any subsurface contamination would have the potential to impact the river. There were no signs of contamination during the April 2001 site investigation.

Mitigation Measures

A Phase I/II site assessment will be conducted before or during tank removal to ascertain the level (if any) of contamination.

Residual Impact Rating

There are no residual impacts predicted to the hydrological resources in the area as a result of the decommissioning activities. Potential contamination as a result of the UST will be determined during the Phase I and II site assessment.

Table 6.1 Impact Rating Attributes

Impact Attribute	Rating Term	Definition
Direction	Positive	Beneficial change
	Neutral	No Change
	Negative	Adverse change in the Valued Ecosystem Component being evaluated
Geographic Extent	Local	Within the project area or its immediate environs
	Regional	Beyond the project area but within the Lower Athabasca River Valley
	Extra-regional	Outside the Lower Athabasca River Valley
Duration	Short-term	During decommissioning
	Medium term	Up to two years
	Long-term	Longer than two years
Frequency	Once	Occurs only once (i.e., one 5-day decommissioning period)
	Intermittent	Occurs occasionally (e.g. 3 times per year)
	Continuous	Occurs continuously
Reversibility	Reversible	May be reversed over time or when activity ceases
	Non-Reversible	Will not be reversed
Magnitude	None	
	Negligible	*These terms combine the above attributes.*
	Low	
	Medium	*They are relative and assigned by professional environmental practitioners*
	High	
Significance	No	*The Responsible Authority (Parks Canada) will assign significance to the impacts. Impacts are considered significant if the magnitude of the impact is either medium or high, and the duration of the impact is greater than short-term. Significance is only assigned to adverse residual impacts.*
	Yes	

6.2.2 Terrain and Soils

Potential Impacts

Decommissioning will require removal of the airstrip centre button, windsock mounting block, underground fuel storage tank and surface concrete slab, registration booth and supporting piling, outhouses, concrete slab on which the garbage container is mounted, aircraft tie-down platforms and blocks, and reduction in the size of the parking lot. In total, these operations will yield an estimated 170 m^3 of materials to be removed and disposed at an approved site (see Appendix B, Rehabilitation Plan, for details).

Elk and other ungulates could be attracted by tender new growth resulting from reclamation activities. Grazing and trampling could cause compaction during wet conditions, or bare surfaces and potential blowouts during dry conditions. The climate in the airstrip area is quite dry which may inhibit seed germination and allow wind erosion of the newly reclaimed spots if timely precipitation is not forthcoming. Additionally, newly exposed topsoils are common sites for weed establishment, whether their seeds were introduced in the soil or invaded from the surrounding vegetation.

Cessation of maintenance activities on the airstrip will have a positive effect on soils. Maintenance activities include occasional ploughing during winter after heavy snowfalls, and occasional mowing during the summer, if the grasses become too long. Topsoil stripping is evident on the airstrip, at least partially the result of maintenance activities, particularly ploughing during the winter, as well as airplane landings on the runway.

Potential impacts to soils and terrain during decommissioning activities include:

- Erosion of disturbed areas;
- Weed invasion;
- Dust during excavation activities;
- Compaction of sub-soil from heavy equipment; and
- Soil contamination from accidental spills.

Potential impacts to soils and terrain post decommissioning include:

- Decreased soil erosion as a result of cessation of maintenance activities after decommissioning.

Any potential contamination from the UST must be removed during the decommissioning phase.

Mitigation Measures

Once all facilities are removed from the airstrip, clean fill should be added to create a topography consistent with the surroundings, and compacted to eliminate the potential for subsidence. After the addition of clean fill, 5 cm of preferred topsoil mixture should be added. The topsoil should be lightly packed to minimize settling and possible erosion and to provide a suitable seed bed for an approved seed mix. In particular, the following site-specific mitigations apply:

- Alleviate compaction under removed structures by ripping subsurface.

- Complete a Phase I/Phase II site assessment on the UST and remove in accordance with the Canada-Wide Standards for Petroleum Hydrocarbons by the Canadian Council of Ministers of the Environment (2001) and Alberta Environment (1994) approved standards. Soil samples should be collected and analyzed according to these guidelines to determine the extent of any possible subsurface contamination associated with the tank. This investigation will determine the composition of the materials to be excavated, will direct the appropriate methods and locations for their disposal and the volume of material required to infill the pit.

- Ensure two pit outhouses are removed and the pits filled before surface reclamation takes place.

- Scarify and add topsoil to the trail from the registration booth to the outhouses, which has been worn down to roughly 5 cm below the surrounding ground surface. This will encourage regrowth of the understory.

- Use weed-free topsoil for reclamation. Discussions with Parks personnel (Westhaver, pers. com.) indicated that JNP uses a preferred topsoil mixture from locally produced compost mixed with sand/silt to create a viable growing medium. This mixture has been developed and tested as a result of the 5th Bridge Revegetation Project, and is showing the best promise for arid montane areas. Table 6.2 provides areas and volumes of soil required for reclamation purposes.

- Practice due care and attention during equipment operation to minimize any impacts on the vegetation and topsoil resources. Areas requiring demolition/excavation activities include the centre button, windsock mounting block and aircraft tie-down sites (see Figure 1). Avoidance of sharp turns, excessive speed and rapid starts on wheeled or tracked equipment or vehicles is imperative, especially under wet conditions. Potential remediation activities immediately around the underground fuel storage tank will also require the use of heavy equipment and entail traversing on and working from the grassed areas on and beside the airstrip.

- Seed all reclaimed sites immediately to reduce the potential for invasion by non-native species.

- To prevent trampling or grazing by elk, fence all but the smallest revegetation sites until plants have well established root structures and the soil is stabilized.

- Monitor reclaimed sites to ensure seed germination. The criteria include density, ground cover, and self-sustaining herbaceous vegetation (Axys Consulting 1998).
- Halt all construction activities during wet conditions (i.e. heavy rainfall and runoff events, or high winds).
- Only use existing roadways, pathways and previously disturbed areas for site access and travel. Access routes and boundaries for equipment will be flagged in the field and subject to on-site surveillance in order to prevent off-site damage.
- Use only low PSI tires on disturbed areas to reduce compaction.
- Park vehicles or equipment only within designated areas and not on undisturbed areas.
- Prepare an appropriate emergency response plan including numbers of appropriate authorities to report spills (JNP Warden Office (780) 852-6155). Spill contingency equipment and measures must be in place before commencement of work.
- Immediately report and manage any leakage or spillage with appropriate spill contingency equipment and measures.
- Follow the Park's Toxic Spill Emergency Plan and the spill clean-up guidelines should a hazardous spill occur (Axys Consulting 1998).
- Ensure all construction equipment is in good working order, especially with respect to leaks of oil, fuel or hydraulic fuels.
- Remove all contaminated soil from the Park and dispose of at provincially certified sites. No treatment of contaminated soils (e.g. bioremediation) is allowed in the Park. Ensure no identified rare plant sites are disturbed.

Table 6.2 Excavation and Fill volume estimates[(a)]

	Volumes (m^3)
Excavation Volume Estimates - Material to be Removed	168.45
Fill Volume Estimates - Clean Replacement Materials	125.15
Estimated Topsoil Volumes[(b)]	37.8

(a) Excavation and fill volumes are estimated. These estimates are subject to change based on results of Phase II assessment for potential soil contamination.
(b) Assumes a 5 cm replacement depth of reclamation mixture.

Residual Impact Rating

Residual impacts that may remain after mitigation measures are applied include a decrease in non-native species invasion (weeds), the removal of potential soil contamination from the UST,

and decreased soil erosion from the cessation of maintenance activities. Reclamation of those areas disturbed by the installation of the airstrip infrastructure, and removal of a portion of the parking lot will return the terrain and soils to their pre-development status, as near as is practicable.

Given the above mitigation measures, the residual impacts to terrain and soils from the decommissioning activities will be positive.

6.2.3 Vegetation

Potential Impacts

Potential effects of decommissioning on the vegetation VECs can be summarized into three general categories (see Table 6.3):

Loss of vegetation resources (including rare plants and plant communities)

Vegetation loss can result from development of permanent facilities, as well as the three "X" markings to be placed on the former runway. Each of the arms that make up the "X" will be 0.9 m wide by 19.4 m long. This procedure will alter vegetation in the area under the "X" marking. According to Transport Canada, the "X" markings must be in place until such time as the area is no longer discernible as a runway; that is, until the area is fully reclaimed (J. Koosel pers. comm.). The area affected will be approximately 36 m^2 for each "X" marking; therefore approximately 108 m^2 of existing vegetation will be lost. The current vegetation communities that will be affected are characterized by a mix of native and non-native plant species. The south end of the centre of the runway has a species poor *Antennaria-Agropyron pectiniforme* community. Approximately half-way up the runway is a very dry, sparsely vegetated *Antennaria parviflora-Elymus lanceolatus* community. The north end of the runway has a very dry, level *Koeleria macrantha-Astragalus* spp. – *Artemisia frigida* community.

Change in vegetation composition and structure (including rare plants and plant communities)

Vegetation composition may change as a result of physical alteration, reclamation, and cessation of maintenance activities on the airstrip. Changes can include losses or increases in species richness, decreases in native plant integrity, and/or differences in range quality for wildlife due to reclamation activities. Portions of the airstrip runway and facilities currently dominated by non-native species (e.g. *A. pectiniforme, Bromus inermis*) should be reseeded with native species or reclaimed to a more native state. The actual land area to be reclaimed is unknown but is approximately 1 ha (assuming 20% of the runway needs rehabilitation).

The current non-native vegetation supports reduced biological diversity and structure relative to the native state (Wilkinson 2000). Successful native restoration will lead to increases in plant diversity and structure, reduction in the proportion of exotic species, less bare ground, and improved wildlife habitat suitability. Approximately 3,000 ha of native dry montane grassland associations similar to those occurring on the airstrip are found in the Athabasca River valley of JNP. The incremental increase in native grassland resulting from 1 ha of successful reclamation

will be less than 0.1% of the current supply. The known locations of the rare plant species *Potentilla hookeriana* will be avoided during reclamation.

Cessation of maintenance activities will positively impact vegetation structure and diversity through a reduction of soil erosion and direct mortality of vegetation. Plant species diversity and herbaceous cover are considerably lower on the runway than in the surrounding area. This is likely partially due to grading under low snow conditions, and airplane landings.

Vegetation composition may also change due to human activities, for example, recreation and trampling. Contractors working on-site during decommissioning have potential to trample rare plants or portions of plant communities. Decommissioning staff will be on site for about 5 days during the summer or fall. Potential impacts could include decreases in species richness, decreases in native plant integrity, and/or differences in range quality for wildlife. The likelihood of these impacts occurring is negligible.

Vegetation composition may change due to alteration of ecological processes. Decommissioning activities would not obstruct the continued use of prescribed fire to improve the ecological integrity of the site and surrounding areas. This results in a change in vegetation composition and structure either directly or through ungulate foraging response (i.e. herbivory and trampling). The supply of native grasslands in the montane ecoregion of the Athabasca River Valley has been reduced due to fire suppression (Rhemtulla 1999). Prescribed fire on and around the airstrip was used to discourage additional encroachment of shrubs and trees and to create additional grassland supply where trees currently dominate (e.g. AT1 ecosite; see Figure 2). The airstrip was burned in June, 2001, and may be re-burned in five to six years as part of restoring historic fire cycles to the grassland area (Westhaver, pers. comm.). The amount of additional grassland in the immediate vicinity of the airstrip that could be created and maintained by burning is significant, as 90% of the pines in the area during the prescribed burn were killed.

Introduction or removal of exotic plant species

No noxious plant species were observed on the runway or associated with facilities. Some areas may require spot-spraying with herbicides to remove species such as *Agropyron pectiniforme* and *Bromus inermis.* Parks Canada's focus on herbicide application is on these aggressive non-native species.

Mitigation Measures

The following mitigation measures are recommended to minimize project-specific effects on vegetation VECs (Table 6.3).

Loss of vegetation resources

- Mark and avoid any rare plants currently occurring in the areas to be reclaimed or covered with an "X" marking.

Changes in vegetation composition and structure

- Ensure efforts are made to reduce the number of non-native species present and reseed with native species representative of the surrounding montane grassland. Runway areas with established vegetation will not be disturbed during reclamation. Native plants recommended by Wilkinson (2000) include *Elymus lanceolatus, Koeleria macrantha, Calamagrostis montanensis, C. purparascens, Carex stenophylla, Carex siccata, Prunus pensylvanica, Achillea millefolium, Antennaria parviflora, Erigeron glabellus* ssp. *pubescens, Astragalus striatus, Linum lewissi, Campanula rotundifolia, Artemisia frigida, Gaillardia aristata, Oxytropis sericea, and O. monticola.*

- Ensure revegetation will occur as soon as practical after reclamation of the site in order to allow for successful regeneration.

- To prevent trampling or grazing by elk, fence all but the smallest revegetation sites until plants have well established root structures and the soil is stabilized.

- Avoid reclamation during excessively wet periods (Wilkinson 2000).

- Mark areas of rare plants with a buffer of at least 3 metres and inform and educate decommissioning contractors about their presence. Conduct a search for additional plants of this species in adjacent areas in mid-June and mid-July (Wilkinson 2000).

- Re-survey areas proposed for reclamation for the occurrence of the provincially rare plant *Potentilla hookeriana*. Mark and avoid these additional sites if identified. Identify sites to Parks Canada staff and ensure follow-up monitoring continues for a minimum of three years in conjunction with monitoring of rehabilitation success.

- Re-seed the small patches of mainly agronomic species adjacent to the runway and areas surrounding the fuelling site, garbage enclosure, registration/phone booth, washroom and parking lot with native species such as *Elymus lanceolatus, Koeleria macrantha, Calamagrostis montanaensis*, and *C. purpurascens*. (Wilkinson 2000). Areas with established vegetation following necessary decommissioning activities will not be excavated (for example the runway), but treated for removal of weeds with approved methods and reseeded.

- Ban all off-road vehicle traffic.

- Consider the continued use of prescribed fire to prevent further encroachment of shrubs and trees onto the airstrip (Wilkinson 2000). Burning also increases forage production and native plant vigor/cover and improving range quality for ungulates (McCallum 1989, Becker 1989).

Introduction or removal of exotic plant species

- Ensure chemical control applications carefully follow Parks Canada's *Integrated Pest Management* Directive 2.4.1, the *Vegetation Management Strategy for Jasper*

National Park (Westhaver and Achuff 2000), and the *Best Available Methods for Common Leaseholder Activity* (Axys Consulting 1998).

- High priority should be placed on the eradication the non-native species *Bromus inermis* and *Agropyron pectiniforme,* where possible, as they are of significant concern to JNP (A. Westhaver pers. comm.).

- Herbicide spraying is not permitted under the following conditions:

  - When winds exceed 16 km/h to minimize off-target drift (Banff National Park 2000).

  - During high temperatures to prevent evaporation of herbicides and vapour drift to non-target plants.

  - During or after heavy rain or when rain is imminent to avoid herbicide from being washed off plants and carried off-target.

- Conduct physical and chemical control at times when most young birds and mammals are sufficiently mobile to avoid mowing equipment and/or spraying operations.

- Consider a three phase approach to eliminating *Bromus inermis* and *Agropyron pectiniforme,* Burn the area first (already completed), then wick the taller plants using a hockey-stick applicator, followed by reseeding with native species. Only spot spraying from a backpack and the hockey stick wicking applicator will be used to apply herbicide.

- Ensure the locations of rare plants are identified and marked and that vegetation control does not occur in these areas.

Residual Impact Rating

If the appropriate mitigation measures are followed, there should be no residual impacts on rare and representative plant species with regards to loss of vegetation, changes in composition in structure, and introduction of exotic plant species. Table 6.3 identifies the potential impacts, mitigations and residual impacts of the proposed project on the project VECs. The residual impacts to rare and representative plant communities have been summarized using the three general impact categories discussed above.

Table 6.3 Summary of Potential Impacts, Mitigating Measures, and Residual Impacts to Vegetation Resources

Potential Impacts	Proposed Mitigative Measures	Valued Ecosystem Component	Residual Impact Ratings					
			Magnitude	Direction	Geographic Extent	Duration	Frequency	Reversibility
Loss of vegetation resources								
	Mark and avoid any rare plants occurring in the areas to be covered with an "X" marking	Rare/representative plant species						
		Rare/representative plant communities	Negligible	Negative	Local	Long-term	Continuous	Reversible
Change in vegetation structure and composition								
	Restore portions of runway to native condition	Rare/representative plant species						
	Fence larger revegetation sites to prevent trampling or grazing by elk							
	Time restoration to avoid excessively wet periods	Rare/representative plant communities		Positive				
	Mark area of rare plants with 3 m buffer and avoid							
	No driving off of existing access							
	Inform and educate contractors of rare plants							
	Continue use of prescribed fire							
Introduction/removal of exotic plants								
	Use eradication methods in Parks Management Directive 2.4.1 for *Bromus inermis* and *Agropyron pectiniforme.*	Rare/representative plant species						
	Avoid spraying in high winds, high temperatures or heavy rains							
	Avoid spraying during nesting/fledgling period	Rare/representative plant communities		Positive				
	Assure contractor compliance with spraying protocols							

Loss of vegetation resources

There will be loss of 36 m^2 of vegetation under each of three "X" markings on the decommissioned airstrip, representing less than 0.1% of the available dry grassland habitat in the Athabasca Valley.

> *Residual impacts related to loss of rare and representative plant communities will be negative in direction, negligible in magnitude, local, long-term, continuous, and reversible.*

Change in vegetation structure and composition

Physical alteration and reclamation activities will result in a change in vegetation composition and structure from non-native species to native species. Human recreation and trampling of rare plant communities may occur during decommissioning activities. Altered ecological processes, particularly changed levels of herbivory could have a permanent impact on rare plant communities. Cessation of maintenance activities will have a positive impact on vegetation communities.

> *The overall residual impacts associated with a change in structure and composition on rare plant communities will be positive.*

Introduction or removal of exotic species

Removal of exotic species may affect rare and representative plant communities by enhancing biodiversity and the native integrity of the site.

> *The residual impact from removal of exotic species will be positive.*

6.2.3.1 Summary of Impacts on Vegetation

The overall effects of decommissioning the Jasper airstrip on native plant communities will be positive. Montane native grasslands are an uncommon and diminishing vegetation resource in JNP because of long-term fire suppression and invasion by non-native species. Decommissioning is likely to result in the conversion of up to 1 ha of disturbed grassland to a more native condition. This amount of land represents <0.1% of the total current native grassland in the Athabasca River Valley of JNP. Potential negative effects of decommissioning on rare plants and rare plant communities are negligible given the mitigation measures proposed.

6.2.4 Wildlife

Potential Impacts

Potential effects of decommissioning activities on wildlife can be summarized into three general categories (Table 6.4):

- Increased risk of mortality from project activities;

- Direct loss or change in habitat quality resulting from physical alteration; and
- Habitat alienation or disruption of traditional movement patterns from anthropogenic sensory disturbance.

Increased risk of mortality from project activities

Decommissioning activities will require the use of construction equipment to demolish/remove buildings, excavate gravel and remove materials from the airstrip. There is potential for this equipment to injure ground nesting birds and fledglings, or damage or destroy nests. Increased mortality could occur directly as a result of vehicle collisions with ground nesting birds or smaller carnivores such as long-tailed weasel. Other wildlife VECs are not likely to be affected.

Mortality could also occur indirectly as a result of problem wildlife encounters with decommissioning contractors. Inadequate waste disposal has potential to entice wildlife species into areas they would otherwise avoid. This could result in removal of the offending animal. This is a concern for species such as grizzly bears that have low reproductive rates. In contrast, increased risk of mortality is less of a concern for wildlife such as breeding birds (e.g. sparrows) and elk that have large litter sizes and/or reproduce often which enhances compensation for population losses.

Direct loss or change in habitat quality resulting from physical alteration

Habitat alteration is the physical loss or gain of habitats that are potentially useful to a species for feeding, denning, hiding, movement and reproduction. Wildlife VECs that use the airstrip as habitat include elk, wolf, grizzly bear, long-tailed weasel, cougar, and vesper sparrow.

For the proposed project, the majority of habitat alteration would occur as a result of decommissioning and reclamation of existing structures and landscapes (e.g. runway, aircraft parking areas).

Approximately 108 m^2 of the airstrip will be removed from the existing grass runway for use by wildlife as a result of "X" markings. It is likely a significant portion of the airstrip runway and infrastructure currently dominated by non-native species will be reclaimed to a more native state.

The actual land area to be reclaimed but will likely approximate 1 ha (10,000 m^2). This is less than 0.1% of current Lower Athabasca River valley supply of dry, native grasslands typical of those occurring on the airstrip.

Table 6.4 Summary of Potential Impacts, Mitigating Measures, and Residual Impacts to Wildlife Resources

Potential Impacts	Proposed Mitigating Measures	Valued Ecosystem Component	Residual Impact Ratings					
			Magnitude	Direction	Duration	Geographic Extent	Frequency	Reversibility
Increased risk of mortality								
	Bear/cougar awareness and safety training	Large-bodied carnivores	Negligible	Negative	Short-term	Local	Once*	Non-Reversible
	Remove all foods and refuse from job site	Small-medium-bodied carnivores	Low	Negative	Short-term	Local	Once	Non-Reversible
	Retain/enhance access road gating	Elk	Negligible	Negative	Short-term	Local	Once	Non-Reversible
	Limit vehicle access and speed	Breeding Birds	Low	Negative	Short-term	Local	Once	Non-Reversible
Direct habitat alteration/loss								
	Reclaim runway/facilities with native plant stock	Large-bodied carnivores		Positive				
	Mark boundaries of native/non-native plant communities	Small-medium-bodied carnivores	Low	Neutral	Long-term	Local	Continuous	Reversible
	Minimal disturbance decommissioning methods	Elk		Positive				
		Breeding Birds		Positive				
Habitat alienation and sensory disturbance								
	Survey decommissioning sites for nesting birds	Large-bodied carnivores	Negligible	Neutral-Negative	Short-term	Local	Once	Reversible
	Avoid decommissioning activities during nesting/fledging	Small-medium-bodied carnivores	Negligible	Neutral-Negative	Short-term	Local	Once	Reversible
		Elk	Negligible	Neutral-Negative	Short-term	Local	Once	Reversible
		Breeding Birds	Negligible	Neutral-Negative	Short-term	Local	Once	Reversible
Movement disruption								
	Limit human activity in Athabasca River floodplain area	Large-bodied carnivores	Negligible	Neutral-Negative	Short-term	Local	Once	Reversible
		Small-medium-bodied carnivores	Negligible	Neutral-Negative	Short-term	Local	Once	Reversible
		Elk	Negligible	Neutral-Negative	Short-term	Local	Once	Reversible
		Breeding Birds	Negligible	Neutral-Negative	Short-term	Local	Once	Reversible

* Once refers to one five-day decommissioning period

Native grasslands will offer increased structure and food sources for ground nesting birds and microtine rodents such as clay-coloured sparrow, vesper sparrow, savannah sparrow and meadow voles. On the other hand converting currently mowed agronomic grasslands to taller, more structured grasslands could reduce ground squirrel abundance and lessen this food source for small carnivores such as long-tailed weasels. The degree to which reclaimed grasslands retain structure will depend on ungulate (elk) foraging response to the reclaimed sites. Wildlife species that are adaptable habitat generalists (e.g. elk, wolves, and cougar) have a higher resiliency to habitat removal than do habitat specialists (e.g. long-tailed weasel). They can forage on a wide variety of food items and reproduce within a wide range of habitats. Specialists, on the other hand, tend to forage on a narrow range of food types and reproduce within specific habitats.

Habitat alienation or movement disruption from sensory disturbance

In the project area, sensory disturbance can occur from human presence, vehicles or noise due to local traffic, recreational human use, continued unauthorized aircraft landings on the airstrip, airstrip maintenance and decommissioning activities.

Wildlife may avoid using habitat that is structurally and floristically intact because of the presence of human activity and associated sensory disturbance. This has been termed habitat avoidance and can result in "effective habitat loss" (Weaver *et al*. 1986, Gibeau *et al*. 1996). The duration and magnitude of the human use and the behavioural response of the species in question determine whether the extent of the habitat loss will be complete, partial, temporary or permanent (Bromley 1985). The duration and extent of habitat avoidance resulting from sensory disturbance depends on a number of factors including: 1) type of human use; 2) the duration and intensity of human use; 3) the sensitivity of the species in question; and, 4) habitat characteristics (extent of hiding cover). The implications of effective habitat loss are greatest in the following situations:

- In areas of very high habitat quality or in "critical" reproductive habitat such as nest/den sites or courtship areas;
- In areas of traditional concentration of colonial or gregarious species (e.g. elk winter range);
- When the timing of activities interrupts breeding, nesting or rearing of young (e.g. vesper sparrow);
- When the disturbance leads to effective loss of all or a high percentage of a particularly high quality habitat type (e.g. long-tailed weasel);
- When the population of a sensitive species is low or decreasing (e.g. long-tailed weasel); and,
- When effective habitat loss occurs as linear disturbances create barriers to movement which serve to fragment or isolate large areas of habitat (e.g. wolf, cougar and grizzly bear).

Project VECs most sensitive to human activities and sensory disturbance include grizzly bear and wolf. Wary species are often reluctant to cross open areas lacking hiding cover, especially if there is noticeable human presence. Demolition and reclamation activities involved in decommissioning will require the use of heavy equipment and large trucks, which will increase noise and human activity in the area. This has potential to result in additional sensory disturbance to wildlife on the airstrip and could adversely impact wildlife movement if noise from the activities result in reduced levels of movement. Human activities associated with decommissioning activities will be minor and short-term, and will not significantly impact wildlife in the long term.

Post-decommissioning, the anticipated elimination of unauthorized landings on the airstrip will positively impact wildlife by reducing sensory disturbance. However, the total sensory disturbance that can be attributed to unauthorized landings is negligible in comparison to the traffic noise on the Yellowhead Highway and the train on the rail line, adjacent to the airstrip. The frequency of unauthorized landings and overflights is minimal in comparison to traffic on Highway 16. Noise measurements taken at the west end of the runway a distance of 150 m from the Yellowhead Highway found noise levels of 50.6 dbA for a car, 58.4 dbA for a semi-truck, and 64.9 dbA for a train (train tracks are approximately 50 m north of the Highway). It is unlikely sensory disturbance due to noise from aircraft is substantially affecting wildlife at the airstrip relative to existing traffic noise levels.

Mitigation Measures

The following mitigation measures are recommended in order to minimize project-specific effects on wildlife VECs.

Increased risk of mortality from project activities

- Personnel conducting decommissioning activities should be made aware of the potential (albeit unlikely) to encounter large carnivores in the wooded areas near the parking lot. Appropriate safety equipment should be carried.
- All food refuse associated with activities must be removed immediately.
- Vehicle traffic should remain on existing roads to avoid trampling ground-nesting birds, especially during the early summer period.
- Maintain vehicle speeds of less than 20 km/hr while on site.
- Decommissioning activities on the grassed strip should not occur during ground-nesting season.

Direct loss or change in habitat quality resulting from physical alteration

- Limit activities to disturbed areas only.
- Boundaries between native and non-native vegetation should be located and communicated to decommissioning personnel.
- Reclaim the runway, aircraft parking areas, gravel access road and other facilities (outhouse, registration boxes) with native seed stock representative of the surrounding montane grassland.

Habitat alienation from sensory disturbance

- Conduct a brief survey to determine if raptors nests or ground nesting birds occur in the vicinity of decommissioning activities. Avoid operations in these areas during the nesting and fledging periods (early summer).

Disruption of traditional movement patterns.

- Limit decommissioning activities to the subject lands, and refrain from entering the wooded area along the Athabasca River (VL3 ecosite).

Residual Impact Rating

Table 6.4 identifies the potential impacts, mitigations and residual impacts of the proposed project on the project VECs. Residual impacts remaining after implementation of all of the proposed mitigation measures include:

Increased risk of mortality from project activities

The primary potential source of mortality of large carnivores associated with the airport decommissioning is an accidental encounter between a human and a bear or cougar that results in the death or translocation of the animal. Given the short-term nature of the project (approximately five days), the current low levels of such encounters in JNP, and the mitigation measures proposed above, we consider this event to be highly unlikely. Most diurnal wildlife movement in the vicinity of the airstrip likely occurs along the Athabasca River floodplain located 300 to 400 m from the runway area. If decommissioning contractors operating motor vehicles travel at low speeds and avoid native grasslands, the likelihood of vehicle collision mortality of breeding birds, smaller carnivores and elk is negligible.

> *The residual impact of airport decommissioning related to increased risk of mortality on all wildlife VECs will be negative in direction, negligible in magnitude, local, short-term, once only, and non-reversible.*

Direct loss or change in habitat quality resulting from physical alteration

The loss of habitat resulting from the placement of "X" markings is of negligible magnitude and will not have a measurable effect on habitat or populations of any VEC species. Reclamation of the runway and associated facilities to a more native condition will result in an overall increase (approx. 1 ha) in high quality habitat supply of native grassland for breeding bird VECs and potentially for smaller carnivores. This increase will not be as important for carnivores and ungulates. While the 1 ha increase in native grassland is minor relative to regional grassland supply, it is an important increase in relation to local supply.

> *The residual impact on wildlife VECs of airport decommissioning related to direct loss or change in habitat quality resulting from physical alteration will be positive.*

Habitat alienation from sensory disturbance

Decommissioning staff will be on site for a total of about five days. Noise from these activities will include heavy equipment operation and some minor demolition. Decommissioning will be planned for the post-nesting/fledging period.

> *The residual impact on wildlife VECs of airport decommissioning related to habitat alienation from sensory disturbance will be neutral, negligible in magnitude, local, short-term, once only, and reversible. Overall the effect has potential to be negative or neutral for decommissioning activities and positive for indirect effects of curtailing small aircraft use by stopping unauthorized landings.*

Disruption of traditional movement patterns

Most daytime movement of large carnivores and ungulates likely occurs along the Athabasca River floodplain located 300 to 400 m east of the runway. As detailed above, airport decommissioning will not result in significant increases in sensory disturbance. Based on this, movement of wildlife VECs will not be impaired by decommissioning activities.

> *The residual impact on wildlife VECs of airport decommissioning related to disruption of traditional movement patterns will be negligible, neutral, local, short-term, occur once, and be reversible. Overall the effect has potential to be negative to neutral for actual decommissioning activities and positive for indirect effects of curtailing unauthorized small aircraft use.*

6.2.4.1 Summary of Impacts on Wildlife

The increase in montane, high quality habitat resulting from reclamation activities will be a positive impact for breeding birds and potentially smaller carnivores. Sensory disturbance will be localized and will avoid sensitive timing windows for wildlife. No significant adverse residual impacts related to wildlife movement are anticipated.

Given the minimal activities associated with decommissioning and the mitigation measures outlined above, the potential project-specific impacts of airport decommissioning on wildlife VECs related to mortality, habitat loss and movement obstruction will be negligible.

Table 6.4 summarizes potential impacts, mitigation measures and residual impact ratings for the wildlife VECs.

6.2.5 Recreational Use and Aesthetics

Potential Impacts

Decommissioning activities at the airstrip should have no long-term impact on the recreational activities currently occurring on the airstrip. There are no long-term plans to restrict human use on the decommissioned airstrip. Access to the Athabasca River picnic area will remain and other users may continue using the parking lot and the open field for a range of informal uses. There is, however, a potential impact from any open excavations that could pose a danger to recreational users.

There will be a short-term reduction in aesthetics during decommissioning, but proper reclamation and site clean-up will ensure the impact is temporary. For safety purposes, the public will not be permitted to be close to heavy machinery engaged in decommissioning work.

Mitigation Measures

The excavated area from the UST will be fenced if left unattended for any period of time. Standard construction site measure will be employed to safeguard public safety during decommissioning activities. To ensure aesthetics are not negatively impacted, construction waste will be sorted, reused, recycled or disposed of at an approved trade waste facility**.** Reclamation will follow the guidelines outlined above, and in Appendix B, Rehabilitation Plan.

Residual Impact Rating

There are no predicted residual impacts to recreational use of the airstrip resulting from decommissioning activities.

6.2.6 Historical Resources

Potential Impacts

As no known sites of significance have been recorded on the Jasper airstrip, there are no potential impacts of the project on known sites. Unknown buried archaeological sites may be exposed and impacted during the proposed rehabilitation activities that have subsurface impacts, such as the removal of contaminated soil or asphalt from the paved section of the parking lot. There are identified cultural sites in proximity to the airstrip but they will not be impacted by project activities.

Mitigation Measures

The subsurface reclamation activities should be monitored by a professional archaeologist to ensure any exposed artifacts are identified, authorities notified and work stopped immediately. The archaeologist may indicate when activities can resume.

Residual Impact Rating

Given the above mitigation measures, there will be no residual impacts to historical resources as a result of decommissioning activities.

6.2.7 Aviation Safety

Potential Impacts

As outlined in Section 5.10, decommissioning of the airstrip at Jasper will formalize the closure that occurred in 1997 and will involve removal of all facilities. In terms of aviation safety, the major effect of decommissioning the Jasper airstrip will be the elimination of one safe alternative landing area for aircraft that encounter negative unexpected flying conditions and/or equipment problems during a routine VFR flight.

Potential aviation safety impacts from decommissioning include:

- Elimination of a potential landing area for emergency/diversionary landings along the Jasper VFR Route. This could result in an increased risk for VFR aviators.

The issue of a "safe" distance between airstrips for emergency/diversionary use by aviators was partially addressed in the 1994 Transport Canada Report. This report referenced a report by Sypher (1986) which proposed a distance of 75 nautical miles as a criteria between airstrips for the Government of Yukon, in relation to the establishment of a network of emergency airstrips. In the case of a westerly VFR trip originating from the Jasper-Hinton airstrip, the closest alternate airstrip would be at Valemount, 99 nautical miles west of Jasper-Hinton (see Figure 3). This exceeds the 75 nautical miles criteria referred to by Transport Canada (1994) as possible criteria for the location of emergency airstrips.

Aviation weather reporting by Environment Canada is based on regional information and as a result there are no local aviation weather briefings for the Jasper area. The risk for safe VFR flying may be elevated with decommissioning of the Jasper airstrip if unforeseen weather conditions arise along this VFR route.

Based on over-flight activity information from 1991 (see Section 5.10) and airport registry information for the year 2000, it is reasonable to conclude that there is a reasonably high level of over-flight activity in the Jasper VFR corridor, and a minimum of 40 unauthorized landings (approximate only) per year. There also appears to be occasional unauthorized usage of the strip for search and rescue training activities. In the year 2000, the airport registry shows there were two diversionary landings due to poor weather conditions.

Private aircraft following VFR routes in mountainous terrain are often not equipped with the latest aviation technology (e.g. weather radar) and many light aircraft do not have the "horsepower" to deal with wind shear, downdrafts and other weather conditions. VFR pilots are not trained to fly in conditions of poor visibility, and aviation weather forecasts based on local mountain conditions are not provided by Environment Canada. This limits the options available to VFR aviators if unforeseen poor weather is encountered. Favourable VFR weather conditions are commonly found in Jasper and, because of this, the airstrip has been traditionally viewed as a relatively reliable option for VFR flight planning purposes.

As continued use of airstrips inside national parks is against Parks policy, alternative sites for landing are not addressed here. Parks Canada does not have the authority to consider alternate landing sites outside JNP.

After decommissioning is complete, the airstrip site at Jasper will remain as open grassland. Planned reclamation activities include seeding of native species, and does not call for planting of trees or shrubs on the airstrip. Therefore the site, while being reclaimed to its natural state as required by the Park Management Plan, will remain as an open grassed area. As the airstrip is in a wide, flat part of the valley, reclamation activities will not preclude its possible use as a site for future true emergency landings.

Based on this information, removal of the airstrip at Jasper for diversionary use may slightly elevate the risk associated with flying light aircraft in this mountainous terrain.

Mitigative Measures

The following mitigation measures are suggested as possible means of reducing the potential impacts of decommissioning:

- Use of the Hinton-Jasper airport as a reasonable alternative to some of the current activities at Jasper such as search and rescue training and medical evacuations.

Residual Impact Ratings

The current Canada Flight Supplement indicates that the Jasper airstrip should be used for "emergency/diversions only". Given this current practice, it is predicted that the long-term residual effect on aviation safety is negative in direction and negligible to low in magnitude, extra-regional, long term, and intermittent. The Responsible Authority (Parks Canada) will conduct a risk assessment as a separate process to confirm this rating.

6.2.8 Summary

There will be no significant negative impacts to biophysical VECs as a result of the Jasper airstrip decommissioning. There is a positive impact that relates to wildlife as a result of a change in habitat quality due to the alteration of ecological processes. The use of prescribed fire on the airstrip has the potential to increase the supply of montane native grasslands and subsequently improve habitat quality, provided herbivory from elk populations is controlled. This impact would also be positive.

Once the airstrip has been decommissioned, the predicted impact on aviation safety is negligible to low. Parks Canada will conduct a risk assessment as a separate process to confirm this rating.

Table 6.5 summarizes potential impacts, mitigation measures and residual impact ratings for each VEC discussed above.

6.3 Maintenance Activities

The cessation of maintenance activities on the airstrip allows the area to be fully reclaimed to native montane grassland, as per the objectives of the project. As such, this activity is fully assessed in the impact assessment in Section 6.2. However, Justice Campbell (1997) directed consideration be given to retaining the airstrip in a condition that would allow for safe emergency landings after decommissioning. In response to this direction, the impacts of continuing maintenance activities on the airstrip are compared with the impacts of cessation of maintenance activities (see Table 6.6).

Continued maintenance of the airstrip includes mowing the runway in summer and ploughing the snow off the runway in winter. Cessation of maintenance activities includes not mowing the runway in summer or ploughing in winter. A discussion of each option is provided below.

6.3.1 Continuation of maintenance activities

It is considered unsafe to land on an airstrip that is not maintained regularly. If the airstrip continues to be maintained in a state suitable for emergency/diversionary purposes, closure markings and formal notification of the change in airstrip status in the Canada Flight Supplement would be required to inform pilots that the airstrip was available for emergency/diversionary use only.

Maintenance activities have directly impacted the soils, vegetation, and wildlife on the airstrip. In particular, past maintenance activities have caused soil erosion and loss of vegetation structure and diversity. Ploughing in the winter stripped the topsoil, which resulted in areas of bare ground unable to support vegetation. As a consequence, non-vegetated areas experienced increased soil erosion, which adversely affects the soils. Summer maintenance activities negatively affected vegetation structure and reduced diversity, including loss of species richness and introduction of non-native species. Aircraft landings on the airstrip also cause soil erosion on the runway. Given the impact of past maintenance, continuation of these activities would have a negative impact on soils and vegetation in the local study area.

Table 6.5 Summary of Potential Impacts, Mitigation Measures, and Residual Impact Ratings During Jasper Airstrip Decommissioning

VEC	Potential Impacts	Mitigation Measures	Residual Impacts (yes/no)	Direction (pos/neutral/neg)	Geographic Extent (L / R/ ER)	Duration (S / M / L)	Frequency (O / I / C)	Reversibility (reversible/non-reversible)	Magnitude (none/negligible/ L / M / H)
Hydrological resources	Contamination of groundwater from UST	• Conduct a Phase I/II site assessment	no						
Terrain and soils	Erosion of disturbed areas during decommissioning Weed invasion during decommissioning Dust during excavation activities Compaction of sub-soil from heavy equipment during decommissioning Soil contamination from accidental spills Decreased soil erosion as a result of cessation of maintenance activities after decommissioning	• Alleviate compaction under removed structures by ripping subsurface. • Complete a Phase I/Phase II site assessment on the UST and remove in accordance with the Canada-Wide Standards for Petroleum Hydrocarbons(CCME 2001) and AENV (1994). Soil samples should be collected and analyzed according to these guidelines to determine the extent of any possible subsurface contamination that may be associated with the tank. This investigation will determine the composition of the materials to be excavated, and will direct the appropriate methods and locations for their disposal and the volume of material required to infill the pit. • Ensure two pit outhouses are removed and the pits filled before surface reclamation takes place. • Scarify and add topsoil to the trail from the registration booth to the outhouses, which has been worn down to roughly 5 cm below the surrounding ground surface. This will encourage regrowth of the understory. • Use weed-free topsoil for reclamation. Discussions with Parks personnel (Westhaver, pers. com.) revealed that Jasper uses a preferred topsoil mixture from locally produced compost mixed with sand/silt to create a viable growing medium. • Practice due care and attention during equipment operation to minimize any impacts on the vegetation and topsoil resources. Areas requiring demolition/excavation activities include the centre button, windsock mounting block and aircraft tie-down sites. Avoidance of sharp turns, excessive speed and rapid starts on wheeled or tracked equipment or vehicles is imperative, especially under wet conditions. Potential remediation activities immediately around the underground fuel storage tank will also require the use of heavy equipment and entail traversing on and working from the grassed areas on and beside the airstrip. • Seed all reclaimed sites immediately to reduce the potential for invasion by non-native species; • Monitor reclaimed sites to ensure seed germination. • Halt all construction activities during wet conditions (i.e. heavy rainfall and runoff events, or high winds); • Only use existing roadways, pathways and previously disturbed areas for site access and travel; • Park vehicles or equipment only within designated areas and not undisturbed areas	yes	pos					

Table 6.5 Summary of Potential Impacts, Mitigation Measures, and Residual Impact Ratings During Jasper Airstrip Decommissioning – *Continued*

VEC	Potential Impacts	Mitigation Measures	Residual Impacts (yes/no)	Direction (pos/neutral/neg)	Geographic Extent (L / R/ ER)	Duration (S / M / L)	Frequency (O / I / C)	Reversibility (reversible/non-reversible)	Magnitude (none/negligible/ L / M / H)
Terrain and Soils continued		• Prepare an appropriate emergency response plan. Know the name and number of the appropriate authorities to report spills (JNP Warden Office 780 852-6155). Spill contingency equipment and measures must be in place before commencement of work; • Immediately report and manage any leakage or spillage with appropriate spill contingency equipment and measures; • Ensure all construction equipment is in good working order, especially with respect to leaks of oil, fuel or hydraulic fuels; • Follow the Park's Toxic Spill Emergency Plan and spill clean-up guidelines should a hazardous spill occur; and • Remove all contaminated soil from the Park and dispose of at provincially certified sites. No treatment of contaminated soils (e.g. bioremediation) is allowed in the Park.							
Rare and representative plant species	Loss of vegetation resources	• Mark and avoid any rare plants occurring in areas to be covered with an "X" marking	no						
	Change in vegetation structure and composition	• Reduce the number of non-native species present and reseed with native species representative of the surrounding Montane grassland. • Ensure revegetation occurs as soon as practical after reclamation of the site. In order to allow for successful regeneration, consider fencing larger revegetated areas. • Avoid reclamation during excessively wet periods. • Mark areas of rare plants with a buffer of at least 3 m and inform and educate decommissioning contractors about their presence. Conduct a search for additional plants of this species in adjacent areas in mid-June and mid-July. • Re-survey areas proposed for reclamation for the occurrence of the provincially rare plant *Potentilla hookeriana*. Mark and avoid these sites if identified. Identify sites to Parks Canada staff and ensure follow-up monitoring continues for a minimum of three years, in conjunction with monitoring of rehabilitation success. • Re-seed the small patches of mainly agronomic species adjacent to the runway and areas surrounding the fuelling site, garbage enclosure, registration/phone booth, washroom and parking lot with native species. Areas with established vegetation following necessary decommissioning activities will not be excavated, but treated for removal of weeds with approved methods and reseeded. • Ban all off-road vehicle traffic. • Consider the continued use of prescribed fire	no						

Table 6.5 Summary of Potential Impacts, Mitigation Measures, and Residual Impact Ratings During Jasper Airstrip Decommissioning – *Continued*

VEC	Potential Impacts	Mitigation Measures	Residual Impacts (yes/no)	Direction (pos/neutral/neg)	Geographic Extent (L / R/ ER)	Duration (S / M / L)	Frequency (O / I / C)	Reversibility (reversible/non-reversible)	Magnitude (none/negligible/ L / M / H)
Rare and representative plant species continued	Introduction/Removal of exotic plants	• Use eradication methods recommended in Parks Management Directive 2.4.1 for *Bromus inermis and Agropyron pectiniforme,* • Avoid spraying in high winds, high temperatures or heavy rains • Avoid spraying during nesting/fledging period • Ensure locations of rare plants identified prior to herbicide application • Assure contractor compliance with spraying protocols	no						
Rare and representative plant communities	Loss of vegetation resources	• See rare and representative plant species	yes	neg	L	L	C	reversible	negligible
	Change in vegetation structure and composition	• See rare and representative plant species	yes	pos					
	Introduction/Removal of exotic plants	• See rare and representative plant species	yes	pos					
Carnivores (large-bodied: grizzly bear, cougar, wolf) (small and medium-bodied: long-tailed weasel)	Increased risk of mortality	• Conduct bear/cougar awareness and safety training • Remove all foods and refuse from job site • Retain/enhance road gating to prevent vehicle access • Limit vehicle access and speed	yes	neg	L	S	O	non-reversible	negligible to L
	Direct habitat alteration / loss	• Reclaim airstrip/infrastructure with native plant stock • Mark boundaries of native/non-native plant communities and communicate to decommissioning staff • Use minimal disturbance decommissioning methods	yes	pos					
	Habitat alienation from sensory disturbance	• No recommended measures for large carnivores, given the short duration of decommissioning activities	yes	neutral-neg	L	S	O	reversible	negligible
	Disruption of traditional movement patterns	• Limit human activity to subject lands and refrain from entering wooded area along Athabasca River (VL3 ecosite)	yes	neutral-neg	L	S	O	reversible	negligible
Elk	Increased risk of mortality	• Remove all foods and refuse from job site • Retain/enhance road gating to prevent vehicle access • Limit vehicle access and speed	yes	neg	L	S	O	non-reversible	negligible
	Direct habitat alteration / loss	• Reclaim airstrip/infrastructure with native plant stock • Mark boundaries of native/non-native plant communities and communicate to decommissioning staff • Use minimal disturbance decommissioning methods	yes	pos					
	Habitat alienation from sensory disturbance	• No recommended measures for elk, given the short duration of decommissioning activities	yes	neutral-neg	L	S	O	reversible	negligible
	Disruption of traditional movement patterns	• Limit human activity to subject lands and refrain from entering wooded area along Athabasca River (VL3 ecosite)	yes	neutral-neg	L	S	O	reversible	negligible

Table 6.5 Summary of Potential Impacts, Mitigation Measures, and Residual Impact Ratings During Jasper Airstrip Decommissioning – *Continued*

VEC	Potential Impacts	Mitigation Measures	Residual Impacts (yes/no)	Direction (pos/neutral/neg)	Geographic Extent (L / R/ ER)	Duration (S / M / L)	Frequency (O / I / C)	Reversibility (reversible/non-reversible)	Magnitude (none/negligible/ L / M / H)
Breeding birds (vesper sparrow)	Increased risk of mortality	• Limit vehicle access and speed on grasslands	yes	neg	L	S	O	non-reversible	L
	Direct habitat alteration / loss	• Reclaim airstrip/infrastructure with native plant stock • Mark boundaries of native/non-native plant communities and communicate to decommissioning staff • Use minimal disturbance decommissioning methods	yes	pos					
	Habitat alienation from sensory disturbance	• Survey decommissioning site for nesting birds • Avoid decommissioning during nesting/fledging	yes	neutral-neg	L	S	O	reversible	negligible
	Disruption of traditional movement patterns	• Limit human activity to subject lands and refrain from entering wooded area along Athabasca River (VL3 ecosite)	yes	neutral-neg	L	S	O	reversible	negligible
Recreational use and Aesthetics	Potential danger from open excavations of UST Temporary aesthetic impact during decommissioning activities	• Fence excavated areas if left unattended • Ensure proper site clean-up after decommissioning • Ensure trade waste is sorted, recycles, reused or disposed of at trade waste site	no						
Aviation safety	Risk to pilot safety from removal of airstrip along VFR route	• Use the Hinton-Jasper airport as a reasonable alternative to some of the current activities at Jasper such as search and rescue training.	yes	negative	ER	L	I	non-reversible	negligible-L*
Historical resources	Disruption of potential archaeological sites	• Ensure professional archaeologist on-site during subsurface activities	no						

See Table 6.1 for definition of impact rating attributes
* Parks Canada, as the Responsible Authority, will conduct a risk assessment as a separate process to confirm this rating.

In addition to impacting soils and vegetation, maintenance activities positively and negatively affect the wildlife and habitat on the airstrip. Some wildlife species may be positively impacted by continued maintenance activities; for example, small carnivores such as badger and long-tailed weasels prey on ground squirrels that rely on the mowed grasslands for habitat. On the other hand, continuation of mowing activities precludes successful reclamation of the airstrip to native montane grassland, which is natural wildlife habitat for native ungulates. Carnivores are subsequently attracted to low elevation montane habitats with abundant prey species.

Maintenance activities also create sensory disturbance through the operation of equipment. Wildlife may avoid using habitat that is structurally and floristically intact because of the presence of human activity and associated sensory disturbance. Project VECs that are most sensitive to human activities and sensory disturbance include grizzly bear, wolf and lynx. In this regard, continued maintenance would have a negative effect on wildlife use of the airstrip.

6.3.2 Cessation of maintenance activities

The airstrip would still be available as a last resort for emergency or diversionary landings if maintenance activities ceased. Formal notification of the change in airstrip status in the Canada Flight Supplement would be required to inform pilots that the airstrip is closed and decommissioned, and not available for landings. As a last resort, a pilot in distress may choose to use the reclaimed site in an emergency.

Cessation of maintenance activities would have several positive environmental effects on the soils, vegetation and wildlife in the area. Currently, topsoil stripping is evident on the airstrip, partially as the result of ploughing snow in the winter. Ceasing maintenance would result in less topsoil stripping, less bare ground, and decreased soil erosion, which in turn would support more vegetation and improve wildlife habitat.

Cessation of maintenance activities may change vegetation composition on the airstrip, and particularly the runway. The airstrip is located in montane AT3 ecosite, which was identified as a special feature by Achuff *et al*. (1986) because of its importance as habitat for ungulates, wolves and several bird species. The runway is a mosaic of dry, montane native grassland interspersed with areas dominated by agronomic (non-native) grass species. Plant species diversity and herbaceous cover are considerably lower, and amount of bare ground is higher on the runway than in the surrounding plant communities (Wilkinson 2000). The centre of the runway to near the south end is dominated by large amounts of agronomic (weed) species. Reduced diversity is likely due to grading under low snow conditions, and plane take offs and landings. Ceasing maintenance activities would allow the natural ecological processes that promote species diversity to occur. Successful native restoration to montane grassland would lead to increases in plant diversity and structure, and a reduction in the proportion of non-native species.

Wildlife would be positively affected if the airstrip were no longer maintained. The montane ecoregion is considered prime wildlife habitat and is critical for wildlife movement throughout the Park. Rehabilitation efforts will ensure that shrubs and forbs associated with montane grasslands will be encouraged to return to the site which will help perpetuate habitat relationships and the natural browsing and grazing regimes of native ungulates. The end-land use

of rehabilitation efforts focuses on wildlife habitat and the re-establishment of native species. In addition to improved wildlife habitat suitability for grazing ungulates, restoring native grasslands will offer increased structure and food sources for ground nesting birds and microtine rodents.

6.3.3 Assessment of Maintenance Activities

The preferred option for maintenance activities must be consistent with Parks Canada policies and legislation. One priority of the Jasper National Park Management Plan is maintenance and restoration of key wildlife corridors and wildlife habitat. In addition, recent amendments to the *Canada National Parks Act* confirm that maintaining or restoring ecological integrity and resource preservation are the first consideration of management decisions in national parks.

One of the goals of the Jasper National Park Management Plan is to maintain and restore the compositional, structural and functional integrity of the montane ecoregion. This goal is consistent with the Vegetation Management Guidelines for the Mountain Parks. The Mountain District is mandated to maintain or restore natural composition, structure and processes of vegetation representative of these natural regions. Cessation of maintenance activities would aid in restoring the airstrip to its natural vegetation structure and composition, while minimizing erosion and landform degradation.

In response to the direction from Justice Campbell (1997), continuation of maintenance of the Jasper airstrip after decommissioning has been considered and evaluated. Based on consideration of the environmental and socio-economic impacts of maintenance activities, and acknowledging the environmental objectives, policies and legislation that govern Parks Canada, it is concluded that continuation of maintenance does not meet the objectives of the project. Continued maintenance is not the chosen option for carrying out the project for several reasons:

- It does not meet the objectives of reclamation, namely to rehabilitate the physical area of the airstrip, including the grass runway and taxiways;
- It does not meet the Jasper National Park Management Plan objective of restoring the area to its natural montane ecoregion; and
- It is contrary to the policy and legislation of Parks Canada, as defined in the Jasper National Park Management Plan, the *Canada National Parks Act,* and the *National Parks Aircraft Access Regulations.*

6.4 Determination of Significance

For this study, Parks Canada, as the Responsible Authority, will assign significance to the impacts based on the combination of impact attributes. Impacts are considered significant if the magnitude of the impact is either medium or high, and the duration of the impact is greater than short-term. Significance is only assigned to adverse impacts.

Table 6.6 Assessment of Maintenance Options

		ENVIRONMENTAL COMPONENTS				SOCIAL/ECONOMIC COMPONENTS			
Maintenance Option	**Potential Impacts**	Hydrological Resources	Terrain and Soils	Vegetation	Wildlife	Recreational Use and Aesthetics	Historical Resources	Aviation Safety	Compliance with Parks Canada Policy and Legislation
Option 1: Continuation of Maintenance									
Mowing activities	loss of vegetation structure and diversity, invasion of non-native plant species, direct mortality of wildlife, habitat alienation, direct habitat alteration and loss	-	L	L	L	-	-	P	H
Ploughing activities	topsoil scraping and erosion, invasion of non-native plant species	-	L	L	L	-	-	P	H
Option 2: Cessation of Maintenance									
No mowing activities	reclamation to native montane grassland, increased vegetation structure and diversity	-	P	P	P	-	-	N-L*	P
No ploughing activities	reduction in topsoil loss and erosion, increased vegetation structure and diversity	-	P	P	P	-	-	N-L*	P

*Parks Canada, as the Responsible Authority, will conduct a risk assessment as a separate process to confirm this rating

Impact Scale:

P	**-**	**N**	**L**	**M**	**H**
Positive	None	Negligible	Low	Moderate	High

Negative

6.5 Malfunctions and Accidents

Section 16 (1) of *CEAA* requires an environmental assessment to consider the environmental effects of malfunctions and accidents that may occur in connection with the project. Decommissioning will consist of approximately five days of activity to physically remove the infrastructure, place closure markings, and reclaim the airstrip. Post-decommissioning, the airstrip will no longer be maintained.

Potential accidents that may affect the environment during these activities are limited to accidental spills of fuel oil or hydraulic fluids during on-site decommissioning. To address this potential impact, the following mitigation measures related to terrain and soils are recommended:

- Prepare an appropriate emergency response plan including numbers of appropriate authorities to report spills (JNP Warden Office (780) 852-6155). Spill contingency equipment and measures must be in place before commencement of work;
- Immediately report and manage any leakage or spillage with appropriate spill contingency equipment and measures;
- Follow the Park's Toxic Spill Emergency Plan should a hazardous spill occur and the spill clean-up guidelines in Axys Consulting (1998); and
- Ensure all construction equipment is in good working order, especially with respect to leaks of oil, fuel or hydraulic fuels.

6.6 Sustainable Use of Renewable Resources

Section 16 (2) of *CEAA* stipulates that a Comprehensive Study consider the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present with those of the future. There are no renewable resources likely to be affected by the project.

6.7 Effects of the Environment on the Project

During the removal of infrastructure and placement of closure marking, heavy rainfall and wildfire are the two environmental conditions that may affect the project. All construction activities will be halted during wet conditions (i.e. heavy rainfall and runoff events, or high winds). The airstrip was burned in June 2001, and so it is highly unlikely that fire will affect the decommissioning activities.

7.0 CUMULATIVE EFFECTS ASSESSMENT

Cumulative effects are "changes to the environment that are caused by an action in combination with other past, present and future human actions" (Hegmann *et al.* 1999). Section 16.1 (a) of the *Canadian Environmental Assessment Act* requires the consideration of cumulative environmental effects that are likely to result from a project in combination with other projects or activities that have been or will be carried out in the study area. Therefore, an environmental assessment must consider the effects of a project within the context of its environment, taking into account both the existing stressors already acting upon the environment (combined effects) and future stressors which are likely to occur. The evaluation should identify the relative contribution of the proposal under review to the overall stress load. Assumptions used and levels of uncertainty should also be documented (Parks Canada 1997*b*).

A cumulative effects assessment determines the potential for project effects to combine with other activities in the project area to produce a cumulative impact on the environment. Although project-specific environmental effects may be small, the combined effects of the project with other effects from existing or planned projects may be cause for concern. Mitigation measures are intended to minimize project-specific impacts that could contribute to cumulative effects.

Project-specific cumulative effects may occur if:

(1) Local effects on VECs occur as a result of the action under review; and

(2) Those VECs are affected by other actions (Hegmann *et al*. 1999).

When there are no project specific impacts, insignificant or otherwise, there can be no cumulative effects. Project-specific environmental effects of the Jasper airstrip on selected VECs are predicted to be largely mitigable. However, there are two areas where impacts from decommissioning may combine with effects from other existing activities or planned projects to incrementally contribute to cumulative effects. These areas of concern are:

- Impacts to wildlife from other activities presently occurring along the Athabasca River floodplain and terrace, which likely serves as an important diurnal movement corridor for large mammals (combined effects); and

- Impacts to aviation safety from decommissioning the airstrip.

While the predicted project-specific impacts to both of these VECs are negligible, the potential for combined impacts from other existing uses (for wildlife movement) and future trends in air traffic (for aviation safety) may incrementally contribute to cumulative environmental effects.

7.1 Spatial and Temporal Boundaries

Temporal and spatial boundaries were established for the cumulative effects assessment. Setting boundaries is "the process of establishing limits to the area and period of time examined in an assessment" (Hegmann *et al* 1999). These boundaries are determined through the existence of cause and effect relationships, the limits of available data, and professional judgement.

Temporal boundaries include past, existing, and future time limits. For this study, the past is incorporated into the existing condition. According to Hegmann *et al.* (1999), future temporal boundaries typically end when the pre-action condition becomes established. The future temporal boundary for this assessment will extend to after the VECs have recovered to pre-disturbance conditions. Decommissioning activities will occur for approximately five days, while reclamation success is to be monitored for three years (see Section 8). The future boundary, therefore, is established at ten years after decommissioning to allow for the variability of natural cycles and the successful establishment of native grassland habitat after reclamation.

This temporal boundary also applies to aviation safety. The "X" markings on the airstrip must be in place until the runway is no longer discernable (J. Koosel pers. comm.). For this reason, the temporal boundary for aviation safety also relies on the successful reclamation of native grassland habitat, and is established at ten years. Monitoring will determine when the airstrip has been successfully reclaimed and the "X" markings can be removed.

Project spatial boundaries vary with each environmental component, and are appropriate to the nature and scale of the decommissioning project. The spatial boundary for the wildlife study area includes the Athabasca River floodplain and associated glacial terraces and channel banks which provide suitable cover for wildlife movement surrounding the airstrip. The aviation safety study area includes the VFR corridor between Edson Airport and Valemount, through the mountains as shown on Figure 3.

7.2 Potential Cumulative Impacts to Wildlife

The Jasper airstrip decommissioning is proposed in a regional setting where past, present and future planned human actions have and will continue to affect wildlife VECs. Regionally, the airstrip is part of a larger wildlife movement corridor along the Athabasca River floodplain and terrace. Existing activities within the regional study area that may combine to affect wildlife movement and produce sensory disturbance in addition to decommissioning include:

- Vehicle activity on the Yellowhead Highway;
- Train activity on the Canadian National Railway line;
- Human use of the picnic area east of the airstrip; and
- Human use of the Athabasca River (see Figure 1, Site Plan).

The project-specific impact assessment concludes that decommissioning activities will have negligible effects. During decommissioning activities, there will be negative, short-term, reversible effects on wildlife related to increased sensory disturbance. After the 5-day decommissioning period, all effects on wildlife from decommissioning activities will be positive. For example, reclamation of the runway will result in habitat improvement with long-term positive benefits to native grasslands and wildlife species reliant on them.

The other existing activities identified above will contribute to the effect of sensory disturbance on wildlife within the Athabasca Valley. Demolition and reclamation activities involved in decommissioning will require the use of heavy equipment and large trucks, which will increase

noise and human activity in the area. Sensory disturbance from vehicle, train and human use in the area may combine with the minimal disturbance from decommissioning activities. Given the short-term nature of decommissioning activities (5 days), it is unlikely the combined effects of this project to existing activities in the region will result in a cumulative impact to wildlife. These combined effects are unlikely to affect movement of wildlife along the Athabasca River valley in the vicinity of the airstrip. It is important, however, to avoid an increase in the amount of human recreational use of the formally abandoned strip and especially the area along the Athabasca River floodplain.

Parks Canada is currently developing a Cumulative Effects Analysis framework for the Three Valley Confluence that focuses on ecological indicators such as carnivores and wildlife movement corridors (Cardiff 2000). This framework is still evolving, but should be considered as a future tool to manage the cumulative effects related to wildlife in JNP.

The only known potential future activity in the study area is another prescribed burn on the airstrip in five or six years as part of restoring historic fire cycles and grassland communities (A. Westhaver, pers. comm.). It is not anticipated that this will result in a significant cumulative impact to wildlife in the area.

Overall, the cumulative effects from airstrip decommissioning on wildlife are anticipated to be neutral, negligible, local, occur once, and short-term in duration. Post decommissioning, the effect will be positive.

7.3 Potential Cumulative Impacts to Aviation Safety

Cumulative impacts to aviation safety from decommissioning the Jasper airstrip may occur when other existing or planned activities impact the aviation safety VEC. While there are no known planned projects, such as decommissioning of other airstrips in the cumulative effects study area, there are related activities that may impact aviation safety along the Jasper VFR route, namely:

- Potential increasing air traffic (e.g. mountain aviation tours) between the Edmonton area and remote mountain terrain along the Jasper VFR route.

It is anticipated air traffic may increase as mountain tourism and population increase. Increasing aviation traffic could elevate risk to aviation safety as the likelihood of a mishap such as unforeseen bad weather or equipment failure becomes more likely over time. However, designation within the Canada Flight Supplement that the Jasper airstrip is available for "emergency/diversions only" helps to mitigate this risk. It is therefore concluded that the cumulative effects from decommissioning the Jasper airstrip are negative in direction and of negligible to low magnitude. Parks Canada, as the Responsible Authority, will conduct a risk assessment as a separate process to confirm these findings.

8.0 RECOMMENDED MONITORING AND OTHER FOLLOW-UP

Recommendations for follow-up monitoring programs are made:

- To evaluate the accuracy of impact assessment predictions;
- To address information gaps; and
- To evaluate the effectiveness of mitigation measures.

Even though decommissioning is not anticipated to have significant adverse impacts on project VECs, monitoring will be necessary to measure the effectiveness of mitigation measures. In particular, vegetation monitoring is recommended to evaluate success of the rehabilitation plan in this montane setting. Monitoring and follow-up programs are discussed throughout Section 6.2.

Appendix B provides a reclamation and rehabilitation plan for the Jasper airstrip. As part of the plan, site monitoring must be conducted annually for three years following decommissioning to monitor reclamation success. Monitoring should focus on the success of native seed germination, subsistence effects, percent cover, weeds etc. on revegetated areas and areas where herbicide application was used. The recent prescribed burn provides the opportunity to monitor the emergence of weeds and pine species that may compromise the rehabilitation goal of restoring the airstrip to native montane grassland. In addition, any identified populations of the rare species *Potentilla hookeriana* should be monitored during this time.

The criteria for assessment of revegetation success in JNP are listed in *Best Available Methods for Common Leaseholders Activities* (Axys Consulting 1998). The criteria include density of herbaceous cover, ground cover of herbaceous vegetation, and self-sustaining herbaceous cover. Vegetation must be capable of maintaining cover and vegetation without fertilization within three years. Parks Canada will evaluate the site and provide sign off if it meets the rehabilitation criteria at that time.

A risk assessment will be carried out by Parks Canada as a separate process to confirm the level of risk to aviation safety as a result of decommissioning the airstrip.

9.0 PUBLIC CONSULTATIONS

This project is registered under the Federal Environmental Assessment Index and is subject to public consultation. The judicial hearing discussed in Section 3.5 provided guidance on the public involvement component of the Comprehensive Study. Justice Campbell distinguished between closing the airstrip and decommissioning the airstrip, and concluded that there has already been adequate public consultation on the decision to close the airstrip. According to the Terms of Reference (JNP 2001), public consultation for the Comprehensive Study should focus only on matters pertaining to decommissioning.

The purpose of public consultation is to inform members of the public who may be affected by the proposed decommissioning, and to provide opportunities for individuals or groups to express their interests and concerns.

The public involvement process for this Comprehensive Study Report has four phases:

- Public consultation on the draft Terms of Reference;
- Informal discussions during the preparation of this report with representatives of the aviation community, including COPA;
- Planned public input on the draft Comprehensive Study; and
- Public comment period managed by the Canadian Environmental Assessment Agency after the Comprehensive Study is officially submitted by Parks Canada.

9.1 Public Consultation on Draft Terms of Reference

There was extensive public input into the Terms of Reference by other Federal Departments, the Canadian Environmental Assessment Agency, and other interested stakeholders (JNP 2001). A draft Terms of Reference was prepared for the Jasper airstrip decommissioning Comprehensive Study.

Public and stakeholder review and comment were solicited. The response from the public was examined and the Terms of Reference revised, as warranted. The finalized Terms of Reference were circulated to the first round of commentators.

9.2 Informal Meetings with Stakeholders

Meetings with key stakeholders, such as the Canadian Owners and Pilots Association, occurred early in the process to learn about their concerns. Meetings and discussions were held with individual pilots and COPA to discuss aviation safety issues with regards to the Jasper airstrip. Based on input during these meetings and the approved Terms of Reference, the Comprehensive Study was prepared. The first draft of the Comprehensive Study was received by Parks Canada and the Agency in July 2001, and their feedback was incorporated into the second draft. The second draft of the Comprehensive Study was received by Parks Canada and the Agency in September 2001, and was reviewed for adequacy as a basis for public consultation. Feedback

from Parks Canada and the Canadian Environmental Assessment Agency was incorporated into the final draft for public consultation.

9.3 Public Input into Comprehensive Study Report

There are several additional opportunities for interested public to have input into the final report. Parks Canada will publish a notice regarding the availability of the report for review, and will initiate the next phase of public involvement with an independent consultation specialist. The Comprehensive Study will be posted on the Parks Canada website and written material will be available at select Parks Canada offices and public libraries. Written responses received and recorded by Parks Canada will be forwarded to the public consultation consultant for analysis. Parks Canada will then audit the public consultation progress and receive a final report of analysis of public concern, to which it will respond. Parks Canada will consider incorporating public input in the final Comprehensive Study report.

9.4 Public Comment Period Managed by the Agency

After Parks Canada officially submits the Comprehensive Study Report to the Canadian Environmental Assessment Agency, a 30-day period is provided for opportunity for more public comment. As per Section 22 of *CEAA*, a notice is published setting out the date the assessment will be made available to the public, the locations copies may be obtained, and the deadline for filing comments. Prior to the posted deadline, any person may file comments with the Agency on the Comprehensive Study.

Upon completion of the public comment period, the Agency prepares and presents a recommendation to the Minister of the Environment. At that time, the Minister will refer the project back to Parks Canada, the Responsible Authority, for action.

10.0 CONCLUSIONS AND RECOMMENDATIONS

Routine aircraft operations at the Jasper airstrip have been legally prohibited since the enactment of the 1997 *National Park Aircraft Access Regulations.* However, aircraft continue to land on the airstrip. The airstrip was closed in 1997 when an environmental screening assessment was completed that evaluated the environmental effects of closure. Decommissioning of the airstrip is needed to remove the physical aspects of the airstrip, and to provide the required visual markings of a closed and decommissioned airstrip that are universally recognized by pilots (JNP 2001). Justice Campbell (1997) directed a Comprehensive Study be conducted under *CEAA* prior to a decision to decommission the airstrip.

Parks Canada believes the Comprehensive Study addresses the *CEAA* requirements to evaluate potential social and environmental impacts that may result from the decommissioning of the airstrip including accidents and malfunctions and cumulative effects. As a result of a court decision, the assessment also considers social effects in a broader sense than required under *CEAA* (e.g., aviation safety) (Campbell 1997). This report addresses the requirements of the Final Terms of Reference issued by Environmental Assessment Services of Jasper National Park (JNP 2001).

Decommissioning the airstrip will require the following activities:

- Removal of all infrastructure which makes the area look like an operational airstrip;
- Installation and maintenance of closure markings;
- Reclamation and rehabilitation of the physical area affected by airstrip activities (as required);
- Maintenance or modification of a gate to control road access;
- Cessation of maintenance activities on the runway; and
- Airstrip closure notification in the Canada Flight Supplement.

The Terms of Reference for the assessment stipulate the scope of the Valued Ecosystem Components (VECs) that must be considered, including:

- Vegetation and soils;
- Carnivores;
- Breeding birds;
- Ungulates;
- Aviation safety; and
- Cultural resources.

Potential effects on hydrological resources, human recreational use, and historical resources were also considered. Potential impacts were identified by assessing interactions between project activities and VECs. Mitigations to minimize predicted impacts were identified for each environmental resource. Residual impacts remaining once mitigation measures were applied were assessed using standard impact assessment methodology. Table 10.1 provides a summary of residual impacts for each VEC.

With appropriate mitigation measures, there were no significant negative residual impacts identified as a result of decommissioning activities. Positive residual impacts were identified for soils, vegetation, and wildlife in terms of improved habitat and enhancement of biodiversity at the site.

The current Canada Flight Supplement indicates that the Jasper airstrip should only be used for "emergency/diversions only". Given this current practice, the potential impact to aviation safety includes an elevation of risk associated with flying light aircraft along the Jasper VFR corridor. It is predicted that the long-term residual effect on aviation safety is negative and negligible to low. Parks Canada, as the Responsible Authority, will conduct a risk assessment as a separate process to confirm this rating.

There are no predicted significant adverse cumulative effects from the project.

In summary, there are no long-term negative environmental impacts predicted from the project, provided that appropriate mitigation measures are followed. A risk assessment will be conducted to confirm the risk to aviation safety is negligible to low.

Table 10.1 Summary of Potential Impacts and Residual Impact Ratings [a]

VEC	Potential Impacts	Residual Impacts (yes/no)	Direction (pos/neutral/neg)	Magnitude (negligible/L/M/ H)
Hydrological resources	• Contamination of groundwater from UST	no		
Terrain and soils	• Erosion of disturbed areas during decommissioning • Weed invasion during decommissioning • Dust during excavation activities • Compaction of sub-soil from heavy equipment during decommissioning • Soil contamination from accidental spills • Decreased soil erosion as a result of cessation of maintenance activities after decommissioning.	yes	positive	
Rare and representative plant species	• Loss of vegetation resources	no		
	• Change in vegetation structure and composition	no		
	• Introduction/Removal of exotic plants	no		
Rare and representative plant communities	• Loss of vegetation resources	yes	negative[b]	negligible
	• Change in vegetation structure and composition	yes	positive	
	• Introduction/Removal of exotic plants	yes	positive	
Wildlife	• Increased risk of mortality	yes	negative[c]	negligible
	• Direct habitat alteration / loss	yes	positive	
	• Habitat alienation from sensory disturbance	yes	neutral-negative	negligible
	• Disruption of traditional movement patterns	yes	neutral-negative	negligible
Recreational use and Aesthetics	• Potential danger from open excavations of UST • Temporary aesthetic impact during decommissioning activities	no		
Aviation safety	• Elevated risk to pilot safety from removal of airstrip along VFR route	yes	negative	negligible – L [d]
Historical resources	• Disruption of potential archaeological sites	no		

[a] See Table 6.1 for definition of impact rating attributes.
[b] Negative rating is the result of placement of the "X" markings. The markings must be in place until such time as the runway is no longer discernable.
[c] Impacts are rated DURING decommissioning activities. Post-decommissioning, it is predicted the impact to wildlife will be positive.
[d] Parks Canada, as the Responsible Authority, will conduct a risk assessment as a separate process to confirm this rating.

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APPENDIX A

TERMS OF REFERENCE

APPENDIX B

REHABILITATION PLAN

REHABILITATION PLAN

During decommissioning activities at the Jasper airstrip, it is expected approximately 1 ha will be disturbed. In efforts to encourage native species establishment, a rehabilitation plan has been developed to ensure restoration activities will lead to montane native grassland (AT3 ecosite phase). This rehabilitation plan has been prepared with special attention to native species use and ecological integrity. The plan provides target areas for reclamation, soil replacement volumes, suggested native vegetation species, and best management practices for rehabilitation.

The overall goal of vegetation management in Jasper is "to maintain or restore natural composition, structure and processes of vegetation representative of the Rocky Mountain Natural Region". The first priority of Jasper National Park's Vegetation Management Strategy is ecological integrity. Ecological integrity is a condition where the structure (genetic, species, community diversity) and function of an ecosystem are unimpaired by the stresses induced by human activity. Rehabilitation in a National Park should emphasize ecosystem replacement with a combination of natural succession and the use of native species. Invasion of native species into the reclaimed areas and the area surrounding disturbed patches is encouraged. As vegetation communities develop over the years, the successional status will vary and change with natural ecosystem processes. The proposed rehabilitation procedures will assist in promoting this development through the following processes:

- Reclamation seeding with native seed mix. Use of a native seed mix acceptable to Parks Canada.

- Topsoil depths will approximate natural conditions. The chosen species, fertilization and seeding rates will promote the invasion of native vegetation from surrounding sources.

- Annual monitoring of re-vegetation success will be conducted for three years to ensure successful establishment. The criteria for assessment of revegetation success listed in *Best Available Methods for Common Leaseholders Activities* (Axys Consulting 1998) should be used. The criteria include density, ground cover, and self-sustaining herbaceous vegetation.

B.1 Target Areas for Rehabilitation

Montane environments have a short growing season, cool summer temperatures, strong winds and movement of soils in soil horizons (freeze/thaw cycles) that can make revegetation challenging. These conditions often inhibit or prevent the germination, emergence, and establishment of plant populations that will eventually provide wildlife food and habitat. Because of these conditions, only the areas disturbed during decommissioning will be reclaimed and revegetated. All existing turf will remain intact.

Sites requiring rehabilitation/reclamation in whole or in part include:

- Grass runway;

- Taxiway;
- Potentially contaminated sites (associated with fuelling areas);
- Areas where shelters were once located; and
- Informal trail running parallel to the airstrip, between the airstrip and Highway 16. The trail appears to have been formerly graded to approximately 2 m wide and 8-10 cm below grade.

B.2 Surface Material Replacement

Rehabilitation will take place after removal of all structures and other material has occurred. Surface material rehabilitation activities include:

- Gravel stripping /excavation;
- Decompaction of soil;
- Addition of fill to excavated areas;
- Grading, if required;
- Application, spreading and scarification of topsoil.

Decommissioning of buildings and gravel surfaces may displace some surface material. These areas must be filled with till and topsoil to level the site and provide a growth medium for planted species. The standard soil reclamation guidelines for Alberta suggest that in the Eastern Slopes Region a minimum surface lift of 15 cm be used for salvage and replacement purposes (AA, 1987). However, this document further states: "the material handling procedures will reflect specific site conditions." Given the existing topsoil depths as determined at the inspection sites the recommended replacement depth is 5 cm. Jasper uses a preferred topsoil mixture from locally produced compost mixed with sand/silt to create a viable growing medium (A. Westhaver pers. comm.).

Soil volume estimates of material to be removed and added are summarized in Tables B.1 and B.2. Volumes of topsoil replacement are provided in Table B.3.

Table B.1 Excavation Volume Estimates for Removal & Disposal

Structure	Area (m^2)	Volume (m^3)
Centre button and tails[a]	235	18
Windsock mounting block[b]	1	1
Outhouses[c]	2.9	N/A
Registration booth[d]	5.2	N/A
Parking lot: pavement gravel	245 456	36.75 22.8
Garbage container[e]	1.8	0
UST[f] : concrete pad tank excavation	28 28	2.9 84
Tie-downs	12	3
Total*	**1,014.9**	**168.45**

[a] Assumes average width of concrete of 1.0 m and average depth of 7.6 cm.
[b] Assumes depth of concrete block of 1.0 m.
[c] Assumes pit depth of 3.0 m.
[d] Assumes only topsoil addition required.
[e] Container is mounted on a concrete slab and sits on a gravelled corner of the parking lot. The entire unit can be transported for use elsewhere. Removal of the underlying gravel has been incorporated in the parking lot values.
[f] Assumes concrete pad is 10.2 cm thick and the tank is the same dimensions as the pad (8 m x 3.5 m). Assumes the tank is 2 m deep and buried 1 m below the pad. These estimates are subject to change based on results of Phase 2 assessment for potential soil contamination.
* See footnotes d and f above.

Table B.2 Fill Volume Estimates for Replacement

Structure	Area (m^2)	Volume (m^3)
Centre button and tails[a]	235	6.1
Windsock mounting block[b]	2	0.90
Outhouses[c]	2.88	8.65
Registration booth[d]	5.2	na
Parking lot	456	20
UST[e]	28	87
Tie-downs	12	2.5
Total*	**741.08**	**125.15**

[a] Assumes no clean fill will be required after removal of concrete surfacing.
[b] There is a 1 m^2 gravel pad immediately beside the mounting block. By removing 5 cm of this and placing it in the hole created by removing the block, less fill will be required.
[c] Assumes pits are 3 m deep.
[d] There are 6 concrete piles supporting the booth but the depth below grade they reach is unknown. It is unknown whether or not there is any contamination beneath the structure.
[e] Estimated as per assumptions set out in Table B.1; subject to change after Phase 1 and 2 audits completed.
* See footnotes a, d and e above.

Table B.3 Rehabilitation Soil[(a)] Volume Estimates[(b)]

Structure	Area (m^2)	Volume (m^3)
Centre button	235	11.75
Windsock mounting block	2	0.10
Outhouses	2.88	0.15
Outhouse path	15	0.75
Parking Lot	456	22.8
UST	28	1.45
Registration booth	5.2	0.25
Tie-downs	12	0.6
Total	**756.08**	**37.8**

[(a)] Reclamation soil is a mixture of compost and mineral materials produced by Jasper National Park as a substitute for topsoil.
[(b)] All volumes are estimated on the assumption that the top dressing of reclamation mix will be 5 cm thick.

The following process is recommended for soil reclamation during decommissioning:

- Alleviate compaction under removed structures by ripping subsurface.
- Complete a Phase I/Phase II site assessment on the UST and remove in accordance with the Canada-Wide Standards for Petroleum Hydrocarbons by the Canadian Council of Ministers of the Environment (2001) and Alberta Environment (1994) approved standards. The Phase II assessment may be conducted before or during UST removal. Soil samples should be collected and analyzed according to these guidelines to determine the extent of any possible subsurface contamination that may be associated with the tank. This investigation will determine the composition of the materials to be excavated, and will direct the appropriate methods and locations for their disposal and the volume of material required to infill the pit.
- Ensure two pit outhouses are removed and the pits filled before surface reclamation takes place.
- Scarify and add topsoil to the trail from the registration booth to the outhouses, which has been worn down to roughly 5 cm below the surrounding ground surface. This will encourage regrowth of the understory.
- Use weed-free topsoil for reclamation. Discussions with Parks personnel (Westhaver, pers. com.) revealed that Jasper uses a preferred topsoil mixture from locally produced compost mixed with sand/silt to create a viable growing medium. This mixture has been developed and tested as a result of the 5th Bridge Revegetation Project, and is showing the best promise for arid montane areas.

- Practice due care and attention during equipment operation to minimize any impacts on the vegetation and topsoil resources. Areas requiring demolition/excavation activities include the centre button, windsock mounting block and aircraft tie-down sites. Avoidance of sharp turns, excessive speed and rapid starts of wheeled or tracked equipment or vehicles is imperative, especially under wet conditions. Potential remediation activities immediately around the underground fuel storage tank will also require the use of heavy equipment and entail traversing on and working from the grassed areas on and beside the airstrip.

B.3 Revegetation

The revegetation of disturbed sites is an essential step in the process of decommissioning a site. The goals of revegetation for this Project are:

- The stabilization of disturbed land to minimize erosion and landform degradation.
- Preventing the introduction of non-native species; and
- Re-establishing suitable habitat for local wildlife by maintaining natural vegetation structure and composition.

These goals are consistent with the Vegetation Management Guidelines for the Mountain Parks. The Mountain District is mandated to maintain or restore natural composition, structure and processes of vegetation representative of these natural regions. To accomplish these goals, the following rehabilitation activities with regard to revegetation will occur:

- Runway areas with established vegetation will not be disturbed during reclamation. Efforts will be made using chemical and manual methods to reduce the number of non-native species present and reseed with native species representative of the surrounding Montane grassland. Native plants recommended by Wilkinson (2000) include *Elymus lanceolatus, Koeleria macrantha, Calamagrostis montanensis, C. purparascens, Carex stenophylla, Carex siccata, Potentilla pensylvanica, Achillea millefolium, Antennaria parviflora, Erigeron glabellus* ssp. *Pubescens, Astragalus striatus, Linum lewissi, Campanula rotundifolia, Artemisia frigida, Gaillardia aristata, Oxytropis sericea, and O. monticola.*
- Ensure revegetation will occur as soon as practical after rehabilitation of the site.
- To prevent trampling or grazing by elk, fence all but the smallest revegetation sites until plants have well established root structures and the soil is stabilized. **AW**
- Avoid reclamation during excessively wet periods (Wilkinson 2000).
- Mark and avoid any rare plants in the areas to be reclaimed or covered with an "X" marking.
- Mark areas of rare plants with a buffer of at least 3 meters and inform and educate decommissioning contractors about their presence. Conduct a search for additional plants of this species in adjacent areas in mid-June and mid-July (Wilkinson 2000).

- Re-survey areas proposed for reclamation for the occurrence of the provincially rare plant *Potentilla hookeriana*. Mark and avoid these additional sites if identified. Identify any sightings to key Parks Canada personnel.
- Following treatments to remove agronomic grass species (*A. peciniforme* and *B. inermis*), re-seed the small patches of mainly agronomic species adjacent to the runway and areas surrounding the fuelling site, garbage enclosure, registration/phone booth, washroom and parking lot. Use native species such as *Elymus lanceolatus, Koeleria macrantha, Calamagrostis montanaensis*, and *C. purpurascens*. (Wilkinson 2000). Areas with established vegetation following necessary decommissioning activities will not be excavated (for example the runway), but treated for removal of weeds with approved methods and reseeded.
- Consider the continued use of prescribed fire to prevent the future encroachment of shrubs and trees onto the airstrip (Wilkinson 2000) and to maintain the supply of native grasslands that are uncommon and declining in the Montane of the Athabasca River Valley. Burning also increases forage production and native plant vigour/cover and improves range quality for ungulates (McCallum 1989, Becker 1989).

Rehabilitation efforts will ensure that trees, shrubs and forbs associated with the AT3 ecosite will be encouraged to return to the site which will help perpetuate habitat relationships and the natural browsing and grazing regimes of native ungulates. This is achieved by leaving existing vegetation undisturbed and by including short-lived species in the revegetation seed mixture. Longevity, along with characteristics such as winter hardiness, erosion control, palatability, browse tolerance, moisture preference and soil preference must be considered when choosing revegetative species. These characteristics are particularly important at the airstrip because of the demanding Montane climatic conditions and the end-land use which focuses on wildlife habitat and the re-establishment of native species.

Parks Canada suggests using the native seed recommended by Wilkinson (2000), subject to availability. Table 1 lists these native species. The seed must be certified Canada No.1 and should be applied at a rate of 55 to 60 kg/ha (6 kg/1000 m^2).

Table B.4 Recommended Native Seed Species[(a)]

Common Name	Scientific Name
Ascending Purple Milk-vetch	*Astragalus striatus*
Common Yarrow	*Achillea millefolium*
Early yellow loco weed	*Oxytropis sericea*
Gaillardia	*Gaillardia aristata*
Harebell	*Campanula rotundifolia*
Hay sedge	*Carex siccata*
Junegrass	*Koeleria macrantha (cristata)*
Late yellow loco weed	*Oxytropis monticola*
Narrow-leaved sedge	*Carex stenophylla*
Northern Wheatgrass	*Elymus lanceolatus*
Pasture Sagewort	*Artemisia frigida*
Plains reed grass	*Calamagrostis montanensis*
Prairie cinquefoil	*Potentilla hookeriana*
Purple reed grass	*Calamagrostis purparascens*
Small-leaved Everlasting	*Antennaria parvifolia*
Smooth fleabone	*Erigeron globellus*
Wild blue flax	*Linum lewissi*

[(a)] Wilkinson (2000) and A. Westhaver (pers. comm.)

BEST MANAGEMENT PRACTICES

In addition to the above rehabilitation steps, the following standard Best Management Practices are to be used during reclamation and rehabilitation of the Jasper airstrip.

- Halt all decommissioning activities during wet conditions (i.e. heavy rainfall and runoff events, or high winds);
- Restrict site access to existing roadways, pathways and previously disturbed areas;
- Stockpile excavated material on plywood sheets (first choice) or heavy canvas or polypropylene tarpaulins (second choice) to protect native vegetation. Whenever possible only stockpile materials on already disturbed areas, including parking lots and roadways;
- Separate topsoil from all excavations;
- Ensure all equipment entering the site is in excellent operating condition and cleaned of all vegetative material. If possible, machinery should be steam cleaned;
- Report all spills immediately to Jasper Dispatch 911 or the **JNP Warden Office** (**780-852-6155**);
- Follow the Park's Toxic Spill Emergency Plan should a hazardous spill occur. Spill kits capable of handling 110% of the largest fuel tank must be available on site at all times;
- Conduct all refuelling and maintenance of vehicles and equipment (lubricating, changing oil, etc.) off-site at an approved location;
- Regrade areas with vehicle ruts, erosion gullies or where the excavation has settled;
- Prohibit the feeding or harassment of wildlife. Construction personnel will not be permitted to have firearms or pets on the site or in project vehicles unless specifically authorized by the Park;
- Ensure an environmental monitor is on-site at critical times to supervise and/or inspect reclamation and revegetation efforts. Presence during clearing, filling, and seeding phases are recommended;
- Conduct site monitoring (annually for 3 years) to ensure reclamation efforts are successful and there are no weed infestations. Follow the revegetation criteria in *Best Methods for Common Leaseholder Activities* (Axys Consulting 1998). Monitor any identified populations of the rare species *Potentilla hookeriana* during this time. Site visits early and towards the end of the growing season can determine subsistence effects, germination success, percent cover, weeds, etc.; and
- Use formal pest control in the event of a weed infestation, with high priority on *Bromus inermis* and *Agropyron pectiniforme.* All effort to control pest species must conform to Parks Canada Management Directive 2.4.1, *Integrated Pest Management*.

APPENDIX C

LIST OF COMMON AND LATIN SPECIES NAMES

Table C.1 Latin/Common Names – Vegetation Species

Latin Name	Common Name
CUPRESSACEAE	
Juniperus communis	Ground Juniper
PINACEAE	
Picea glauca	White Spruce
Pinus contorta	Lodgepole Pine
Pseudotsuga menziesii	Douglas fir
POACEAE	
Agropyron pectiniforme	Crested Wheatgrass
Bromus inermis	Smooth Brome Grass
Calamagrostis montanensis	Plains reed grass
Calamagrostis spp.	Reed Grass
Calamagrostis purpurascens	Purple reed grass
Elymus innovatus	Hairy Wild Rye
Elymus lanceolatus	Northern Wheatgrass
Elymus trachycaulus	Slender wheatgrass
Elymus trachycaulus ssp. subsecundus	Bearded Wheatgrass
Festuca rubra	Red Fescue
Koeleria macrantha	June Grass
Poa compressa	Canada Bluegrass
Poa pratensis	Kentucky Bluegrass
Stipa richardsonii	Richardson's Needle Grass
CYPERACEAE	
Carex filifolia	Thread-leaved sedge
Carex siccata	Hay sedge
Carex stenophylla	Low Sedge
SALICACEAE	
Populus spp.	Aspen
Salix spp	Willow
ONOGRACEAE	
Epilobium angustifolium	Fireweed

Latin Name	Common Name
ROSACEAE	
Dryas drummundii	Yellow Dryas
Potentilla hookerani	Hooker's Cinquefoil
Prunus pensylvanica	Pin Cherry
FABACEAE	
Astragalus dasyglottis	Purple milk-vetch
Astragalus striatus	Standing Milk-vetch
Astragalus tenellus	Pulse milk-vetch
Melilotus alba	White Sweet Clover
Oxytropis monticola	Late yellow loco weed
Oxytropis sericea	Early Yellow Loco-weed
Trifolium repens	White Clover
LINACEAE	
Linum lewissi	Wild Blue Flax
VIOLACEAE	
Viola adunca	Early Blue Violet
ELAEGNACEAE	
Shepherdia canadensis	Canadian Buffaloberry
CAMPANULACEAE	
Campanula rotundifolia	Common Hairbell
ASTERACEAE	
Achillea millefolium	Yarrow
Antennaria parviflora	Small-leaved Everlasting
Artemesia frigida	Pasture Sagewort
Erigeron globellus ssp. *pubescens*	Smooth fleabone
Gaillardia aristata	Gaillardia
Soilidago missiourensis	Missouri Goldenrod
Sonchus spp.	Sowthistle
Taraxacum officianale	Common Dandelion
BETULACEAE	
Betula occidentalis	Western birch
ERICAEAE	
Arctostaphylus uva-ursi	Common Bearberry

Table C.2 Latin/Common Names - Wildlife Species

Latin Name	**Common Name**
Alces alces	Moose
Canis latrans	Coyote
Canis lupus	Wolf
Cervus elaphus	Elk
Felis concolor	Cougar
Gulo gulo	Wolverine
Lynx canadensis	Lynx
Martes americana	Pine Marten
Mustela frenata	Long-tailed weasel
Odoicoileus virginianus	White-tailed deer
O. hemionus	Mule deer
Ovis canadensis	Bighorn sheep
Spizella pallida	Clay-coloured sparrow
Ursus americanus	Black bear
Ursus arctos	Grizzly bear

APPENDIX D

RECORD OF COMMUNICATIONS

Record of Communications

Date	Contact	Organization	Summary
20/04/2001	Joe Marciniuk	AENV	Telephone discussion. Requested any info. Relating to monitoring well at the airstrip. Most wells are catalogued by legal description. There isn't any legal description in the National Parks.
23/04/2001	Dave Cable	AENV- Water Sciences Branch	Telephone discussion. Well was a preliminary hole. Installed to a depth of 40 feet. Project cancelled before any data collected
24/04/2001	Alan Westhaver and Kevin Van Tighem, Wardens	Parks Canada, Jasper National Park	Meeting. Discussed fire ecology in the airstrip area.
25/04/2001	Jan Deemter	AENV (Peace River)	Telephone discussion. The well was only pumped once. It was installed in 1993. The program was discontinued, the temporary casing was left instead of putting in a permanent test well.
25/04/2001	Shawn Cardiff, Warden	Parks Canada, Jasper National Park	Meeting. Discussed Terms of Reference.
25/04/2001	George Mercer	Parks Canada, Jasper National Park	Meeting. Discussed availability of information on elk population management in JNP.
07/05/2001	Alan Westhaver, Warden	Parks Canada, Jasper National Park	Telephone discussion. Parks do not have any topsoil stockpiled, and do not import due to weeds. Manure is composted at Trade Waste Pit and used with sand-silt as a topsoil substitute. Request compost early, it is in high demand and limited quantities. Highways may have sand-silt. Trade waste pit has Toadflax. Good experience with compost-mineral mix.
10/05/2001	Sheila	Edmonton Flight Services	Telephone discussion. Automatic weather stations exist at the Jasper airstrip. Pilot record go off service after about 2 hours.
10/05/2001	John MacIntyre	Environment Canada-Calgary Office.	Telephone Discussion. Requested weather station descriptions and pilot reports for Jasper Airstrip. Info is archived onto CDs but it is time consuming to retrieve this info at a cost. Provided weather station descriptions for Jasper via fax.
10/05/2001	Bruce Lowry	Environment Canada-Edmonton Office	Telephone discussion. There are archives of weather data for Jasper and Banff airstrips. He said he would send weather data and # of days below VFR but it was never received.

Date	Contact	Organization	Summary
15/05/2001	Al Westhaver, Warden	Parks Canada, Jasper National Park	Telephone discussion. Talked about prescribed fire program near JNP airstrip.
13/05/2001	Bruce Meyers, Executive Director	Stats Canada	Telephone Discussion. Do not have DATR (Daily Air Traffic Records) information for Jasper airstrip, only non-commercial flights use these strips. Suggested calling Parks Canada and Transport Canada.
14/05/2001	Jacques Laflamme	Environment Canada-Edmonton Office	Telephone Discussion. Requested archived weather data for Jasper airstrip. Automatic station data started around 94/95 at airstrips. Stations were manned prior to this. Automatic station provide daily temp., precipitation, hourly winds, humidity and pressure. While manned many more parameters were measured on an hourly basis. Env. Canada charges time to obtain data. # of days below VFR can be requested at a cost.
14/05/2001	Wes	Parks Canada	Telephone discussion. Requested DATR for Jasper. Parks has records, they are sporadic. They have biweekly logs for the last couple of years. Records are before courts now, he suggested phoning the directors of project, Shawn Cardiff and Janet Mercer.
25/06/2001-05/07/2001	Chris White, Regional Communications Officer	Edmonton Flight Services	Telephone discussion. Requested info for Jasper VFR. Do not have complete records, he suggested calling managers of individual airstrips. Edmonton Flight Services keep plane for only 30 days.
25/06/2001	Doug Soloway	Transport Canada	Telephone discussion. Suggested calling other airstrip managers for information along the VFR routes. There are no official stats for Jasper airstrip.
04/07/2001	Jerry Peller	Town of Edson	Telephone discussion. Requested air traffic information for the Edson Airstrip. Only about ¼ of pilots fill out pilot registry. Many do not radio in. Sent registry for 2000 and 2001.
04/07/2001	Judy Bosh	Village of Valemount	Requested air traffic info. For the Valemount airstrip. No records are kept, it is an unmanned airstrip. Suggested Kamloops Flight Centre.
09/07/2001	John Gregory	Yellowhead County	Telephone discussion. Requested info for Jasper/Hinton Airstrips. Only 50-60% of pilots fill in logs. Faxed the logs from the last 3 years.

Date	Contact	Organization	Summary
09/07/2001	Dan Rogers	Kamloops Flight Services/Flight Information	Telephone discussion. Requested available information on air traffic at Valemount. Rough estimate of 10% of traffic call in to flight services. No stats kept for air traffic.
10/07/2001	Bryn Thomas	Jasper Flying Club	Telephone discussion. Bryn was interested in release of Comp. Study.
17/07/2001	Alan Westhaver	Parks Canada, Jasper National Park	Telephone discussion. Discussed reclamation seed mix.
09/2001	Moe Bailey	Transport Canada, System Safety	Telephone discussion.

PHOTOS

Photo 1. Plane tie down site and aircraft

Photo 2. Cone runway markers

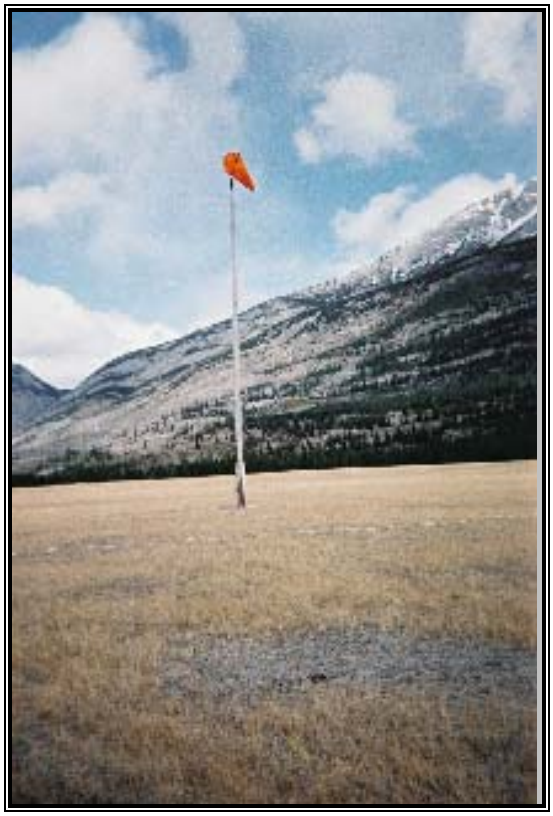

Photo 3. Windsock surrounded by stone circle

Photo 4. Concrete refuelling pad

Photo 5. Concrete landing blocks at runway center –area of greatest landing impact

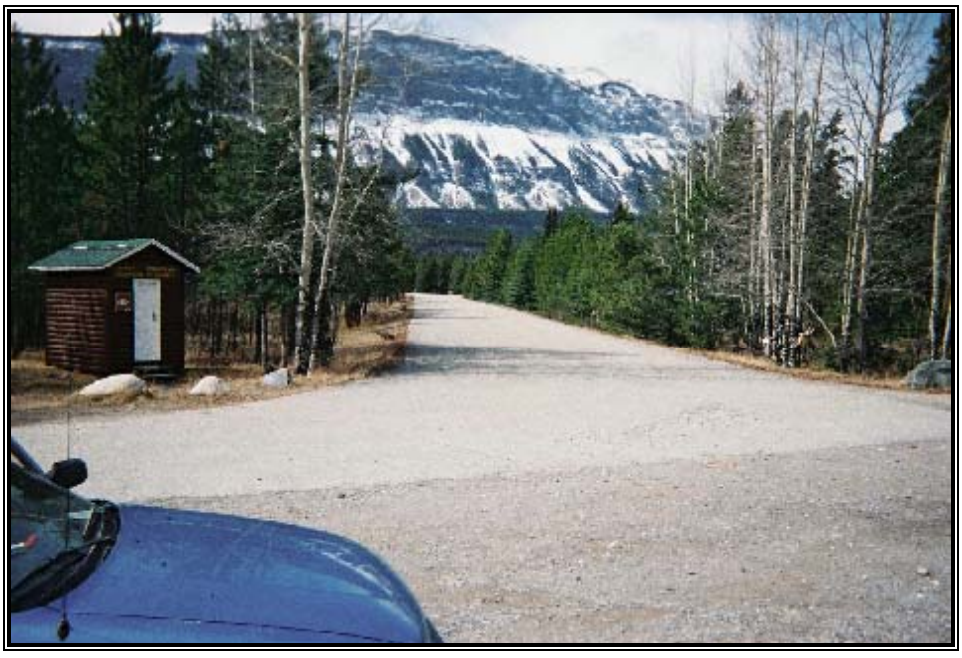

Photo 6. Paved access road and parking lot. Registration booth in the background.

Photo7. Example of ungrazed Junegrass grassland with strong vertical structure.

Photo 8. Example of intensively grazed Junegrass grassland with considerable exposed mineral soil

Photo 9. Moist *Potentilla fructicosa/Elymus innovatus* plant community 26 m east of runway

Photo 10. Ecosite AT3 south of airfield showing results of prescribed fire program