BANFF AIRSTRIP DECOMMISSIONING

COMPREHENSIVE STUDY

HIGHWOOD
Environmental Management

COMPREHENSIVE STUDY REPORT

FOR THE

DECOMMISSIONING OF THE AIRSTRIP

IN

BANFF NATIONAL PARK

FINAL DRAFT

Prepared for:

Parks Canada

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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 Banff National Park (BNP). Parks Canada's intentions to close and decommission the airstrip are long standing, and founded in the 1987 BNP 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* (BNP 2001). The issue of closure is not addressed.

Legislation, regulations and policy documents relevant to the Banff 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 BNP 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, outhouse, aboveground fuel storage tank and accessories, concrete fuelling pad, aircraft parking areas and gravelled access road);
- 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 present, associated with fuelling, and determining the future requirements for vehicle parking and access; 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 BNP 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; and
- Reclamation and rehabilitation.

Alternative locations, or landing sites, are not considered. A landing site within BNP 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 minimal fencing of reclaimed aspen stands, and seeding in areas affected by decommissioning to encourage native species growth and to prevent non-native species invasion.

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, ecosite/species representation, ground cover, forage condition and biodiversity, response to soil conditions, herbivory and fire inclusion/exclusion, soil compaction and potential contamination from fuelling activities;
- 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, which indicates a positive, negative or neutral impact on the VEC;
- Duration, which refers to the period over which the impacts will occur;
- Geographical extent, which is considered local if the impact is limited to the local study area, regional if the impact extends within the Bow Valley, and extra-regional if it extends beyond BNP;
- Frequency, which 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, which assesses whether the impact can be reversed when the activity ceases or over time; and
- Magnitude, which 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;
- Weed invasion;
- 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 and include a decrease in non-native species invasion, the removal of potentially contaminated soil from the AST, and decreased soil erosion from the cessation of maintenance activities.

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 four general categories:

- Increased risk of mortality from project activities;
- Direct loss or change in habitat quality resulting from physical alteration;
- Indirect change in habitat quality due to alteration of ecological processes; and
- 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. There are no predicted residual impacts to recreational use of the airstrip resulting from decommissioning activities.

The presence of archaeological sites on the western periphery of the Banff airstrip suggests there is good potential for near surface sites to be present on the airstrip. Buried archaeological sites may be exposed and impacted during the proposed rehabilitation activities which have subsurface impacts i.e., removal of contaminated soil, and gravel stripping from the access road and aircraft parking areas. Provided the recommended mitigations are followed, it is predicted that there will be no residual impacts to archaeological resources.

The potential impact to aviation safety includes the elimination of a potential landing area for emergency/diversionary landings along the Banff VFR Route, which could result in an increased risk for VFR aviators. Based on available information, it is predicted that the long-term residual effect on aviation safety is low, negative in direction, extra-regional, long term, and intermittent. 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 Banff 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. Based on an assessment of the impacts of maintenance options on environmental and socio-economic components, 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 reclamation objectives of the project, namely to rehabilitate the physical area of the airstrip and return it to its natural state, including the grass runway and taxiways;
- It does not meet the Banff National Park Management Plan objective of restoring the area to its natural montane habitat; and
- It is contrary to the policy and legislation of Parks Canada, as defined in the Banff 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), or in the event of wildfires in the vicinity.

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 activities within the Norquay-Cascade and Fenland-Indian Grounds wildlife corridors; and
- Impacts to aviation safety from decommissioning of the airstrip when considered in conjunction with planned changes in flight services at the Springbank Airport.

While the impact of decommissioning will add only a small incremental effect, the combined and cumulative effects of all of the closures and relocation of facilities in the Norquay-Cascade corridor is already having a positive impact on wildlife use of the corridor. The cumulative effects from airstrip decommissioning add to this positive effect.

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 Banff airstrip on aviation safety are negative in direction and of low magnitude. 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 Banff National Park. The Banff airstrip is an unlicensed grass facility located within the Bow Valley in Banff National Park (BNP). The airstrip has existed at its present location since 1933, with minor improvements over time including aboveground fuel tanks, an outhouse, registration box and two airplane shelters. It is located along the visual flight route between Calgary, Alberta and Golden or Cranbrook, B.C.

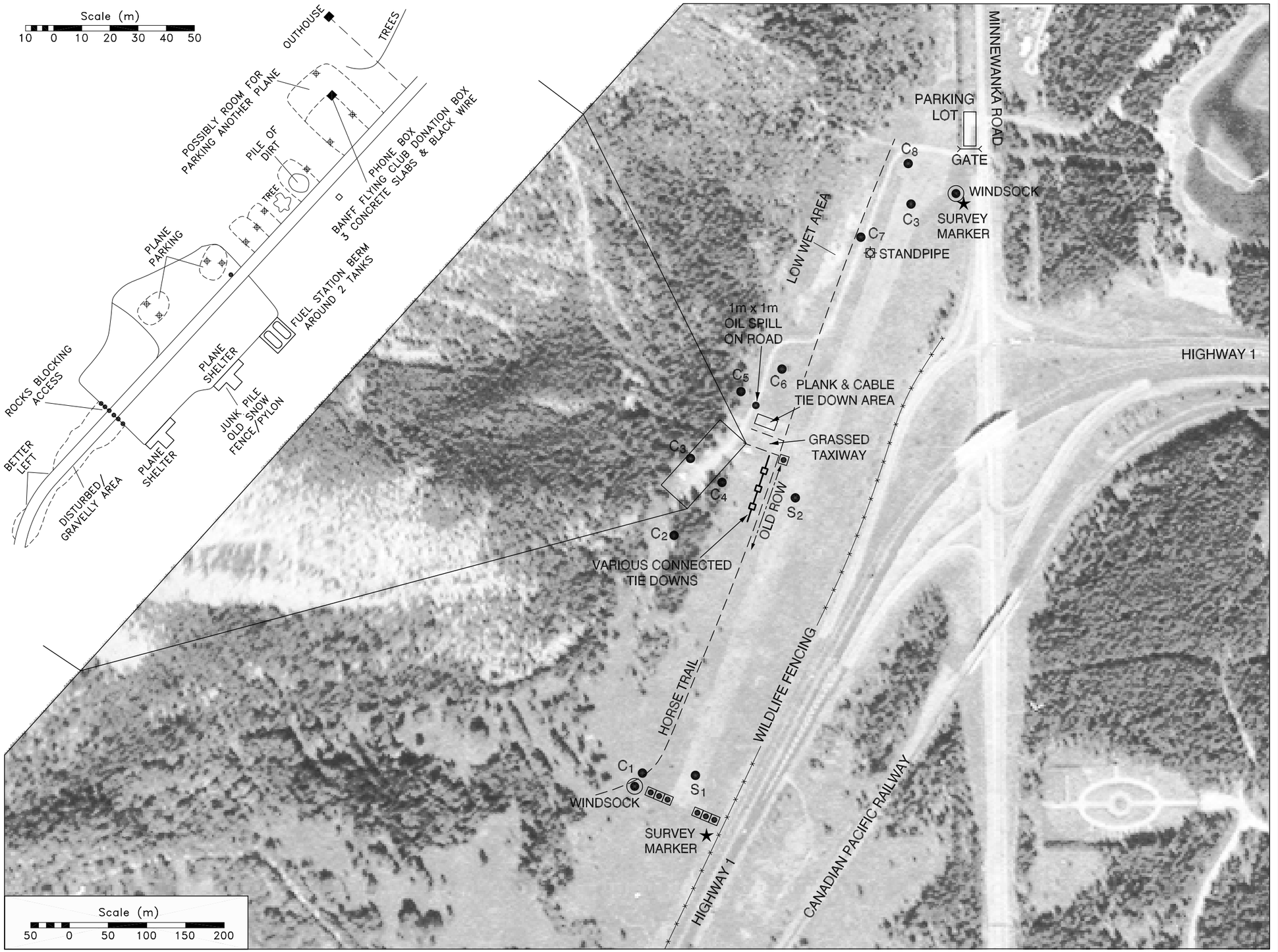
Parks Canada's intentions to close and decommission the airstrip are long standing, and founded in the 1987 BNP Management Plan. Routine aircraft operations at the airstrip have been legally prohibited since the enactment of the 1997 *National Park Aircraft Access Regulations*. In 1997, an environmental 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 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* (BNP 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 socio-economic and environmental impacts, including accidents, 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 Banff 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.



LEGEND

- S_3 AIRSTRIP SOIL INSPECTION SITE
- C_1 AIRSTRIP SOIL CONTROL SITE
- CONE
- WINDSOCK
- TRAIL
- TIE DOWNS
  - WOODEN PLANK
  - CABLE
  - SINGLE
- SURVEY MARKER
- STANDPIPE

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FIGURE 1 SITE PLAN FOR THE BANFF AIRSTRIP

HIGHWOOD Environmental Management

2.0 PROJECT APPROACH

The following approach was used to complete this report:

- Review of Parks Canada regulations, policy and guidelines in Banff 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 predicted 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 Banff airstrip decommissioning were reviewed to ensure that 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 Principals and Operational Policies (1994);
- BNP Management Plan (1997);
- 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 S16 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)

Banff National Park is managed under the *Canada National Park Act*. Section 4(1) of the Act states the general purpose of a national park:

> "The national parks of Canada are hereby dedicated to the people of Canada for their benefit, education and enjoyment, subject to this Act and the regulations, and the parks shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations."

While national parks in Canada have been dedicated to the people of Canada for their benefit, education and enjoyment, 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.

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

3.2.1 National Parks Aircraft Access Regulations (1997)

The *National Parks Aircraft Access Regulations*, enacted in 1997, control aircraft access in all Canadian national parks. These regulations prohibit take off and landing of aircraft in BNP, 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 (see photo 1). Despite the closure of the airstrip, aircraft continue to contravene this regulation and land 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 BNP would contravene these regulations. Parks Canada does not have the authority to consider alternate locations outside of BNP.

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 Banff National Park Management Plan (1997)

The *Canada National Parks Act* requires BNP to have a management plan that serves as a framework for all planning within the Park. The BNP Management Plan provides the context and vision for the future of BNP. It sets strategic goals to manage ecological, social and economic systems in the Park and enhance ecological integrity. One priority of the Plan is maintenance and re-establishment of key wildlife corridors, including the Cascade Wildlife corridor between Cascade Mountain and the TransCanada Highway (TCH), from the Vermillion lakes to the Fairholme Bench. To achieve this goal, the Management Plan proposes the removal, wherever feasible, of the facilities along the lower slopes and floor of the Bow Valley, including closure of the airstrip as soon as is legally possible. Facilities that have already been decommissioned in this corridor include the bison paddock, the horse corrals, and the cadet camp. The continued routine landings, despite closure of the airstrip in 1997, contravene the BNP Management Plan.

Other management objectives listed in the BNP Management Plan are summarized in Table 3.1.

Table 3.1 Management Objectives and Directives in Banff National Park Management Plan

Resource	Objective/Principal
General	To protect unique, rare, threatened and endangered plant and animal species, including those that are of scientific importance, and those that are locally, regionally and nationally and internationally significant (i.e., on provincial conservation data centre tracking lists and COSEWIC).
	Manage developed areas to promote the use of native species and communities while limiting fire risk and wildlife/human conflicts.
	To remove, wherever feasible, the facilities along the lower slopes and floor of the Bow Valley, including closure of the airstrip as soon as is legally possible.
Vegetation	To maintain and, where feasible, restore natural biodiversity, age and distribution of native vegetation communities, including montane habitat, to reflect the long-term ecosystem states and processes.
	Increase efforts to reduce non-native plant populations, particularly noxious species that have the potential to invade recently burned areas, native wetlands and grasslands. Monitor, control or eliminate non-native species that threaten native plant communities or species.
Wildlife	To maintain and restore native bird communities through the protection and management of vegetation.
	To maintain viable populations of wary species such as grizzly bear, wolf, wolverine and cougar by reducing human-caused mortality, reducing the impact of human use and working with surrounding jurisdictions.
	To restore the long-term patterns of behaviour, distribution and abundance of ungulates, and restore predator-prey relationships.
	To maintain and where possible restore habitat connectivity for large carnivores, ungulates and other wildlife in the park and on surrounding lands.
	To reduce the sources of human-caused wildlife mortality that threaten the viability of wildlife populations in the park and adjacent lands.

3.5 Summary of Judicial Hearing

A 1997 judicial hearing addressed whether a legal error was made in the implementation of the decision to close the airstrips in Banff and Jasper. 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. During the hearing, Justice Campbell concluded that 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* (Campbell 1997). Decommissioning the airstrip, on the other hand, is a physical work, and therefore requires an environmental assessment under *CEAA*. In addition, Justice Campbell concluded that decommissioning the airstrip is contrary to the 1988 BNP Management Plan, which stated that the airstrip would be retained for emergency diversion landing purposes until a review was completed (BNP 1997). A joint Transport Canada- Parks Canada monitoring program concluded in 1994 that the airstrips were no longer required for emergency purposes (Transport Canada 1994).

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?" (BNP 2001).

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.

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 points out that in order 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. 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 Bow Valley in which the airstrip is located has been subject to various active management initiatives stemming from recommendations that came out of the Banff-Bow Valley Study (1996) including the decommissioning of several facilities. The driver for these decisions has been to open up the valley as a key wildlife corridor in the Park to help restore natural predator – prey relationships. These actions as they relate to decommissioning the airstrip are discussed above in the context of the BNP Management Plan.

The Panel on Ecological Integrity also recommended that human use in the national parks must pass the dual test of allowability and appropriateness (Parks Canada Agency 2000). 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 BNP unless authorized by the superintendent. Parks Canada policies support the restoration of key wildlife corridors, which involves closure and decommissioning of several facilities, including the airstrip.

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 BNP 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" (BNP 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, outhouse, aboveground fuel storage tank and accessories, concrete fuelling pad, aircraft parking areas and gravelled access road);
- 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; 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" (BNP 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 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 BNP 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 Banff 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 (BNP 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, ecosite/species representation, ground cover, forage condition and biodiversity, response to soil conditions, herbivory and fire inclusion/exclusion, soil compaction and potential contamination from fuelling activities;
- 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 Banff 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 BNP. Although the Banff airstrip is closed, there are still unauthorized 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 impacts of 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 Banff 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 (BNP 2001), Parks Canada's strategy to close the airstrips without decommissioning has been unsuccessful. The lack of physical elements on the airstrip that 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 that pilots are aware that 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 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.

In order 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);
- Cessation of all maintenance activities; and
- Notification in Canada Flight Supplement that the airstrip is closed.

4.3.1 Removal of All Infrastructure

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

Table 4.1 Decommissioning activities related to airstrip facilities

Structure	Description	Activity
Tie downs	Concrete blocks (with metal loop imbedded in the concrete) or looped metal rods imbedded in the ground, or buckets of gravel equipped with small metal chain, or plank and cable methods	Metal rods will be pulled and disposed of at the waste transfer station. Concrete blocks, planks and cables will be removed.
Runway markers	Large plastic orange/red/white cones or flat red triangles inserted into the ground with a wooden stake.	Plastic cones and triangles will be collected and disposed of at an approved facility (waste transfer station)
Windsock	Two metal poles (painted red and white) embedded in the ground with concrete footing (approx.1m diameter) with orange windsock (see photo 2)	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 to an approved facility (the waste transfer station or Exshaw).
Fuelling Facilities	Fencing Berm Two above ground storage tanks (ASTs) Hoses Two pony tanks (see photo 3)	Fuelling facilities will be dismantled and removed according to federal and provincial guidelines. Prior to excavation and facilities removal, a Phase I/II site assessment may have to be undertaken. The ASTs 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).
Aircraft parking areas	Shallow gravel pad areas, usually two tie-downs (as described above) per site. (see photo 4)	Gravel stripping and excavation will be required. Materials will be transported to the Cascade pits storage area and eventually be re-used in the Park. Stripped areas will have to be reclaimed.
Airplane shelters	There are two wooden airplane shelters. These are three sided "T- shaped" structures designed to cover small planes. (see photo 5)	Prior to demolition activities, the Banff Flying Club will be contacted to allow for material/equipment salvage from inside the shelter (metal tool boxes etc). Wooden structures will be dismantled, rubble will be collected and trucked to an approved facility (the waste transfer station or Exshaw regional landfill).
Gate and access 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 once on-strip decommissioning activities are completed, and the gate removed.
Gravel access road	A gravel road provides access from the Minnewanka Loop parking lot to the parking/fuelling area. (see photo 6)	Gravel stripping and excavation will be required. Materials will be transported to the Cascade pits storage and eventual re-use in the Park. The road will be reclaimed as outlined in Section 6.2.2.
Outhouse	Wooden outhouses	Demolition and transport to the Exshaw Regional Landfill.
Registration and other miscellaneous boxes	Various sizes of wooden boxes (see photo 7)	Demolition and transport to the Exshaw Regional Landfill.
Buried telephone and power connections	Buried telephone and power connections Previous utilities have been removed	Underground cables and pipe shall be left in-situ; protruding wire will be cut to a minimum of 25 cm below ground-level.
Closure markings	"X" markings	Installation of three "X" markings. Each arm will be 0.9 m wide and 19.4 m long.
General	Cessation of maintenance activities	Mowing in summer and snow ploughing in winter

4.3.2 Installation of Closure Markings

According to Transport Canada rules, in order for the airstrip to be fully decommissioned closure markings are required to alert pilots to the fact that the airstrip is no longer in use. This requires three "X" markings on the runway 7.25 m wide, 18 m long. Each of the two arms that make up the "X" will be 0.9 m wide by 19.4 m long. Parks Canada will seek guidance from Transport Canada regarding the 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); and
- All gravelled surfaces including road, gravel parking, under plane shelters (see Figure 1).

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

- Gravel stripping /excavation of fill;
- Decompaction of soil;
- Addition of fill to excavated areas;
- Grading, if required;
- Restoration of site including scarifying, addition and spreading of soil, seeding, and herbicide use, as required; and
- Spot seeding in areas of grassy strip, as required.

Appendix B provides a rehabilitation plan for the Banff airstrip.

4.3.4 Cessation of Maintenance Activities

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.

Table 4.1 summarizes the list of activities involved in the decommissioning. Reclamation and rehabilitation are discussed in Appendix B.

4.3.5 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; and
- Reclamation and rehabilitation.

Alternative locations, or landing sites, will not be considered as an alternative means in this Comprehensive Study, as a landing site within BNP 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 (Parks Canada 1997a). 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 Banff 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 this goal through the restoration of montane native grassland on the site. Alternative means considered for reclamation were:

- To allow vegetation to come back naturally;
- To scarify, seed, and fence all areas affected by decommissioning;
- To scarify, seed, and **not** fence all areas affected by decommissioning; and
- To plant trees parallel to the TransCanada Highway to create a visual screen for wildlife.

The first alternative would not be appropriate for the airstrip given its close proximity to the TransCanada Highway and the potential for non-native species invasion. The goal of 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).

The second alternative considered was to reseed decommissioned areas with native seed mix recommended by Parks, and to fence the newly revegetated area to prevent herbivory by elk. Fencing reclaimed areas would create a barrier to wildlife movement, and therefore is not recommended by Parks Canada for the entire BNP airstrip. However, the airplane shelters that are to be removed during decommissioning are within aspen stands, and may be naturally regenerated with aspen, in addition to the native seed mix. The age distribution of aspen in BNP is currently skewed because of the high levels of herbivory of young aspen by elk. For this reason, it is recommended in the rehabilitation plan that the areas that are within aspen stands, such as the airplane shelters, should be fenced until plants have well established root structures and the soil is stabilized. Other newly revegetated areas may remain unfenced to ensure wildlife can move freely throughout the site.

The fourth alternative, which included the addition of trees, was considered to create a visual screen between the TransCanada Highway and the airstrip. Carnivores such as wolves are using the airstrip, and a visual screen will further encourage this movement (Duke 2000). Parks Canada decided against planting trees on the site because the goal of rehabilitation is to restore the airstrip to its native ecosystem, which is primarily grassland.

The preferred alternative means for reclamation of the airstrip includes the third alternative, with minimal fencing of reclaimed aspen stands. Seeding is recommended in areas affected by decommissioning to encourage native species growth and to prevent non-native species invasion. Reclamation techniques discussed in Appendix B, Rehabilitation Plan, are proven technology and the preferred alternative means, given conditions at the Banff airstrip.

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 timeframe in which project impacts may occur. Based on the nature of the proposed decommissioning activities, the study area 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 disturbed 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 Norquay-Cascade wildlife movement corridor as shown on 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 Visual Flight Rules flight path between Springbank Airport and Golden/Invermere, 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 Banff airstrip is located within the montane ecoregion in the Bow Valley (Figure 2). The montane ecoregion is the most biologically diverse and ecologically important area in BNP (BBVS, 1996). It is also the least extensive ecoregion in BNP, covering only 2.9% of the Park, and is confined to the bottom of river valleys; 77.4% of the Park's montane ecoregion is in the Bow River Valley.

The montane ecoregion is considered prime wildlife habitat and is critical for wildlife movement throughout the Park. 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*), lynx (*Lynx canadensis*), coyote (*Canis latrans*), wolf (*C. lupus*), cougar (*Felis concolor*) and black bear (*Ursus americanus*). Grizzly bear (*Ursus arctos*) and wolverine (*Gulo gulo*) are rare in the study area and are normally found in more remote areas (see Appendix C for complete list of wildlife species discussed in this report).

The airstrip is located in the montane ecoregion and within the Norquay-Cascade wildlife corridor. The Norquay-Cascade corridor is a critical link for the movement of animals through the Central Rockies Ecosystem. All ungulates use this corridor, as do coyote, marten, lynx, wolf

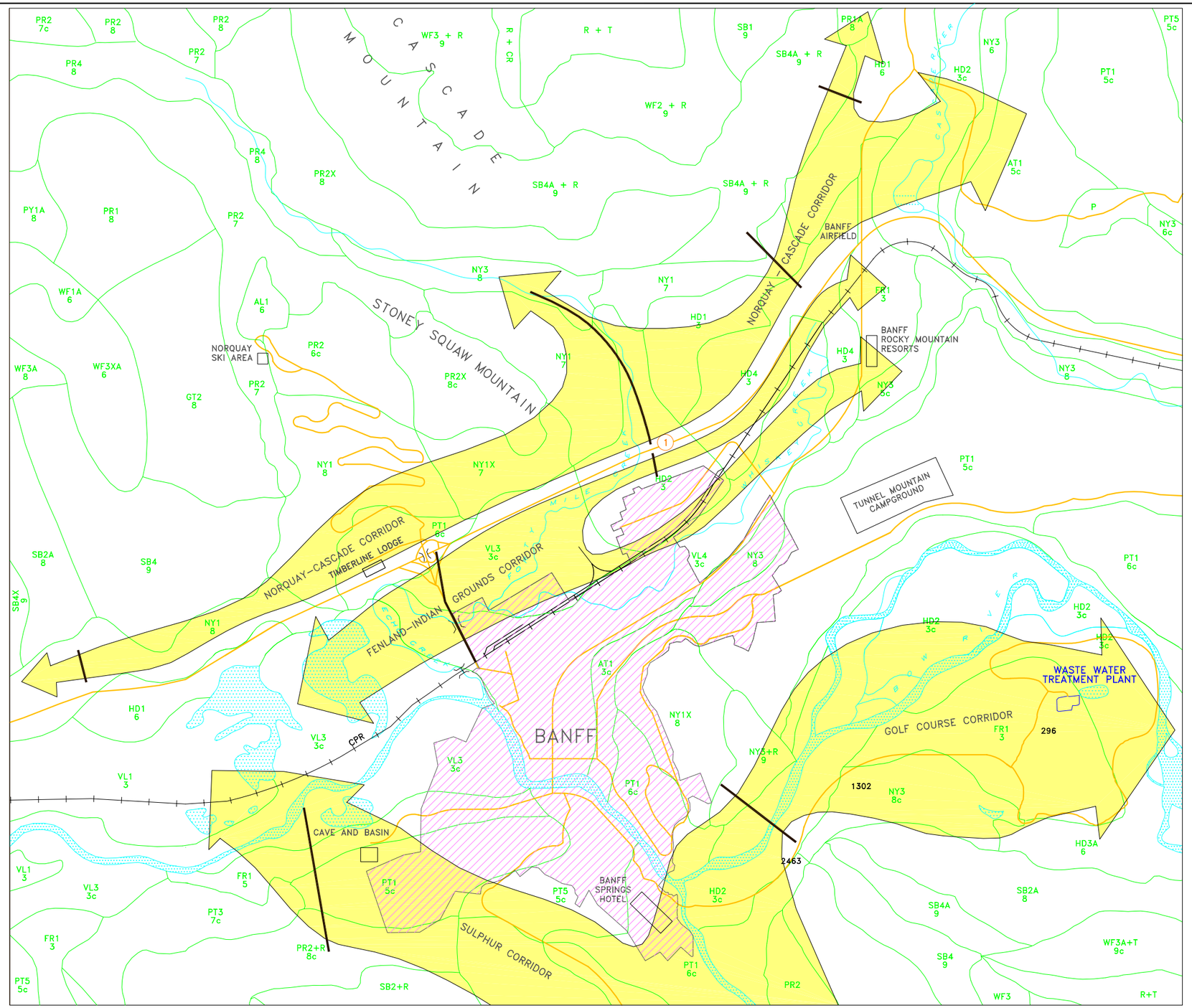
and cougar (Duke 2000). This corridor connects areas east and west of the town of Banff north of the TransCanada Highway as well as to the Forty Mile Creek and Cascade Valleys (Heuer 1995). The corridor is bound to the north by Cascade, Stony Squaw and Norquay mountains; the TransCanada Highway bounds the corridor to the south, however, there are three underpasses that link the Norquay-Cascade corridor to the Fenland-Indian Grounds Corridor, as follows:

- Vermilion underpass,
- Buffalo paddock underpass, and
- Forty-Mile Creek underpass.

Ecological integrity, a Parks Canada commitment, implies that ecosystem structure and functions are unimpaired by human-caused stresses, and native species are present at viable population levels. Continued landings on the airstrip after closure may jeopardize this commitment. Protecting secure travel corridors to allow wildlife to freely move between areas that provide habitat for various seasons or life stages (including feeding, denning, resting, mating etc.) is a critical component of a balanced ecosystem. Protecting functioning wildlife corridors north of the TransCanada Highway will:

- Reduce numbers of habituated animals in and around the town of Banff and thus human-wildlife encounters;
- Help to restore predator prey relationships around the town;
- Lessen the chance of producing an environment around the town 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 aspen stands around the town.

The vegetation of the montane ecoregion is dominated by three main vegetation types: Douglas fir and white spruce; aspen poplar; and grassland at dry sites (see Appendix C for a complete list of vegetation species discussed in this report). The two ecological processes that exert the greatest influence on vegetation structure and composition in the montane ecoregion of the Banff Bow River valley are fire and herbivory (grazing and browsing by ungulates, particularly elk). 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 translocations and infrastructure development all serve to modify natural ecological processes and resultant vegetation structure and composition.



LEGEND

- Main Road/Highway
- Railway
- River/Creek
- Lake
- Town of Banff
- Building/Site
- Wildlife Corridors
- Transect

ECOSITES

- VL3–VERMILION ECOSITE 3
- VL4–VERMILION ECOSITE 4
- HD2–HILLSDALE ECOSITE 2
- FR1–FIRESIDE ECOSITE 1
- NY1–NORQUAY ECOSITE 1
- NY3–NORQUAY ECOSITE 3
- PT1–PATRICIA ECOSITE 1
- PT3–PATRICIA ECOSITE 3
- PT5–PATRICIA ECOSITE 5
- AT1–ATHABASCA ECOSITE 1
- PR1–PANARAMA RIDGE ECOSITE 1
- PR2–PANORAMA RIDGE ECOSITE 2
- PR4–PANORAMA RIDGE ECOSITE 4
- WF2–WILDFLOWER ECOSITE 2
- WF3–WILDFLOWER ECOSITE 3
- HD1–HILLSDALE ECOSITE 1
- HD4–HILLSDALE ECOSITE 4
- SB1–SAWBACK ECOSITE 1
- SB2–SAWBACK ECOSITE 2
- SB4–SAWBACK ECOSITE 4
- AL1–ALTRUDE ECOSITE 1
- 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 (e.g. VL3 / 3) — SLOPE CLASS

Scale (km)

0.3 0 0.3 0.6 0.9 1.2

N

SOURCE: DUKE 2000

BANFF–ECOSITES

FIGURE 2 ECOSITE CLASSIFICATION AND WILDLIFE CORRIDORS AROUND THE BANFF AIRSTRIP

HIGHWOOD Environmental Management

VFR Route through Banff National Park

- Visual Flight Routes
- Highways
- Roads
- Lakes
- Streams
- Parks
- Airstrips of interest
- Other airstrips
- Towns
- Peaks >9000 ft

Distance in nautical miles from Banff Airstrip:

Springbank:	55 mi
Golden:	50 mi
Radium:	71 mi
Invermere:	78 mi
Fairmont:	91 mi

10 0 10 20

Nautical Miles

Scale: 1:1,000,000

GLL Project #: 21-852
Map produced by: D.Lu
Last modified: 05/17/01

Gartner Lee Limited

Figure 3

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). Available ungulate winter range in BNP has been reduced by years of fire suppression under Park management (White and Pengelly 1995). Although natural variability in the abundance and distribution of vegetation is expected, Park ecologists suspect that these reductions may be occurring outside of historic range of variation (Achuff *et al.* 1996).

The ecological land classification (ELC) for the area identifies the airstrip site as being located in the Hillsdale ecosite (HD4) (Holland and Coen, 1982) (Figure 2). Several additional montane and lower subalpine ecosites occur contiguous with or in the immediate vicinity of the HD4 unit. Table 5.1 summarizes the vegetation and site characteristics of these ecosites in BNP. 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 and are part of the Norquay-Cascade wildlife movement corridor.

The Banff airstrip lies on a level floodplain located at 1402.08 m above sea level (asl) (4,600 ft) while surrounding peaks rise to 2103.12 m asl (9600 ft). The site is between the lower reaches of the Cascade River and Forty-Mile Creek, both of which flow into the Bow River (Figure 2). The airstrip itself is primarily grassland with some tree and shrub encroachment on the outer boundaries. The runway is situated on what was originally a nearly level, shrubby montane grassland that has since been seeded with agronomic plant species. Montane grassland is considered a special vegetative resource in the Park. The airstrip has been regularly graded and mowed to maintain safe conditions for plane take off and landing (Wilkinson 2000).

The TransCanada Highway and the wildlife fence border the southeast side of the airstrip, while the northeast side is bordered by Lake Minnewanka road. The west side of the airstrip is bordered by Cascade mountain and conifer forest. Semi-aspen forest occurs approximately 200 m to the south of the southern end of the runway, while closed lodgepole pine forest occurs 50 to 75 m from the northern end of the runway.

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 Banff townsite (1397 m asl; 51°11'N and 115°34'W) can be used to characterize the project site. Mean daily temperatures range from –10.6°C in January to 14.4°C in July, with the mean annual temperature registering at 2.2°C. The total annual precipitation for the area averages 476 mm, with 42% of that falling as snow. The wettest month is June, during which an average of 64 mm of precipitation falls. Substantial precipitation also occurs during the winter (November to February inclusive) with monthly rates ranging from 30 to 38 mm (or as snow, from 25.4 to 35.6 cm). The lowest precipitation occurs during the spring (March and April) and fall (September) transition seasons (Holland and Coen 1982).

Table 5.1 Ecological Characteristics and Occurrence of Ecosites in the Vicinity of the Banff Airstrip

Ecosite	Ecoregion	Slope Angle	Landform	Dominant Soil	Dominant Vegetation Cover
AT1	Montane	1% - 15%	Glaciofluvial	Eutric Brunisol	Lodgepole pine forest
FR1	Montane	2% - 30%	Fluvial	Eutric Brunisol	Lodgepole pine forest
HD1	Montane	1% - 15%	Fluvial	Regosol	Aspen Forest
HD2	Montane	1% - 15%	Fluvial	Regosol	White spruce Forest
HD4	Montane	1% - 15%	Fluvial	Regosol	Grassland/Lodgepole pine Forest
NY1	Montane	30% - 70%	Till C	Eutric Brunisol	Lodgepole pine/Douglas fir Forest
NY3	Montane	45% - 70%	Stratified Drift	Eutric Brunisol	White spruce/Douglas fir Forest/Grassland
PR1	Lower Subalpine	5% - 45%	Till C	Eutric Brunisol	Lodgepole pine Forest
SB4	Lower Subalpine	45% - 90%	Colluvium	Brunisol/Regosol	Open Mixed Conifer Forest
VL3	Montane	0% - 2%	Fluvial/Lacustrine	Gleysol	Wet White spruce Forest/Wet Shrub Meadow
VL4	Montane	0% - 2%	Fluvial/Lacustrine	Gleysol	Wet White spruce Forest

The nearest weather station to the Banff airstrip is south of the TransCanada Highway, and is automated. According to Maqbool (2001), the "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 in BNP 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 above the town of Banff results in rapid changes in wind speed and direction. At Banff, winds are predominantly from the southwest/west direction, which indicates the channelling influence of the valley of the Bow River at this location (in general the Bow Valley is northwest/southeast oriented). The annual mean wind speed is 7.8 km/hr (Rudolph 2001). The frequency of occurrence and speed of the prevailing winds are shown in Figures 4 and 5. At the Banff site, the total frequency of occurrence of the prevailing winds (southwest, west and northeast) are along the valley and occur between 67% of the time in August and 78% in November.

In general, small aircraft experience stronger winds at the mountain peaks than within the valleys. Upper level tropospheric wind flow is from the northwest, which imports moisture off the Pacific Ocean and causes cloud formation on the west side of the mountain ranges. This results in little or no cloud cover over the Banff airstrip, east of these mountain ranges (Maqbool 2001).

Thunderstorms causing reduced visibility are uncommon in the summer in this region. The monthly mean number of thunderstorm days is three in July, two in August and one in September. In the winter months, wind flow from the north through northeast to the east can result in freezing fog, drizzle or freezing rain. This condition occurs 3%-6% of the time annually, and represents the percent of dangerous flying conditions during the year.

The relatively good weather is the original reason for the location of the airstrip, and the Visual Flight Rules route through the mountains. The range of frequency of occurrence of VFR conditions based on visibility is from 92% in February and December to 99% in July. The frequency of occurrence of VFR conditions based on cloud ceiling estimates range from 78% in May to 90% in January (Figure 6). The high frequency of VFR conditions means the airstrip is well suited for pilots who are not skilled in instrument approaches (Rudolph 2001). 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 (Maqbool 2001).

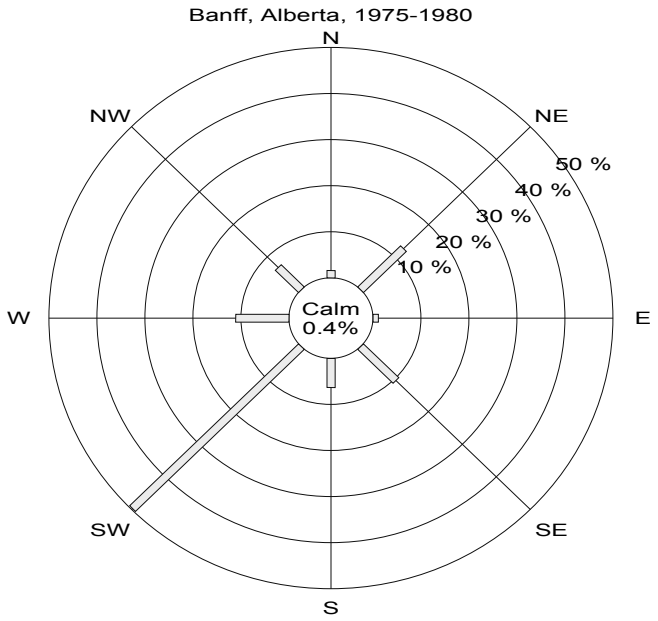


Figure 4. Annual Wind Frequency Distribution at Banff Airstrip

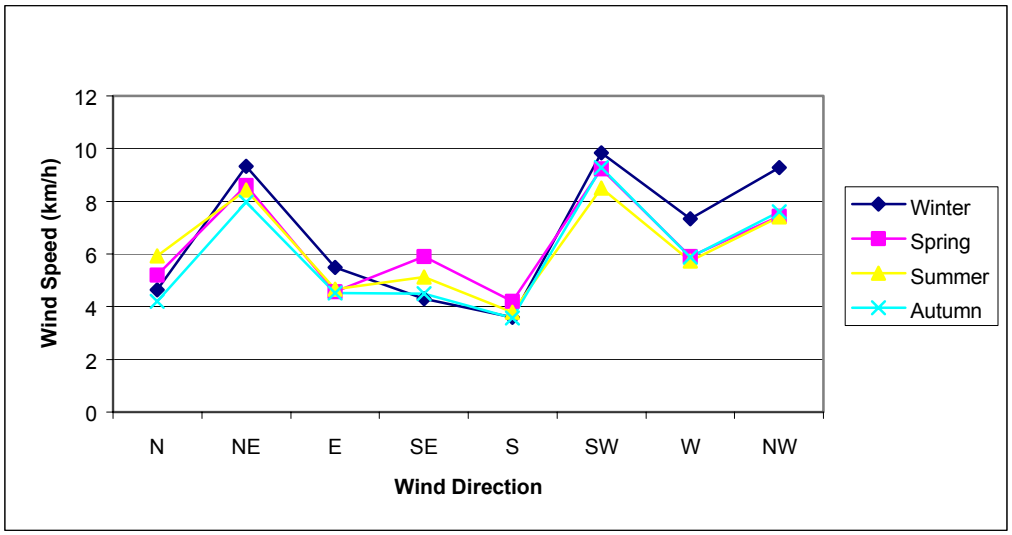


Figure 5. Seasonal Mean Wind Speed by Direction at Banff

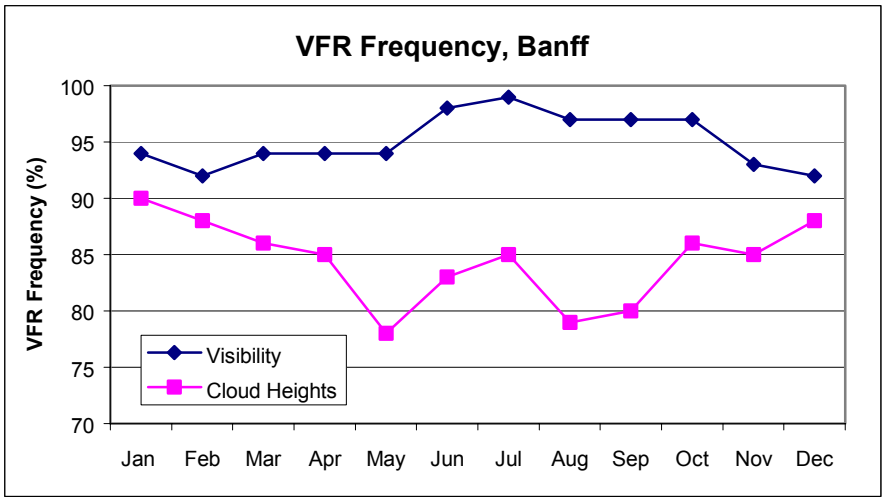


Figure 6. VFR Frequency Based on Visibility and Cloud Height Criteria

5.4 Hydrological Resources

A sand and gravel aquifer, referred to as the Banff aquifer, lies below the airstrip site at a depth of approximately 20 m. There are no groundwater wells at the site. Water wells used by the town of Banff are located west of the site, in the area of the former Buffalo Paddock. A standpipe is located on the south side of the road which may have been connected to the Cascade falls at an earlier time (Dave Hunter, pers. comm.).

The Banff aquifer is approximately 13 km^2, and the volume of groundwater stored fluctuates during the year. In April, groundwater volumes are usually at their highest, and have been estimated at seventy six million m^3. February levels have been estimated at seventy four million m^3. According to Hydrogeological Consultants Ltd. (2001), 15% of local precipitation enters the aquifer by direct infiltration. The remaining recharge includes mountain runoff onto scree material, and recharge onto scree that could be related to discharge from a karst solution cavity. Between 1978 and 1999, recharge to the aquifer was estimated at eleven million to twenty two million m^3/year. Groundwater use by the town of Banff in 1999 was estimated at 3.5 million m^3/year (Hydrogeological Consultants Ltd. 2001).

There is no surface water at the site.

5.5 Terrain and Soils

The Banff airstrip is situated on relatively level fluvial deposits in the Norquay-Cascade Corridor in BNP (Figure 2). Rutter (1972) notes that this particular segment of the floor of the Bow Valley is variously covered in either a till blanket or glaciofluvial deposits which intergrade with no apparent change in surface expression. Post-glacial valley fill materials are dominantly gravels with frequent lenses of sands, silts and/or clays at the surface.

The biophysical classification for the mountain parks (Holland and Coen 1982) places the Banff airstrip on one of the few areas of the Hillsdale 4 (HD4) ecosite found in BNP, with steeply sloping Norquay 1 (NY1) and Hillsdale 1 (HD1) to the north and northwest, respectively. Some deposition of slopewash from these ecosites may have influenced the soil conditions found in the proximal areas of the strip.

Topography falls within slope class 1, less than 1% slope, an essentially level area with some micro-scale variation along the north side of the strip. In general, the surface expression is consistent with the assertion that HD4 are found primarily on level fluvial fans (Holland and Coen 1982).

HD4 ecosites are characterized by an intergrade between forest and grassland vegetation types which, over time, have made their particular contributions to the formation of the soils. Holland and Coen (1982) classified the soils in HD4 as mainly well drained Orthic or Cumulic Regosols with minor occurrences of Orthic Eutric Brunisols. The principal differences between the soils is that the regosols have extremely shallow Ah horizons (humus enriched topsoil) of typically 3 to 5 cm in depth whereas the Brunisols typically have an Ah horizon 10 to 15 cm deep.

Soil surveys were completed on April 19, 2001 at 12 sites on and adjacent to the Banff airstrip (Figure 1). Eight sites were controls and four sites were directly on the airstrip. Information on soil horizon depth, colour, texture and other standard characteristics was recorded at each site. The inspections revealed Ah/topsoil depths ranging from 3 to 27 cm. On the airstrip, topsoil depths ranged from 10 to 18 cm, with an average of 13 cm, while the controls ranged from 3 to 27 cm, with an average of 18 cm. Profile characteristics resulted in the classification of the soils as Orthic Melanic Brunisols (AAFC 1998), with thick Ah horizons and an absence of an underlying eluviated/leached Ae horizon.

Across the entire airstrip, the topsoils were distinguished by a dark black colour (soils were moist at the time of inspection), loam to silt-loam texture and an average depth of 16.5 cm.

The soil under the aboveground storage tank was frozen at the time of the site investigation. The textures of the soils tested, however, and the high carbonate presence indicate there is little water movement in the soils. Contaminant migration through these soils, if contamination is present, is unlikely.

5.6 Vegetation

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; and
- 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 HD4 ecosite (Holland and Coen 1982). Characteristic native vegetation of the HD4 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. The HD4 ecosite occurs at two locations in BNP totalling 320 ha – one at Hillsdale, and one in the vicinity of the Banff airstrip. Both locations occur within the montane ecological region.

Wilkinson (2000) conducted a detailed vegetation survey of the Banff 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 forest to the west of the runway. All vascular plants within 5 x 5 m (grassland) and 20 x 20 m (forest) plots were identified and their abundance (% cover) recorded. Dominant and characteristic plant species were also recorded in areas surrounding facilities such as plane tie-downs, hangars, washrooms, registration boxes, and fuelling areas. Rare plants were searched for on the runway and in adjacent areas 50 m to the east and west 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 middle portion of the marked runway (size and spatial position not reported) is dominated by agronomic plant species that frequently occur in dense monocultures.
- Common agronomic plant (grass) species on the runway include *Agropyron pectiniforme,* and *Poa pratensis,* with smaller amounts of *Bromus inermis, Festuca rubra, F. ovina,* and *Poa compressa.*
- Large sections of the runway are dominated by a wide variety of native plant species. Common and widespread native grass species were *Elymus trachycaulus, E.*

trachycaulus ssp. Subsecundus, E. lanceolatus and *Koeleria macrantha*. Less abundant native graminoid species were *Carex stenophylla, C. praegracilis, Stipa richardsonii,* and *Muhlenbergia richardsonis*.

- Plant species diversity is much lower on the runway than in the surrounding (50 m to the east, west and north) plant communities. Reduced diversity is likely due to seeding and mowing, and plane take off and landing (see Photo 8).

- Areas adjacent to but off of the runway are characterized by shrubby grassland (See Photo 9). These areas generally have a higher ratio of native to non-native species, higher species diversity, taller and denser vegetation and more irregular topography. Characteristic plant species include *Potentilla fruticosa, Elymus innovatus, E. lanceolatus, Geum triflorum, Poa pratensis, Koeleria macrantha, Stipa richardsonii, Festuca rubra, and F. campestris.*

- Agronomic species, notably *Agropyron pectiniforme, Bromus inermis and Poa pratensis,* are aggressive competitors and have invaded some areas (less than 10 m^2) adjacent to the runway.

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

- Several weedy and/or introduced plant species occur adjacent to the gravel airstrip access road, particularly *Taraxacum officianale, Hordeum jubatum and Bromus inermis.* Weedy forbs associated with the access road have not invaded the native grassland although *Bromus inermis* has invaded in some locations.

- The areas surrounding the hangars and plane tie-down sites have considerable bare ground and support abundant weed growth, primarily *Poa pratensis* and *Taraxacum officianale*, with lesser amounts of *Festuca rubra, Hordeum jubatum,* and *Lepidium sp.*

- The area surrounding the fuel tanks is dominated by native *Rosa acicularis* and sapling *Picea glauca* and *Populus tremuloides*, with an agronomic herbaceous understory dominated by *Bromus inermis, Poa pratensis, Festuca rubra and Taraxacum officianale.*

Appendix C provides a Latin and common name species index.

5.6.3 Rare Plants and Botanically Significant Communities

One rare plant species, *Sisyrinchium septentrionale*, was found 50 m west of the north end of the runway. Habitat associated with this plant was a previously disturbed, eroded, depressional, sparsely vegetated area that was expected to be wet in the spring (Wilkinson 2000). The possibility also exists for the occurrence of a provincially rare plant species, *Potentilla hookerani,* in the extreme south end of the runway. An additional search for this species in the summer of 2001 was recommended by Wilkinson (2000).

The montane HD4 ecosite (Holland and Coen 1982) was identified as a special feature by Achuff (1986) because of its limited areal extent in BNP, and 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 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 Banff airstrip are fire and herbivory. Historically, the mean fire return interval for BNP's montane was 20 to 40 years (Tande 1979, White 1985). Neither natural nor prescribed fire has occurred on or adjacent to the airstrip in approximately 75 years (C. White pers. comm.).

Elk population densities increased dramatically in the Banff townsite area since 1985. This is thought to be due to decreased mortality rates resulting from fencing of the highway and avoidance of the area by wolves (Parks Canada 1999). An Elk Management Strategy was implemented around the townsite in 2000, reducing the number of elk in the Bow Valley from 400 to approximately 140 (G. Peers 2001). A comparison of April 2001 elk pellet group densities on the airstrip to previous regional pellet group data from Holroyd and Van Tighem (1983) indicate that increased use of the airstrip by elk is likely to have occurred since the late 1970s/early 1980s (Table 5.2). The relative contribution and extent of the effects of this increased elk grazing use on the grasslands of the airstrip are not clear.

Table 5.2 Elk Pellet Group Densities in HD4 Ecosite - Banff Airstrip Vicinity

Year/Source	Location	# Pellet Groups/ha		
		Winter	*Summer*	*Total*
2001 field survey	On Airstrip 15-m west of TCH Fence (HD4)	1840	560	2400
2001 field survey	On Airstrip 35-m east of Runway Centre (HD4)	1040	200	1240
2001 field survey	Indian Grounds east of TCH (HD4)	3200	40	3240
2001 field survey	Buffalo Paddock south of Airstrip (HD4)	720	280	1000
2001 field survey	Average of HD4 (year 2001)	1700	270	1970
1983/Holroyd and van Tighem[(a)]	Average of Banff HD4 transects 1975 to 1981	1886	200	2086

(a) Holroyd and Van Tighem 1983.

5.7 Wildlife Resources

5.7.1 Valued Ecosystem Components

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

- Habitat use, effectiveness and fragmentation of 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.

In addition to the VECs proposed in the Terms of Reference, a list of wildlife species that are most likely to be affected by the airstrip decommissioning was developed based on ecosite descriptions, two reconnaissance site visits (April 24 and 29, 2001), and reference to intensive wildlife and habitat inventory work conducted in BNP 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, American badger, lynx);
- Elk; and
- Breeding birds (clay-coloured sparrow).

Table 5.3 Valued Ecosystem Component of Wildlife Species Selected for Banff 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		Yes	Listed species; sensitive to sensory disturbance
Long-tailed Weasel	R	R	Yellow A		No	Listed species; grassland obligate
American Badger	?	?	Yellow A		Historically	Listed species; grassland obligate
Cougar	R	S	Yellow B		Yes	Listed species; predation affects elk numbers; sensitive to disturbance
Lynx	S		Yellow B		Yes	Listed species; sensitive to disturbance
Birds						
Clay-coloured sparrow	R	U	Yellow A		Yes	Listed Species; 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, American badger, long-tailed weasel, clay-colored 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, American badger, cougar, lynx, clay-colored sparrow);
- The species was known to be sensitive to sensory disturbance and/or prone to movement obstruction (wolf, grizzly bear, cougar, lynx); 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 seven are mammals. No aquatic species were selected since the habitats affected by airstrip 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 5.3 provides ratings of nil, low, moderate, high or very high habitat suitability of each VEC species for the 11 ecosites that are on and adjacent to the airstrip. These ratings were based on information from Holroyd and Van Tighem (1983) and the author's knowledge of species/habitat relationships.

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 BNP. Stelfox (1964) noted that there were next to no elk in BNP in the 1890s. During 1918-20, 235 elk were introduced into Banff from Yellowstone National Park and by the 1940s these elk had multiplied to inhabit all of the areas in which they currently reside. A combination of mild winters, reduced hunting mortality, fire-related habitat change and hybrid vigour led to periodic peaks in elk numbers that threatened park habitat quality. Controlled elk slaughters took place to reduce elk numbers in Banff from 1941 to 1969 (Holroyd and Van Tighem 1983).

Elk numbers have ranged from 700 to 1,200 in BNP since the 1940s (Parks Canada 1999). Jacobsen (1977) estimated the population of elk in Banff to be 1,000 animals from 1975 to 1977.

Current overall populations of elk in BNP are likely within the above range. (Parks Canada 1999). Parks Canada's elk management strategy (Parks Canada 1999) calls for a reduction of the elk population in the Banff townsite area from 400 to less than 200 elk by the year 2003. The strategy included removing habituated elk from the urban core, habituation management and aversive conditioning, improved predator habitat, public education, and translocation. Parks Canada translocated 153 aggressive and habituated elk from the town of Banff in the year 2000 (Ellis 2000). The strategy suggests translocating 75 elk in 2001-2002, and possibly additional elk in 2002-2003 (Parks Canada 1999). After 2003, approximately 10 to 20 elk per year will be relocated. Currently elk numbers in the Banff townsite area are less than 200 (140 estimated in 2001), due to relocations and intensive wolf predation (C. White. pers. comm.; G. Peers 2001).

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 10 favoured ecosites of wintering elk in BNP are HD4, PP7, HD2, GT2, NY1, NY3, VL4, SB5, VL5, AT1. Seven 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 Bow valley are habituated to human presence and as such are generally able to make effective use of the majority of high quality habitat present.

Current Airstrip Status

The high density of elk tracks in addition to evidence of feeding and resting activity suggest that elk use the airstrip as habitat rather that a movement corridor (Heuer 1995, Heuer *et al* 1998, Duke 2000). Six of the top-10 ecosites in BNP for wintering elk occur on (HD4) and adjacent to (HD2, NY1, NY3, VL4, AT1) the Banff airstrip. Based on pellet group counts, the HD4 ecosite (airstrip) received the highest winter elk use in BNP from 1975 to 1981 (Holroyd and Van Tighem 1983). In 2001, pellet counts indicated slightly greater use of the airstrip by elk than recorded from 1975 to 1981 (see Table 5.2). In addition, winter tracking data from the Banff Wildlife Corridor Project (Duke 2000) show that elk use of the airfield transect ranked 7th highest of 21 transects located in the Bow Valley montane. Duke (2000) calculated an index of 4.02 elk trails per 100 m per 100 hours sampled on the airfield in 1999/2000. This translates to 96.6 trails/10 km-days, which is slightly higher than the 70.3 trails/10 km-days found by Holroyd and Van Tighem (1983) for the montane ecoregion in Banff and Jasper National Parks from 1975 to 1981.

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 BNP. Most wolves were eliminated from BNP 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. This campaign continued until 1966 after which wolves slowly re-colonized from JNP and eastern slopes to the north and the Columbia valley to the west (Paquet 1993). In 1987 Banff Park wardens documented that two or more packs of wolves had become established in or near the central Bow Valley of the park. Wolf numbers initially increased rapidly in the Bow Valley. Paquet (1993) reported the occurrence of as many as 21 wolves distributed among two to three packs in and around the Bow River valley. During the latter half of the 1990s wolf numbers began to decline as fewer elk and other secondary prey species (deer and moose) were accessible to wolves outside of the Banff townsite area. By 1998 only one pack consisting of four individuals (Cascade pack) used the main Bow Valley (Parks Canada 1999). A new pack (Fairholme pack) formed in 2000 and has made extensive use of the Norquay-Cascade and Fenlands/Indian Grounds corridors as travel routes, including the airstrip. As of May 2001, the Fairholme pack consisted of 17 or 18 individuals (Pope 2001).

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 BNP, these types of landscapes occur almost entirely within the montane ecoregion at elevations below approximately 1400 m. Paquet (1993) observed that by far the primary prey of wolves in Banff were elk. The next most common prey item, the combined category of white-tailed and mule deer, occurred less than half as often. 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). There has been concern by town residents and Park Wardens that wolves may be losing their natural wariness of people. In the winter of 2000/2001, a number of close encounters with wolves occurred in the town and surrounding areas due to habituation. Two members of the Fairholme pack were destroyed in 2001 as a result of their habituation to humans (Bruce Leeson pers. comm.). While the number of encounters subsided, Wardens continue to monitor the situation to ensure habituation does not lead to human conflict. 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

Recently, wolves (from the Fairholme pack) have moved into the study area to prey on elk. This pack routinely uses the Cascade-Norquay corridor as a travel route; the eastern portion of this

corridor surrounds the Banff airstrip (Figure 2). Wolves have been documented using the Norquay-Cascade corridor during each of the last seven winters. The number of wolf occurrences on the airfield transect per winter has ranged from one to 21, with use increasing steadily since 1993/1994 (Duke 2000; Pope 2001). Wolves do not appear to regularly use the open grasslands of the airstrip for hunting but did so on one occasion during the winter of 1997/98 (Heuer *et al.* 1998). According to Warden Doug Eastcott, 13 wolves were spotted on the airstrip and seven were spotted at the Vermillion Lakes in 2001 (Ellis 2001). During the winter 2000/2001 tracking season, wolves were tracked on the airstrip six times (Pope 2001).

Holroyd and Van Tighem (1983) rated five of the 10 ecosites in the vicinity of the Banff airstrip as very highly important to wolves during winter (Table 5.4). An additional four ecosites were rated as high and one as moderate. The HD4 ecosite on which the airstrip is located was rated as very highly important to wolves in winter and summer.

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 both Banff and Jasper National Parks. A precise population estimate for grizzly bears in BNP is not currently available. As of 1980, the warden service estimated that there were 80 grizzlies in BNP (Holroyd and Van Tighem 1983). Gibeau *et al.* (1996) stated that "While valid scientific population size estimates do not exist for Banff Park, estimates based on professional judgement range between 60 (Gibeau and Herrero 1995) and 80 (Vroom 1974)". The most recent scientific estimate of population trend for grizzly bears in the Central Rockies Ecosystem was completed by Garshelis *et al.* (2001) who calculated a population growth rate from 0.99 to 1.01 for the period 1992 to 2001. This is indicative of a stable population (i.e., growth rate of 1.0 = no growth). However, mortality rates prior to 1992 (i.e., 1971 to 1990) were considerably higher in BNP (Gibeau *et al.* 1996) than the remainder of the Central Rockies Ecosystem (Benn 1998). Hence it is likely that grizzly bear populations were in decline during the 1970s and 80s.

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.* 1987, Mace and Waller 1997). This loss of suitable habitat to sensory disturbance is called effective habitat loss (Weaver *et al.* 1986, Gibeau 1998). In the Banff, Kootenay and Yoho National Parks there are 40 grizzly bear management units based on

topography and watershed. The unit surrounding the Banff townsite and lower Bow River valley has experienced the greatest effective loss (approximately 51%) of grizzly bear habitat according to landscape modeling by Gibeau *et al.* (1996). 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).

Current Airstrip Status

Inherent habitat suitability of the 11 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, including the HD4 ecosite on which the airstrip is located (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, NY1, NY3, SB4) that support abundant buffaloberry crops. The HD4 ecosite is poor quality grizzly bear habitat during summer and fall. In spite of the presence of inherently high quality habitat, the ecosites in the vicinity of the airstrip are probably not used, especially by female grizzly bears, to the extent that they would be used with lesser human use. The four-lane divided TransCanada Highway runs through the area and directly adjacent to the airstrip. The average number of vehicle passes on the TCH approximates 21,000. Gibeau (2000) showed that female grizzly bears avoided high quality habitats in the vicinity of the TCH. In Montana, Mace *et al.* (1996) showed that most grizzly bears avoided roads having >10 vehicles/day, and all grizzly bears studied avoided roads with traffic volumes of >60 vehicles/day. Based on these data it is very likely that grizzly bears, especially females, currently avoid habitats in the immediate vicinity of the TCH and airstrip. This does not mean that some habituated and/or subadult dispersing animals do not use the area periodically. For example, a grizzly bear was observed on the airstrip during the summer of 2000 (Ron Tessolini, pers. comm.).

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 BNP occurring at densities of approximately 0.5 animals per 100 km^2 (Holroyd and Van Tighem 1983, Alberta Forestry, Lands and Wildlife 1992). Current population estimates of cougar are unavailable for BNP. Based on a comparison of trail densities from 1975 to 1981 (Holroyd and Van Tighem 1983) and 1993 to 2000 (Duke 2000) it appears that cougar use of the Bow Valley may have increased in recent times. Three cougars in the Bow Valley died of natural and human causes in 2001 (Pope 2001).

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. Holroyd and Van Tighem (1983) rated the importance of ecosites in Banff and Jasper National Parks to cougar using a predictive model based on ungulate

Table 5.4 Habitat Importance Ratings for VEC Wildlife Species and Ecosites in the Vicinity of the Banff Airstrip

Species	Ecosite Type[(a)]										
	AT1	FR1	HD1	HD2	HD4	NY1	NY3	PR1	SB4	VL3	VL4
Mammals											
Elk	3	3	3	3	4	3	3	1	2	3	3
Wolf	3	3	3	3	3	3	3	2	2	3	3
Grizzly Bear	3	3	3	3	2	3	3	2	3	3	2
Long-tailed Weasel	1	1	3	2	4	1	1	1	1	1	1
Badger	1	1	3	1	4	1	1	0	0	0	0
Cougar	3	3	3	3	2	4	4	2	3	3	3
Lynx	3	3	2	3	0	2	1	2	2	3	3
Birds											
Clay-colored Sparrow	0	0	0	0	3	0	3	0	0	2	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.

abundance. They found that 12 of the top 14 ecosites during the winter were found in the montane. In Banff and Jasper National Parks 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 regular occurrence of cougars in the townsite of Banff (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 (HD2, HD4, NY1, NY3, and AT1) are located in the vicinity of the Banff airstrip. The HD4 ecosite on which the airstrip is located, was rated as very high importance for cougars during both winter and summer. Cougars have been observed using the Norquay-Cascade corridor for six of the last seven winters. From zero to five cougar crossings of the airfield transect have been documented per year. Crossing indices that take into account the available track record (# trails per 100 m per 1,000 hours sampled) indicate an increase in cougar use of the corridor in the winters of 1998/99, 1999/2000 (Duke 2000), and 2000/2001 (Pope 2001). Cougars appear to use the Norquay-Cascade corridor primarily for travel, using the rugged colluvial slopes of Cascade Mountain. Cougar kills of an elk on the open grasslands of the airstrip were recorded during the winter of 1996/97 and 2000/2001 (Heuer *et al.* 1998; Pope 2001).

5.7.2.5 Lynx *(Lynx canadensis)*

Population Status and Trend

The lynx is listed as Yellow B by Alberta Environmental Protection (1996) and as "Not at Risk" by COSEWIC (2000). Lynx are a relatively scarce carnivore species in BNP. Holroyd and Van Tighem (1983) recorded only 27 lynx trails in 4658 km-days of tracking in Banff and Jasper National Parks from 1975 to 1980. The current status and trend of lynx populations in BNP are unknown.

Habitat Requirements

Across western North America, snowshoe hares comprise from one-third to nearly all of prey items eaten by lynx (Mowat *et al.* 2000). Lynx foraging habitat use generally mirrors that of the snowshoe hare although hares tend to use more dense forest stands (Mowat *et al.* 2000, O'Donoghue *et al.* 1998). Snowshoe hares in mountainous regions tend to occur at low and stable densities through time (Apps 2000). Because of this, Rocky Mountain lynx utilize a wider variety of prey items than in boreal environments and include such species as red squirrel, northern flying squirrels, grouse (spp.) and voles (Apps 2000). Early seral dense forest stands are relatively rare in BNP largely because of fire suppression. Field studies by Holroyd and Van Tighem (1983) showed that snowshoe hare pellet densities were highest at lower elevations and were approximately equal between the montane and lower subalpine ecoregions. Favoured hare

habitats were open and closed coniferous forests including lodgepole pine/dwarf bilberry, white spruce/buffaloberry/fern moss, white spruce/prickly rose/horsetail, black spruce-lodgepole pine forest and white spruce-Douglas fir/feathermoss forest. In BNP, lynx trails were observed most often in closed pine and spruce forests in the Lower subalpine ecoregion (Holroyd and Van Tighem 1983).

Current Airstrip Status

Five of the 11 ecosites in the vicinity of the Banff airstrip were rated as high importance to lynx (Holroyd and Van Tighem 1983). The ecosite on which the airstrip is located (HD4) was rated as of no importance to lynx because of the lack of cover and food. No lynx trails have been recorded crossing the airfield transect of the Norquay-Cascade corridor in seven winters of tracking. One incident of a single lynx has been noted following the TCH fence and crossing the Norquay transect west of the airstrip (Heuer 1995). Most occurrences of lynx trails associated with the Banff Wildlife Corridor Project have been associated with transects located in Lower Subalpine ecoregion (e.g. Whitehorn transect – Heuer *et al.* 1998).

5.7.2.6 American Badger (*Taxidea taxus*)

Population Status and Trend

The prairie population of badger is listed as Yellow A by Alberta Environmental Protection (1996) and as Not at Risk by COSEWIC (2001). Holroyd and Van Tighem (1983) reported the badger to be relatively uncommon, with its range limited to grassland areas of the middle Cascade, Panther, Healy, Bryant Creek and lower Spray River drainages. The range of badgers in BNP was formerly more extensive than present. Green *et al*. (1997) noted that badgers were "often seen" including at the airstrip and along the TransCanada Highway west to Redearth Creek. Banff Park Wardens recorded 48 observations of badgers from 1944 to 1975 with half of these occurring in the Bow Valley along roadsides and disturbed grasslands near the townsite. The current population status of badgers in BNP is not known.

Habitat Requirements

Badgers typically prefer prairie grasslands, open low shrublands and open aspen parkland (Soper 1964). In BNP, badgers have been observed in all ecological regions. Most sightings in recent times have been in dry grasslands of front range river valleys and the lower subalpine ecoregion in association with fire-succession open forests (Holroyd and van Tighem 1983). It is likely that fire suppression has had a negative influence on badger populations in montane of the Bow River valley. Badgers rely on ground squirrels as prey (Banfield 1974, Holroyd and Van Tighem 1983).

Current Airstrip Status

Of the ecosites in the vicinity of the Banff airstrip, the HD4 ecosite is by far the most suitable for badger (Table 5.4). No sign of badger was observed on the airstrip during two site visits in April of 2001 and three site visits by Wilkinson (2000) during the summer of 1999. Given this and the

shortage of recent badger sightings in the Bow Valley since 1975, it is probable that badgers do not currently use the airstrip grasslands. Habitat suitability on this site is moderate to high as ground squirrels are abundant especially at the north end of the runway, and on the runway itself.

5.7.2.7 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 uncommon resident of Banff and Jasper National Parks where only 27 observations were made between 1976 and 1981 (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 Banff airstrip is unknown; however, based on habitat availability, this species is a likely resident.

5.7.2.8 Clay-colored Sparrow (*Spizella pallida*)

Population Status and Trend

The Clay-colored Sparrow is designated Yellow A (AEP 1996) in Alberta. Despite being an abundant bird, Breeding Bird Survey data indicate a significant decline in Alberta in recent years (AEP 1996), which has lead to its designation.

Habitat Requirements

The Clay-colored Sparrow is the most numerous passerine of low shrub communities of the northern prairies. It is a common species of open shrubland, thickets along edges of waterways, second-growth areas, and forest edges and burns (Knapton 1994). In BNP, it is most commonly found in willow and birch shrubbery in the montane and Lower Subalpine (Holroyd and Van Tighem 1983). This species forages on wide variety of seeds and invertebrates (Knapton 1994). The nest is typically located in a grass tuft at the base of an herb or shrub, or on a low branch of shrub or small tree (Ehrlich *et al*. 1988).

Current Airstrip Status

No current information is available on the occurrence of this species in the vicinity of the Banff airstrip. Based on habitat availability, this species is a likely resident.

5.8 Recreational Use and Aesthetics

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

- Mountain bikes;
- Hiking;
- Off leash dog walking;
- Ice climber access to Cascade Mountain;
- Informal golfing activity; and
- Horse riding.

In addition to this, the parking lot adjacent to the Minnewanka Loop Road is used by local businesses to transfer goods/supplies from large trucks to smaller trucks that distribute goods and materials within the town of Banff. During the site visit (April 19, 2001) dog walkers were seen using the strip, as were numerous mountain bike tracks, horse tracks and several golf balls. A Canadian Rockies School Division Bus also stopped in the parking lot for a brief period.

In attempts to understand the level of human use in the wildlife corridors around the town of Banff, a number of trail counters have been installed, including one at the north end of the airstrip and one by the trail that leads from the north end of the airstrip to Cascade Mountain. Human use in the vicinity of the Buffalo Paddock and the Road to the town's water supply is also monitored. Average winter human use values (derived from trail counters) for these areas are as follows:

- North end of airstrip (near parking lot): 1575
- Trail to Cascade Mountain: 336
- Road to town water supply: 150
- Buffalo paddock: 75

These values represent average winter use. It is likely that these numbers underestimate the actual level of use since these have been derived from trail counters and the number of events that may have been missed is unknown (T. Hurd, pers. comm. in Highwood Environmental Management Ltd. 2001). 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 practicing golfers and mountain bike enthusiasts are active.

Noise in the area from small aircraft is negligible. This is discussed further in Section 6.2.4, wildlife impacts.

5.9 Historical Resources

CEAA requires consideration of environmental effects such as physical and cultural heritage, including effects on things with archaeological, paleontological or architectural significance, and the current use of lands for traditional purposes by aboriginal persons.

The Banff airstrip has been in existence for approximately 70 years. During the 19th century, the airstrip was a well-known camp area particularly because the open meadows provided good feed for the horses. Reverend Rundle, Sir James Hector (Spry 1968:293) and others camped at the foot of "The Mountain Where the Water Falls" or Cascade Mountain while journeying to or from the passes through the Rocky Mountains further up the Bow Valley. Three Pre-contact archaeological sites (EhPv-10,27,119) have been found on or in the near vicinity of the Banff airstrip. Aboriginal persons do not currently use the land for traditional purposes.

5.9.1 EhPv-10

EhPv-10, a scattered near surface campsite, was first recorded by O.A. Christensen during the initial surface archaeological inventory of BNP (Christensen 1970). Christiansen described the site as being located northwest of the airstrip. Archaeological materials – stone flakes, fire cracked rock, were observed in a dirt road track. Christiansen was of the opinion that there was not sufficient material present at the site to make it worthwhile testing. In 1982 EhPv-10 was revisited during the course of a Heritage Resources Impact Assessment of the adjacent portion of the TransCanada Highway (Steer and Porter 1982). Five shovel tests were excavated along the road. No buried cultural material was found. Steer and Porter were of the opinion that the site had limited potential.

EhPv-10 was revisited in 1984 as part of the archaeological studies associated with the Banff Townsite Peripheral Land Use Study (Wilson 1985). No archaeological materials were noted on the surface, and none were recovered from four shovel tests. It was assumed that the site had been destroyed by use of the vehicle track. However in our opinion that is unlikely since the vehicle track use has been quite stable through time. EhPv-10 would appear to be a widely scattered site of limited significance. It requires relocation and monitoring (Langman and Perry 2001)

5.9.2 EhPv-27

EhPv-27 (which includes EhPv-28 and 29) (Wilson 1985) was first identified in the TransCanada Highway Heritage Resources Impact Assessment (Steer and Porter 1982). The three areas initially identified as separate sites are located 150 m west of the Banff airstrip along an abandoned vehicle track. Stone tools and waste flakes were recovered from the surface. No materials were found in subsurface tests. A low archaeological potential was assigned to the site.

EhPv-27 was revisited in 1984 as part of the Banff Townsite Peripheral Land Use Study (Wilson 1985). A thin scatter of archaeological materials were noted in the vehicle track. Five of 18 shovel tests scattered across the 300 x 150m area were positive. The site was considered to be of low potential. It requires periodic monitoring (Langman and Perry 2001).

5.9.3 EhPv-119

EhPv-119 was located in the 1986 Banff Peripheral Land Use archaeological studies (Head and Van Dyke 1986). The site, a small lithic scatter, is located on a bedrock outcrop on the southeast slope of Cascade Mountain 40 m west of and 20 m above the hangers at the west end of the airstrip. The site requires periodic monitoring (Langman and Perry 2001).

Scattered Precontact archaeological sites have been recorded in the near vicinity of the Banff airstrip suggesting that the area is characterized by a series of scattered near surface campsites. No deep archaeological testing has been carried out of the alluvial sediments at this locale to determine if earlier buried occupations are present.

Based on backhoe studies at the interchange to the northeast there is good potential for buried surfaces and sites to be present (see Langman and Perry 2001:197).

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. 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 this study refer 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* (NPAAR, 1997) prohibit the landing and take off of aircraft in Banff National Park, unless authorized by the park superintendent (see Section 3.2.1 of this report). The Canada Flight Supplement (March 22, 2001) further indicates that the airstrip at Banff is to be used for emergency/diversion purposes only and that the NPAAR are to be enforced. As the NPAAR effectively prohibit the use of the airstrip, it can be reasonably concluded that the facility is closed, except with the authorization of Parks Canada. In addition, the BNP Management Plan (1997) proposed the removal of the airstrip infrastructure to promote ecological integrity in the Park (see Section 3.5). However, the lack of a formal decommissioning program for these airstrips has lead 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 Banff Flying Club, and a variety of other sources and contacts. These are listed below and fully referenced in the bibliography. It

is difficult to obtain completely "accurate" flight information for the Banff airstrip as it is not a serviced aerodrome and there is no formal requirement for pilots to register their flying activities. Much of the aircraft flight information has been obtained from airport registries and anecdotal information.

Information Sources

The following is a list of information sources that were used to compile the information presented below. Full bibliographic references are in Section 11.

- 1991 Air Traffic Monitoring; Banff National Park;
- 1992 Air Traffic Monitoring; Banff National Park;
- Airstrip Monitoring Banff National Park 1993/94;
- Airstrip Monitoring Banff National Park 1995;
- Transport Canada Aviation Analysis; Transport Canada/Parks Canada Joint Study of the Need to Retain the Banff and Jasper Airstrips for Emergency/Diversionary Use (1994);
- Banff and Jasper Airstrips Meteorological Study by Darr Maqbool and Associates;
- 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;
- Review of "Banff and Jasper Airstrips Meteorological Study" by R. Rudolph, URS Corporation, Calgary; and
- 1999 to 2001 Fairmont Hot Springs Airport Registry, Fairmont Hot Springs Resort (Hy-ridge Helicopters Ltd.).

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 Banff VFR route (Figure 3), including:
  - Town of Golden: Golden airstrip;
  - N. Reed: Radium Hot Springs airstrip;
  - Babin Ltd: Invermere airstrip; and

  - Fairmont Hot Springs Resort (Hy-ridge Helicopters Ltd): Fairmont Hot Springs airstrip;
- Local pilots from the Banff Flying Club;
- Cranbrook Flight Services;
- Kamloops Flight Services;
- Springbank 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 Banff 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 Banff airstrip. Official statistics, including Daily Air Traffic Records (DATR) were requested from Statistics 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 Banff and Surrounding Airstrips

The Banff airstrip is located west of the Springbank and Calgary aerodromes in the Canadian Rocky Mountains in Banff National Park. It is at an elevation of 1,400 m and is a grass airstrip that is 914.4 m long. The terrain around the Banff airstrip has a maximum elevation over 3,048 m. The Banff airstrip is found along a VFR route which extends northwesterly from the Calgary-Springbank area, along the Bow Valley and the TransCanada Highway to Golden. This VFR route also intersects a southerly VFR route into Kootenay National Park in the Vermilion River Corridor to Radium Hot Springs and Invermere. Figure 3 illustrates these VFR routes. Table 5.5 summarizes the airstrips in the general area.

Table 5.5 Summary of Airstrips on Banff VFR Route

Airstrip	Elevation	Length of Runway	Comments
Banff, Alberta	1,400 m	914.4 m, grass	The airstrip has been in place since 1934 and prior to that was the location for a dairy farm (Petersons Dairy)
Springbank, Alberta	1,200 m	Two runways that are 1,036 m and 914 m long	Serviced aerodrome. The Flight Services Station is operated by NAV Canada, and is scheduled to be shut down and replaced by a remote service (e.g. computer terminal) for pilots to assess weather conditions and for filing flight plans and notes.
Golden, British Columbia	785 m	1,372 m, asphalt	Fuel services are available.
Radium Hot Springs, British Columbia	808 m	793 m, turf	This runway is not serviced.
Invermere, British Columbia	860 m	914 m, asphalt	Fuel services are available.
Fairmont Hot Springs, British Columbia	810 m	1,829 m, asphalt	Operated by the Fairmont Hot Springs Resort. There is extensive glider activity in this area.

5.10.3 Weather Reporting Services

There are no local aviation weather reporting services along the Banff VFR route. An automated weather station was installed in Banff in 1995/1996 which records 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 Banff VFR route are not provided for pilots.

Aviation weather forecasts are done by Environment Canada on a regional/national basis through the "Graphic Forecast Area or GFA" system. The information provided 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 Banff VFR route has similar levels of information as other regions of Canada. In fact, there are remote areas in Canada (e.g. Yukon Territory, NWT, Nunavut) that have less reliable weather information for VFR flight planning than Banff.

5.10.4 Summary of Aviation Related Information

Airport Registries

Three of the airstrips along the Banff VFR route maintain airport registries: Fairmont Hot Springs, Radium Hot Springs, and the Banff airstrip. Pilots are asked to fill out the registry,

which includes information such 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' categories provide anecdotal information of air traffic along the Banff VFR route.

The following should be noted with regards to the 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 illegible.

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

Limited airstrip registry information was available for airstrips in the Banff VFR corridor, including:

- F.H.S.
- Banff Airstrip (1991 – 1995).

Fairmont Hot Springs Resort through Hy-ridge Helicopters Ltd. maintains the registry for the Fairmont Hot Springs airstrip, and provided registry records for 1999, 2000 and 2001. This registry includes 'location arrived from', but does not include 'location departed for'. Based on pilots recorded as arriving from Calgary, Springbank, and Calgary/Okotoks airstrips, the registry suggests for 1999, 2000 and 2001 (up to and including July 9) that there were at least 43, 35 and 10 flights, respectively, that flew over Banff airstrip. This assumes that the pilots used the Banff VFR route shown in Figure 3.

Summary of Previous Reports

Air Traffic Monitoring Reports (1991-1995)

Activity on the Banff and Jasper airstrips was monitored 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 overflight and landing activity; and
- To monitor and evaluate emergency/diversionary landing activity.

The following table provides a summary of the results that were compiled during this monitoring program. Banff and Jasper are combined in some instances.

Table 5.6 Summary Results of Monitoring Program

Year	Overflights (Banff)	Landings (Banff)	Total Aircraft Movements (Banff)	Emergency Landings (Banff)	Accidents (Banff)
1991	2019 (-Banff & Jasper)	60	892	18	2
1992	2134 (Banff)	62	419	13	4
1993/94	2016 (1993) 2230 (1994)	34 (1993) 63 (1994)	480 (1993) 522 (1994) 4 (CASARA)	10	
1995	1181	64		5	

The overflight data were compiled by Transport Canada from radio contact through remote Communication Outlets for Banff. The information collected for aircraft landings was from registration books at Banff airstrip. Examples of emergency landings circumstances noted in the Banff Aerodrome Log include bad weather, turbulence, low pressure gauge, excessive oil temperature, oil leak, rain showers, flat tire, fuel pump, sick passenger and fatigue. Included in overall aircraft movements summarized above are the Canadian Air Search and Rescue Association (CASARA) training and operations information for the Banff area.

Transport Canada/Parks Canada Joint Study (1994)

In 1994, Transport Canada and Parks Canada completed a report on the "*Need to Retain the Banff and Jasper Airstrips for Emergency/Diversionary Use*". This report did not include the significance of weather in local mountain passes and only dealt with the requirement of the Banff/Jasper airstrips for emergency and/or diversionary use. The objectives of the study included:

- To monitor and evaluate aircraft overflight 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 Banff airstrip, this report concluded:

- There is little air traffic;
- The issue of usage for diversionary/emergency usage has not been accurately determined;

- The weather conditions at Banff are typical for mountain valleys and have relatively good weather for VFR flying; and

- 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) and the Banff Flying Club 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 Banff area provided comments. All of these individuals expressed serious concerns with closing and decommissioning the Banff airstrip from an aviation safety perspective. Examples of the diversionary use for Banff (J. Mulder) are summarized in this report. Comments from pilots are further discussed under Section 5.10.5, below.

Memorandum of Understanding between Parks Canada and Banff Flying Club

In the past, Parks Canada through a Memorandum of Understanding with the Banff Flying Club has agreed to maintain minimum airstrip facilities including:

- A "reasonable" runway surface for summer and winter months;
- A small off-runway parking lot;
- Airstrip boundary markers;
- A wind sock; and,
- A telephone.

There have been maintenance issues in the past such as cutting grass in a timely manner, replacement of boundary markers that have been damaged by elk, filling in gopher holes that can pose a risk to aircraft and keeping the gate to the airstrip closed.

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 Banff airstrip.

- The Banff airstrip is located in a transition zone between "Mountain Weather" and "Foothills/Prairie Weather". The Banff 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 both Banff and Jasper and provides comments on flight safety from a meteorological perspective. It confirms that the frequency of VFR conditions in Banff exceeds 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 Banff;

- The greatest impact on visibility is likely to occur from rainfall in early summer and from snowfall in mid-winter;

- The flight safety comments throughout the DMA report are based on limited data, and are not substantiated;

- The DMA report does not address the question of whether existing facilities in Springbank can serve as alternates without compromising safety during poor weather conditions. An analysis of comparative weather data outside of Banff in areas such as Springbank/Calgary should have been included; and

- The aerodrome at Springbank 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 Banff Flying Club in an effort to understand the issues and concerns of the local pilots. A 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 Banff 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 Banff area. Decommissioning the airstrip elevates risk to human health and safety.

- The Banff airstrip has been in existence since 1934 and prior to that time was the site of a dairy farm. Clearly this area has not been a pristine wilderness area for many years.

- The usage of the airstrip has been in steady decline to the point where the environmental implications are negligible if one considers the presence of other human activity in these areas such as an active railway line, and the presence of the TransCanada Highway.

- There are a variety of other uses at the Banff airstrip that probably have a greater impact on the local wildlife resources. Examples include the use of Banff airstrip area for hiking and climbing (e.g. Cascade Waterfalls), and mountain biking. In addition, the general public uses the airstrip for walking dogs and other recreational activities such as golf.

- The presence of local CASARA capability provides a quick response to aircraft incidents. It has been verbally indicated by the Banff Flying Club that in 1987 over 100 hours were dedicated to search and rescue for downed aircraft in the Banff area.

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

- COPA and the Banff Flying Club believe that 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 rationale for decommissioning the Banff airstrip. From the Parks Canada perspective, the *National Parks Aircraft Access Regulations* (1997) and the BNP Management Plan provide the necessary regulatory and management direction to decommission the facility.

Parks Canada's goal is to decommission the airstrip at Banff 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 Banff for many years and will formalize a long-term desire of Parks Canada to close and decommission the facility.

5.10.7 Canada Flight Supplement

The Canada Flight Supplement cautions pilots using the Banff airstrip that "moderate to severe subsidence, turbulence and wind shear may be encountered". This raises the important issue of the risk of unfamiliar pilots landing at an airstrip with challenging terrain and difficult surface wind conditions.

6.0 IMPACT ASSESSMENT AND BEST MANAGEMENT PRACTICES

6.1 Assessment Approach

This Comprehensive Study Report identifies potential impacts to existing conditions likely to result from the decommissioning activities described in Section 4 (Project Description). It also includes mitigation measures that may be appropriate to reduce the predicted impacts.

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

- Aviation safety issues associated with decommissioning of the airstrip;
- Wildlife habitat effectiveness within the Norquay-Cascade wildlife corridor 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 once mitigation measures are applied were assessed and rated for significance using the definitions and criteria shown in Table 6.1. Only adverse residual impacts are rated. The impact ratings used 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 Bow Valley, and extra-regional if it extends beyond BNP;
- 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.

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 Bow Valley
	Extra-regional	Outside the Park
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	*They are relative and assigned by professional environmental practitioners*
	Medium	
	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 Impacts and Mitigation Measures

6.2.1 Hydrological Resources

Potential Impacts

There will be no impacts to surface water in the area as a result of the decommissioning activities.

Potential impacts to groundwater arise from the possibility of soil contamination in the area of the AST. The site comprises predominately well drained Orthic Melanic Brunisols soils, which could result in potential contamination of groundwater resources if significant soil contamination exists. However, it is unlikely that there would be sufficient contamination to impact the Banff aquifer, which is at a depth of approximately 20 m. In addition, water wells used by the town of Banff are located west of the site and away from the direction of flow of groundwater, and are unlikely to be impacted by potential contamination.

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

It is predicted that there will be no residual impacts to the hydrological resources in the area as a result of the decommissioning activities.

6.2.2 Terrain and Soils

Potential Impacts

Decommissioning of the site will entail the removal of the built facilities and gravel pads underlying the hanger maintenance area, aboveground refuelling compound and gravel tie-down sites (Figure 1), and the reclamation of the disturbed area. The objective of the reclamation effort is to restore the site to resemble the natural surrounding terrain, soil and vegetation types.

Cessation of maintenance activities on the airstrip will have a positive effect on soils. Maintenance activities include 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 as a result of maintenance activities, particularly ploughing during the winter, and airplane landings on the runway.

Potential impacts to soils and terrain during decommissioning 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.

In addition, there is the possibility of soil contamination from the AST that may have to be addressed. While not a direct impact from decommissioning, any potential contamination from the AST must be removed during the decommissioning phase.

Mitigation Measures

The following construction site mitigations will be employed to reduce the potential for impacts to soil or terrain during decommissioning activities:

- Initiate discussions with the Banff Flying Club regarding disposal of the AST;
- Conduct a Phase I/II Site Assessment to identify whether any contamination is present on site, particularly in relation to the refuelling area. The AST 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) and Alberta Environment (1994) approved standards;
- Excavate the built-up area around the hangers and fuel tanks first and, once the fill has been removed, deep rip at 90 degree angles to ameliorate subsurface compaction. The depth of excavation will be determined by the level (if any) of contamination. The area should then be partially refilled to near grade with clean fill lightly packed to minimize future subsidence, topped with a thin veneer of topsoil (5 cm) and lightly packed to reduce the potential for settling and erosion. See Table 6.2 for volume estimates of soil removal and fill;
- Remove any contaminated soil and dispose of it at provincially certified sites;
- Truck in weed free topsoil from the Cochrane-Calgary locale (Ian Pengelly pers. comm.). A surface layer of 5 cm is recommended to approximate local conditions. The surface should be kept slightly rough to provide a variety of microsites as found in naturally occurring landscapes;
- Remove single pit outhouse, fill, pack and add topsoil in the same manner as outlined for the hanger area;

- Grade and remove gravel surfaced access road (approximately 550 m in length with an average width of 5 m and depth of 10 cm). The gravel should be graded and removed to the Cascade pits for future use within the Park. The underlying surface should be scarified to break up the surface and alleviate compaction, followed by a top dressing of soil;
- Seed all reclaimed sites immediately to reduce the potential for invasion by non-native species;
- Monitor reclaimed sites to ensure seed germination;
- Halt all decommissioning 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 undisturbed areas;
- Know the name and number of the appropriate authorities to report spills (Environmental Management Officer (403) 762-1409 or (403) 762-4506);
- Ensure all construction equipment is in good working order, especially with respect to leaks of oil, fuel or hydraulic fuels; and
- Follow the Park's Toxic Spill Emergency Plan should a hazardous spill occur. Immediately report and manage any leakage or spillage with appropriate spill contingency equipment and measures.

Table 6.2 Fill volume estimates

	Volumes (m^3)
Fill Volume Estimates - Material to be Removed	880
Fill Volume Estimates - Clean Replacement Materials	530
Estimated Topsoil Volumes[(a)]	362

[(a)] Assumes a 5 cm replacement depth of either topsoil or composted manure.

Residual Impact Rating

Residual impacts that may remain after mitigation measures are applied are positive. They include a reduction in invasion by non-native species and the removal of possibly contaminated soil from the AST, as well as a reduction in topsoil loss and soil erosion from the cessation of maintenance activities. Reclamation of those areas disturbed by the installation of the airstrip

infrastructure and parking area will return the terrain and soils to, as near as practicable, their pre-development status.

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 two arms that make up the "X" will be 0.9 m wide by 19.4 m long. Materials used may be white gravel flush with topsoil, or other alternatives to be determined by Parks Canada in consultation with Transport Canada. Whichever material is used, 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 dominated by non-native plant species. These communities are: *Agropyron pectiniforme; A. pectiniforme-Potentilla pensylvanica-Artemisia frigida;* and, *Potentilla* spp. *– A. pectiniforme-Taraxacum officianale.*

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. Changes can include short-term losses and long-term 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 that are currently dominated by non-native species (e.g., A. *pectiniforme, Festuca rubra, Bromus inermis*) may be reseeded with native species or reclaimed to a more native state. The actual land area to be reclaimed could approximate 3 ha.

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 450 ha of native dry montane grassland associations similar to those occurring on the airstrip are found in the Bow Valley of BNP. The incremental increase in native grassland resulting from 3 ha of successful reclamation will be less than 1% of the current supply. The known locations of rare plants such as *Sisyrinchium septentrionale* and *Potentilla hookeriana* will be avoided during reclamation.

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	No impact	n/a	n/a	n/a	n/a	n/a
		Rare/representative plant communities	Negligible to Low	Negative	Local	Long-term	Continuous	Reversible
Change in vegetation structure and composition								
	Restore portions of runway to native condition	Rare/representative plant species	No impact	n/a	n/a	n/a	n/a	n/a
	Time restoration to avoid excessively wet periods	Rare/representative plant communities		Positive				
	Mark and avoid rare plant species							
	Strip, scarify and re-seed access road to native							
	Reclaim area north of access road to native							
	No driving off of existing access							
	Mark area of rare plants with 3 m buffer							
	Inform and educate contractors of rare plants							
	Consider use of prescribed fire							
Introduction/removal of exotic plants								
	Use of herbicides recommended in Banff Screening	Rare/representative plant species	No impact	n/a	n/a	n/a	n/a	n/a
	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							

Cessation of maintenance activities will positively impact the vegetation structure and diversity through a reduction of both soil erosion and direct loss of vegetation.

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 during the short time that they are on site. Decommissioning staff will be on site for a 5-day period 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, but there is a very low likelihood of these impacts occurring.

Vegetation composition may change due to alteration of ecological processes. Decommissioning activities could facilitate the use of prescribed fire to improve the ecological integrity of the site and surrounding areas. This would result 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 Bow Valley has been reduced due to fire suppression. Prescribed fire in the vicinity of the airstrip could be used to discourage encroachment of shrubs and trees and also to create additional grassland supply where trees currently dominate (e.g., FR1, HD1, HD2 ecosites; see Figure 2). The amount of additional grassland in the immediate vicinity of the airstrip that could be created and maintained by burning is unknown.

Introduction or removal of exotic plant species

Decommissioning activities will reduce noxious weeds through removal, re-seeding and scarification/re-seeding of gravel areas. Noxious weeds such *as Chrysanthemum leucanthemum* and *Cirsium arvense* currently exist at several sites on and adjacent to the airstrip. These sites are very small (<10-m^2). Reduction of these plants with appropriate physical and chemical methods, in accordance with Park Integrated Pest Management Directive 2.4.1, followed by re-seeding with native species will enhance the diversity and native integrity of these sites.

Mitigation Measures

The following mitigation measures are recommended by Wilkinson (2000) in order to minimize project-specific effects on vegetation VECs, as described above (see Table 6.3).

Permanent 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

- 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 shrubby grassland. Native plants recommended by Wilkinson

(2000) include *Festuca campestris, Elymus lanceolatus, Elymus trachycaulus, E. trachycaulus* ssp. *Subsecundus, Koeleria macrantha, Stipa richardsonii, Helictotrichon hookeri, Potentilla gracilis, Prunus pensylvanica, Geum triflorum, Achillea millefolium, Antennaria parviflora, Erigeron glabellus* ssp. *Pubescens, Astragalus striatus, Linum lewissi, Campanula rotundifolia,* and *Anemone mulitifida.*

- Revegetation will occur as soon as practical after reclamation of the site in order to allow for successful regeneration (Wilkinson 2000).

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

- Mark and avoid locations of the provincially rare plant *Sisyrinchium septentrionale* and conduct a search for additional plants of this species in adjacent areas in mid-June and mid-July (Wilkinson 2000). 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-survey the southern portion of the runway for the occurrence of the provincially rare plant *Potentilla hookeriana*. Mark and avoid these additional sites if identified.

- Re-seed and re-vegetate the area north of the gravel access road that is dominated currently by non-native *Festuca rubra, Taraxacum officianale,* and *Bromus inermis* (Wilkinson 2000). This area will not be excavated, but treated for removal of weeds with approved methods and reseeded.

- Strip, scarify, add topsoil and re-seed the gravel access road to an appropriate native plant mix (Wilkinson 2000).

- Re-seed the hangar and plane tie-down, fuelling sites, washroom, registration box/phone booth, first aid box/garbage enclosure, windsock, and soil pile areas with appropriate native plants after removing these facilities. Use plants recommended by Wilkinson (2000).

- Mark areas of rare plants with a buffer of at least 3 metres and inform and educate decommissioning contractors about their presence.

- Ban all off-road vehicle traffic.

- Consider the use of prescribed fire to prevent the encroachment of shrubs and trees onto the airstrip (Wilkinson 2000) to maintain the supply of native grasslands that are rare in the montane of the Bow Valley. Burning may also be a consideration for increasing forage production and native plant vigour/cover and improving range quality for ungulates (McCallum 1989, Becker 1989).

Introduction or removal of exotic plant species

- Eradicate the noxious weed *Chrysanthemum leucanthemum* from the north end of the eroded depression area west of the runway, east of the runway and near the fuel tanks

(Wilkinson 2000). Also eradicate *Cirsium arvense* from adjacent the road and south and east of the depressional area. Eradication methods should follow recommendations from the Environmental Screening entitled "Control of Non-native Plants through an Integrated Program of Physical and Chemical Control Methods" (BNP 2000), as well as Parks Canada Management Directive 2.4.1 "Integrated Pest Management". The use of the herbicide Glyphosate is recommended for eradication of Canada Thistle (*Cirsium arvense*).

- Assure that the contractor conducting chemical control procedures carefully follows Parks Management Directive 2.4.1.
- Avoid spraying when winds exceed 16 km/h to minimize off-target drift (BNP 2000).
- Avoid spraying during high temperatures to prevent evaporation of herbicides and vapour drift to non-target plants (BNP 2000).
- Avoid spraying during or after heavy rain or when rain is imminent to avoid herbicide from being washed off plants and carried off-target (BNP 2000).
- Conduct physical and chemical control at times when most young birds and mammals are sufficiently mobile to avoid equipment and/or spraying operations.
- Ensure the locations of rare plants are identified and marked and that vegetation control will 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 permanent loss of vegetation, changes in composition in structure, and introduction of exotic plant species.

Given the mitigation measures outlined in Table 6.3, the residual impacts to rare and representative plant communities can be summarized using the three general impact categories discussed above. Table 6.3 identifies the potential impacts, mitigations and residual impacts of the proposed project on the project VECs.

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 1% of the available dry grassland habitat in the Bow Valley.

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

Changes in vegetation composition and structure

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 Residual Impacts on Vegetation

The overall effects of the decommissioning of the Banff airstrip on native plant communities will be positive. Montane native grasslands are a rare and diminishing vegetation resource in BNP both because of long-term fire suppression and invasion by non-native species. Decommissioning is likely to result in the conversion of up to 3 ha of disturbed grassland to a more native condition. This amount of land is minor (<1%) when compared to the total current native grassland in the Bow Valley of BNP. Use of prescribed fire in the vicinity of the airstrip has potential to maintain and potentially increase the supply of native montane grassland in the study area. Identified potential negative effects of decommissioning on plant communities and rare plants are negligible given the mitigation measures proposed.

6.2.4 Wildlife

Potential Impacts

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

- Increased risk of mortality from project activities;
- Direct loss or change in habitat quality resulting from physical alteration;
- Indirect change in habitat quality due to alteration of ecological processes; 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 buildings, excavate gravel and remove materials from the airstrip. There is potential for this equipment to injure ground nesting birds and fledglings, damage or destroy nests or for fatal collisions with small mammals. Risk of direct or indirect mortality has the highest potential to occur during removal of the airplane shelters and parking areas adjacent to the trees (Figure 1). Increased mortality could occur directly as a result of vehicle collisions with ground nesting birds or smaller carnivores such as long-tailed weasel. Other 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 mortality is less of a concern for wildlife such as breeding birds (e.g., sparrows) and elk, which 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 clay-colored sparrow.

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 that a significant portion of the airstrip runway and infrastructure that are currently dominated by non-native species will be reclaimed to a more native state since winter maintenance has severely denuded patches of the runway. The actual land area to be reclaimed is approximately 3 ha (30,000 m^2). This is less than 1% of current lower Bow Valley supply of dry, native grasslands typical of those occurring on the airstrip.

Native grasslands will offer increased structure and food sources for ground nesting birds and microtine rodents such as clay-colored 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 badger and 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., American badger, 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.

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

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	Low	Negative	Short-term	Local	Once*	Irreversible
	Remove all foods and refuse from job site	Small-medium – bodied carnivores	Low	Negative	Short-term	Local	Once	Irreversible
	Retain/enhance access road gating	Elk	Low	Negative	Short-term	Local	Once	Irreversible
	Limit vehicle access and speed	Breeding Birds	Low	Negative	Short-term	Local	Once	Irreversible
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				
Alteration of ecological processes								
	Investigate potential for prescribed fire in HD4	Large-bodied carnivores		Positive				
	Fence larger revegetated areas to prevent excess elk grazing	Small-medium – bodied carnivores		Positive				
		Elk		Positive				
		Breeding Birds		Positive				

Table 6.4 Summary of Potential Impacts, Mitigating Measures, and Residual Impacts to Wildlife - *Continued*

Potential Impacts	Proposed Mitigating Measures	Valued Ecosystem Component	Residual Impact Ratings					
			Magnitude	Direction	Duration	Geographic Extent	Frequency	Reversibility
Habitat alienation								
	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 NY1/HD1 of corridor slopes	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

Change in habitat quality due to alteration of ecological processes

Fire suppression and herbivory are the two most influential ecological processes on montane vegetation structure. Restoring these processes has potential to change habitat significantly and extensively in the area and to improve habitat conditions for all VEC species, with the possible exception of lynx.

A shortage of fire in recent history in the montane ecoregion of the Bow 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*. 1996). The presence of the town of Banff has limited the opportunity for the use of prescribed fire to improve the native integrity of the vegetation of this area, and to increase the amount of grassland. By decommissioning the airstrip, it may enhance the opportunity to use prescribed fire in the montane surrounding the airstrip. This would result in a change in vegetation composition and structure either directly or through ungulate foraging response (i.e., herbivory and trampling). These changes in vegetation in turn change the suitability of landscapes for grassland wildlife specialists and may ultimately affect population size and trend. Prescribed fire in the vicinity of the airstrip could be used to discourage encroachment of shrubs and trees and also create additional grassland habitat supply where trees currently dominate (e.g., FR1, HD1, HD2 ecosites; see Figure 2).

These changes resulting from increased use of fire in the vicinity of the airstrip could have the following potential impacts on the wildlife VECs:

- Elk - increased grassland forage supply and quality;
- Wolf - increase in ungulate prey density;
- Grizzly bear – increased berry forage production;
- Long-tailed weasel – increased grassland habitat supply and small mammal prey abundance;
- American badger – increased grassland habitat supply and small mammal prey abundance;
- Cougar – increased ungulate prey density; and
- Clay-colored sparrow – increased high quality habitat supply (mixed grass/low shrub).

Habitat alienation from sensory disturbance

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

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. Decommissioning activities have potential to adversely impact wildlife movement if noise from the activities result in reduced levels of movement.

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 (e.g., American badger den sites);
- 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., clay-colored sparrow);
- When the disturbance leads to effective loss of all or a high percentage of a particularly high quality habitat type (e.g., American badger, 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., lynx, wolf, cougar and grizzly bear).

Project VECs that are most sensitive to human activities and sensory disturbance include grizzly bear, wolf and lynx. Wary species, such as grizzly bears, are often reluctant to cross open areas lacking hiding cover, especially if there is noticeable human presence. For example, coyote, elk and deer are more likely to cross the TransCanada Highway and underpasses/overpasses in Banff's Bow Valley than grizzly bears (Clevenger and Waltho 2000, Gibeau 2000, Clevenger 2001). Similarly, a monitoring program initiated in 1995 tracks the movement of various wildlife species through the wildlife corridors surrounding the town of Banff. The results of the 1999 report (Duke) indicate that construction at the Middle Springs subdivision may have influenced large carnivore (wolves and cougars) movement through the adjacent corridor. Subsequent to the initiation of construction activities, there was a marked decrease in large carnivore movements

tracked in the area. Disruption of movement between patches of high quality habitat can lead to reduced optimization of food and reproductive resources.

A study by Duke *et al*. (2000) reported that prior to 1997, wolves rarely used the Cascade Corridor because human use levels were too high. In addition to the airstrip, infrastructure within the corridor included a hotel, ski access road, reservoir with an access road, a Buffalo Paddock, barns, horse corrals, and a cadet camp. In fall of 1997, the buffalo paddock, barns and horse corrals were removed by Parks Canada, and the airstrip was closed. The subsequent decrease in human activity in the corridor resulted in a significant increase in wolves using the Corridor. Removal of airstrip infrastructure, then, should result in a positive impact to wolf movement through the Cascade Corridor.

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 TransCanada Highway. The number of small aircraft flights to and from the Banff airstrip since 1997 (Campbell 1997) is not known. Flight information for the Banff airstrip area for the period 1991 to 1994 showed an average of 453 flights to and from the Banff airstrip per year during this period. Noise measurements obtained for this assessment showed that maximum noise from small aircraft at the Springbank airstrip ranged from 49.4 (Kitana DV-20) to 70.3 (Cessna 172) dbA for take off and landing, depending on the aircraft and at a distance of 150 metres. Similar measurements taken at the Banff airstrip at a distance of 150 metres showed maximum noise levels of cars and trucks on the TransCanada Highway of 56.7 and 57.4 dbA respectively. A small plane observed landing at the Banff airstrip on April 28, 2001 produced a noise level of 63.3 dbA at a distance of approximately 30 m. Wind gusts at that time period produced noise up to 67.7 dbA.

The average number of vehicle passes per year adjacent to and affecting the Banff airstrip exceeds 7 million based on summer statistics (Gibeau 2000). Given the relative similarity in noise levels between vehicles and small aircraft and the major discrepancy between the number of events of these two activities, it is unlikely that sensory disturbance due to noise from aircraft would be affecting wildlife at the airstrip.

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 to encounter large carnivores in the wooded areas of the Norquay-Cascade corridor. Appropriate safety equipment including air horns and red pepper spray 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.

- Retain and enhance efficiency (boulder placement) of current gate to reduce vehicle access onto airstrip area.

- Maintain vehicle speeds of less than 20 km/hr while on site.

- Decommissioning activities should not occur during the ground nesting season between May 1 and August 31.

Direct loss or change in habitat quality resulting from physical alteration

- Decommissioning activities particularly gravel stripping and excavation, should use minimal disturbance construction techniques through fencing or other marking of limits to surface disturbance.

- 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 shrubby grassland.

Change in habitat quality due to alteration of ecological processes

- Investigate the potential for introducing controlled fire onto the HD4 ecosite, similar to work completed in Jasper National Park montane grasslands.

- Consider fencing of at least portions of reclaimed areas until the elk removal program is completed, in order to lessen the effects of elk grazing and trampling on re-vegetation success.

Habitat alienation from sensory disturbance

- Conduct a brief survey to determine whether or not nests of raptors 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 Norquay-Cascade corridor, especially the NY1 and HD1 ecosites on the slope west of the airstrip (see Photo 10).

Residual Impact Rating

Residual impacts that will remain after implementation of all of the mitigation measures identified above include:

Increased risk of mortality from project activities during decommissioning

The primary potential source of mortality of large carnivores associated with the airstrip 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 BNP, and the mitigation measures proposed above, we consider this event to be highly unlikely. 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 very low.

> *The residual impact of airstrip decommissioning related to increased mortality on all wildlife VECs will be negative in direction, low 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. 3 ha) in high quality habitat supply for breeding bird VECs and potentially for smaller carnivores. This increase will not be as important for carnivores and ungulates. While the 3 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 airstrip decommissioning related to direct loss or change in habitat quality resulting from physical alteration will be positive.*

Change in habitat quality due to alteration of ecological processes

If prescribed fire is used in the vicinity of the airstrip there is potential to increase the supply of dry, montane native grasslands that are rare and decreasing in size in BNP. Decommissioning of the airstrip may facilitate this action. The amount of native grassland that could be created as a result of prescribed fire in the vicinity of the airstrip post decommissioning is unknown but has potential to be positive in a regional context. Control of elk populations and associated herbivory will be important in order for the positive effects of this action on other species such as breeding birds to be fully realized.

> *The residual impact on wildlife VECs of airstrip decommissioning related to change in habitat quality due to alteration of ecological processes will be positive.*

Habitat alienation from sensory disturbance

Decommissioning staff will be on site for a total of five days. Noise from these activities will include heavy equipment operation and some minor demolition. Increased sensory disturbance from these activities will be offset by the decrease in sensory disturbance relating to removal of infrastructure, cessation of current levels of activity of aircraft at the hangar and illegal take offs and landings, and the cessation of maintenance activities. Decommissioning will be planned for the post-nesting/fledging period. If this is not possible then surveys will locate nests and activity near these sites will be delayed or avoided if possible.

> *The residual impact on wildlife VECs of airstrip decommissioning related to habitat alienation from sensory disturbance will be negligible in magnitude, neutral in direction, 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 illegal landings post decommissioning.*

Disruption of traditional movement patterns

Movement of large carnivores and ungulates occurs regularly along the forested western edge of the airstrip. As detailed above, airstrip 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 airstrip decommissioning related to disruption of traditional movement patterns will be neutral in direction, negligible in magnitude, local, short-term, once only, and reversible. Overall the effect has potential to be negative or neutral for actual decommissioning activities and positive post-decommissioning because of the indirect effects of curtailing unauthorized small aircraft use.*

6.2.4.1 Summary of Residual 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. The use of prescribed fire also has the potential to increase the amount of montane native grasslands available in BNP. Sensory disturbance will be localized and will avoid sensitive timing windows for wildlife, so it is not anticipated that there will be any significant residual impacts related to wildlife movement.

Given the minimal activities associated with decommissioning and the mitigation measures outlined above, the potential project-specific impacts of airstrip 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 impact on the recreational activities that are currently occurring on the airstrip. There are no long-term plans to restrict human use on the decommissioned airstrip. Access to Cascade Mountain shall remain open and other users may continue using the parking lot and the open field for a range of informal uses during the decommissioning activities.

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. Therefore, a short-term effect will occur.

Mitigation Measures

Standard construction site measures will be employed to safeguard public safety during the actual time of heavy machinery actively engaged in decommissioning. To ensure aesthetics are not negatively impacted, construction waste should be sorted, reused, recycled or disposed of at the Regional Landfill in Exshaw. Reclamation should 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

The presence of archaeological sites on the western periphery of the Banff Airstrip suggests there is good potential for near surface sites to be present on the airstrip. Buried archaeological sites may be exposed and impacted during the proposed rehabilitation activities which have subsurface impacts i.e., removal of contaminated soil, and gravel stripping from the access road and aircraft parking areas.

Mitigation Measures

It is recommended that areas in which subsurface disturbances will occur be subject to a reconstruction subsurface archaeological assessment to determine if significant buried archaeological sites are present which will be impacted by the proposed activities. In addition, a mitigation plan should be developed to alleviate any adverse impacts on these archaeological resources. Metal detecting should also be carried out in order to detect the remains of any 19th century camps that might be present.

Residual Impact Rating

Provided the recommended mitigations are followed, it is predicted that there will be no residual impacts to archaeological resources.

6.2.7 Aviation Safety

Potential Impacts

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

There is the potential for the following impact in terms of aviation safety:

> *Elimination of a potential landing area for emergency/diversionary landings along the Banff VFR Route 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 referenced a report by SYPHER (1986) which proposed a distance of 75 nautical miles as a criteria 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 Springbank Aerodrome, the closest alternate airstrip would be at Golden, 105 nautical miles west of Springbank (Figure 3). This exceeds the 75 nautical miles criteria referred to by Transport Canada (1994) 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 Banff area. It is also understood that the Flight Services Station at the Springbank Airport will be closing. This may negatively impact VFR flight planning for pilots who are flying into remote mountainous terrain in the Banff area. The risk for safe VFR flying may be elevated with decommissioning of the Banff airstrip if unforeseen weather conditions arise along this VFR route.

Based on flight activity (see Section 5.10) and airport registry information, it is reasonable to conclude that there is regular over-flight activity in the Banff VFR corridor in a range of 40 to 60 (approximate only) per year. There also appears to be occasional usage of the strip for search and rescue training activities.

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 Banff and, because of this, the airstrip has been traditionally viewed as a relatively reliable option for VFR flight planning purposes.

The issue of the challenging terrain and wind conditions at the Banff airstrip is an important consideration for routine landings and take offs, however emergency/diversionary landings require rapid assessment of "best options" at the time of the emergency. A decommissioned airstrip that has a suitable landing surface for landing a light aircraft is a superior option to a paved road such as the TransCanada Highway that has heavy traffic and hazards such as wires. 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 BNP.

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

Mitigation Measures

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

- Transport Canada/Nav Canada take appropriate follow-up actions to make aviators aware of any changes in the status of the Banff airstrip for flight planning purposes. 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, decommissioned and unavailable for landings; and

- Investigate the possibility of using the Springbank airport as a reasonable alternative to some of the current activities at Banff such as search and rescue training.

Residual Impact Ratings

The residual impacts to aviation safety are rated as negative in direction, low 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 Banff 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 after decommissioning 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 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

Safe emergency landings are only feasible with continued maintenance. 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 topsoil, which resulted in areas of bare ground unable to support vegetation. As a consequence, non-vegetated areas experienced increased soil erosion and invasion by non-native plant species. 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 Resulting from Proposed Banff Airstrip Decommissioning[(a)]

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 AST	• Conduct Phase I/II site assessment before or during removal.	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	• Initiate discussions with the Banff Flying Club regarding disposal of the AST; • Conduct a Phase I/II Site Assessment to identify whether any contamination is present on site, particularly in relation to the refuelling area. AST must be tested and removed in accordance with CCME (2001) and AENV (1994); • Excavate built-up area around hangers and fuel tanks first and, once fill has been removed, deep rip at 90 degree angles. Depth of excavation will be determined by the level (if any) of contamination. Partially refill area to near grade with clean fill lightly packed to minimize future subsidence, topped with thin veneer of topsoil (5 cm) and lightly packed to reduce the potential for settling and erosion; • Remove any contaminated soil and dispose of it at provincially certified sites; • Truck in weed free topsoil from the Cochrane-Calgary locale. A surface layer of 5 cm is recommended to approximate local conditions. Keep surface slightly rough to provide a variety of microsites; • Remove single pit outhouse, fill, pack and add topsoil in the same manner as outlined for the hanger area; • Grade and remove gravel surfaced access road. Gravel should be graded and removed to the Cascade pits for future use within the Park. Underlying surface should be scarified to break up the surface and alleviate compaction, followed by a top dressing of soil; • Seed all reclaimed sites immediately to reduce the potential for invasion by non-native species; • Monitor reclaimed sites to ensure seed germination; • Halt all decommissioning 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; • Know the name and number of the appropriate authorities to report spills (Environmental Management Officer (403) 762-1409 or (403) 762-4506); • Ensure all construction equipment is in good working order, especially with respect to leaks of oil, fuel or hydraulic fuels; and • Follow the Park's Toxic Spill Emergency Plan should a hazardous spill occur.	yes	pos					

Table 6.5 Summary of Potential Impacts, Mitigation Measures, and Residual Impact Ratings Resulting from Proposed Banff 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	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	• Restore portions of runway and roadway to native condition • Time restoration to avoid excessively wet periods • Mark areas of rare plants with 3 m buffer, and avoid • Re-survey southern portion of runway for *Potentilla hookeriana*, mark, and avoid • Strip, scarify and re-seed access road to native • Reseed area north of access road to native • No driving off existing access roads • Inform and educate contractors about rare plants • Consider use of prescribed fire	no						
	Introduction/Removal of exotic plants	• Use eradication methods recommended in Parks Management Directive 2.4.1 for *Cirsium arvense* and *Chrysanthemum leucanthemum.* • 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 to L
	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, American badger, lynx)	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	L
	Direct habitat alteration / loss	• Reclaim airstrip/infrastructure with native plant stock • Mark boundaries of native/non-native plant communities and communicate to decommissioning personnel • Use minimal disturbance decommissioning methods	yes	pos					
	Indirect change in habitat quality from alteration of ecological processes	• Investigate potential for prescribed fire in HD4 • Consider fencing portions of reclaimed areas to prevent excess elk grazing	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 in NY/HD1 of corridor slopes	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	L

Table 6.5 Summary of Potential Impacts, Mitigation Measures, and Residual Impact Ratings Resulting from Proposed Banff 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)
Elk continued	Direct habitat alteration / loss	• Reclaim airstrip/infrastructure with native plant stock • Mark boundaries of native/non-native plant communities and communicate to decommissioning personnel • Use minimal disturbance decommissioning methods	yes	pos					
	Change in habitat quality from alteration of ecological processes	• Investigate potential for prescribed fire in HD4 • Consider fencing reclaimed or burned areas to prevent excess elk grazing	yes	pos					
	Habitat alienation from sensory disturbance	• No recommended measures for elk	yes	neutral-neg	L	S	O	reversible	negligible
	Disruption of traditional movement patterns	• Limit human activity in NY/HD1 of corridor slopes	yes	neutral-neg	L	S	O	reversible	negligible
Breeding birds (clay-colored sparrow)	Increased risk of mortality	• Limit vehicle access and speed on grasslands • Ensure decommissioning avoids ground nesting season (May 1-Aug. 31)	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 personnel • Use minimal disturbance decommissioning methods	yes	pos					
	Change in habitat quality from alteration of ecological processes	• Investigate potential for prescribed fire in HD4 • Consider fencing burned/reclaimed areas to prevent grazing	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 in NY/HD1 of corridor slopes	yes	neutral-neg	L	S	O	reversible	negligible
Recreational use and Aesthetics	No impacts to approved recreational uses anticipated Temporary aesthetic impact during decommissioning activities	• Ensure proper site clean-up after decommissioning • Ensure trade waste is sorted, recycles, reused or disposed of at Exshaw trade waste site	no						
Historical resources	Disruption of potential archaeological sites	• Conduct reconstruction subsurface archaeological assessment to determine if buried sites are present • Develop mitigation plan to alleviate any adverse impact on historical resources, if necessary • Conduct metal detecting to determine presence of 19th century camps	no						
Aviation safety	Elimination of a potential landing area for emergency/diversionary landings along the Banff VFR route that could result in an increased risk for VFR pilots.	• Transport Canada/Nav Canada take appropriate follow-up actions to make aviators aware of any changes in the status of the Banff airstrip for flight planning purposes. Formal notification (e.g., NOTAMS) of the change in airstrip status in the Canada Flight Supplement shall be required to inform pilots that the airstrip is closed and decommissioned • Investigate the possibility of using the Springbank airport as a reasonable alternative to some of the current activities at Banff such as search and rescue training	yes	negative	ER	L	I	non-reversible	low[(b)]

[(a)] See Table 6.1 for definition of impact rating attributes
[(b)] Parks Canada will conduct a risk assessment as a separate process to confirm this rating.

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, retention of emergency landing site	-	L	L	L	-	-	P	H
Ploughing activities	topsoil scraping and erosion, invasion of non-native plant species, retention of emergency landing site	-	L	L	L	-	-	P	H
Option 2: Cessation of Maintenance									
No mowing activities	reclamation to native montane grassland, increased vegetation structure and diversity, loss of emergency landing site	-	P	P	P	-	-	L*	P
No ploughing activities	reduction in topsoil loss and erosion, increased vegetation structure and diversity, loss of emergency landing site	-	P	P	P	-	-	L*	P

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

Impact Scale:

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

Negative

In addition to impacting soils and vegetation, maintenance activities affect the wildlife habitat on the airstrip. Some wildlife species may be positively impacted; 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. Native grasslands also offer increased structure and food sources for ground nesting birds and microtine rodents such as clay-colored sparrow, vesper sparrow, savannah sparrow and meadow voles.

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 be unsafe for emergency or diversionary landings if maintenance activities ceased. Once natural processes are established, taller grasslands in the summer and snow in the winter may preclude safe landings on the runway. 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.

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 result in changes to vegetation composition on the airstrip. The airstrip is located in the montane HD4 ecosite, which was identified as a special feature by Achuff (1986) because of its limited areal extent in BNP, and its importance as habitat for ungulates, wolves and several bird species. The runway on the airstrip is a mosaic of dry, montane native grassland interspersed with areas dominated by agronomic grass species. Plant species diversity is currently much lower on the runway than in the surrounding plant communities, likely as a result of mowing activities. Ceasing mowing 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 impacted if the airstrip were no longer maintained. Rehabilitation efforts will ensure that trees, shrubs and forbs associated with montane grasslands are 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.

Cessation of maintenance activities would eliminate the sensory disturbance associated with mowing and ploughing activities. Sensitive carnivore species such as grizzly bear, lynx, and wolf would be positively impacted by a decrease in sensory disturbance on the airstrip, which is within the Norquay-Cascade wildlife corridor. The Norquay-Cascade corridor is a critical link for the movement of animals through the Central Rockies Ecosystem.

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 Banff National Park Management Plan is the re-establishment and maintenance of key wildlife corridors. To achieve this goal, the Management Plan proposes the removal of facilities along the lower slopes and floor of the Bow Valley, including the airstrip. Other facilities close to the airstrip have already been decommissioned, including the cadet camp, buffalo paddock, and horse corrals. Cessation of maintenance activities would aid in the re-establishment of wildlife corridors and help achieve the goal of the Management Plan.

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 Banff National Park Management Plan is to maintain and, where feasible, restore natural biodiversity, age and distribution of native vegetation communities, including montane habitat, to reflect the long-term ecosystem states and processes. 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 Banff airstrip after decommissioning has been considered and evaluated. Based on consideration of the environmental and socio-economic impacts of the 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 Banff National Park Management Plan objective of restoring the area to its natural montane ecosystem; and
- It is contrary to the policy and legislation of Parks Canada, as defined in the Banff National Park Management Plan, the *Canada National Parks Act,* and the *National Parks Aircraft Access Regulations.*

For these reasons, continuation of maintenance activities is not an appropriate option for the decommissioning of the Banff airstrip.

6.4 Determination of Significance

For this study, the Responsible Authority (Parks Canada) will assign significance to the impacts based on the combination of impact attributes (see Table 6.1). 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.

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 during on-site decommissioning. To address this potential impact, the following mitigation measures related to terrain and soils are recommended:

- Know the name and number of the appropriate authorities to report spills (Environmental Management Officer (403) 762-1409 or (403) 762-4506);
- Ensure all construction equipment is in good working order, especially with respect to leaks of oil, fuel or hydraulic fuels; and
- Follow the Park's Toxic Spill Emergency Plan should a hazardous spill occur. Immediately report and manage any leakage or spillage with appropriate spill contingency equipment and measures.

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 in a significant way 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), or in the event of wildfires in the vicinity.

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 1997b).

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 also 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 Banff 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 are:

- Impacts to wildlife from activities within the Norquay-Cascade and Fenland-Indian Grounds wildlife corridors,

- Impacts to aviation safety from decommissioning of the airstrip when considered in conjunction with planned changes in flight services at the Springbank Airport.

While the predicted project-specific impacts to both of these VECs are negligible to low, the potential for combined impacts from other existing uses (for wildlife movement) and future trends in air traffic (for public/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 for all VECs.

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 Norquay-Cascade wildlife movement corridor. The aviation safety study area includes the VFR corridor between Springbank Airport and Golden/Invermere, through the mountains as shown on Figure 3.

7.2 Potential Cumulative Impacts to Wildlife

The Banff airstrip decommissioning is proposed in a regional setting where numerous past, present and future planned human actions have and will continue to affect wildlife VECs. The Banff Bow Valley study was commissioned to assess the status and implications of multiple land use effects on VECs in the Bow Valley of BNP (Banff Bow Valley Study 1996). Part of this study used a regional planning approach to cumulative effects assessment and concluded that multiple land uses occurring in the area had exerted negative effects on various indicators of ecological integrity, including (among others) elk, grizzly bear and wolves (Green *et al*. 1997). As a result of these effects, a number of recommendations were made by the Banff Bow Valley Task Force to reduce the cumulative effects of land uses on VECs. One of these was to …"close the Banff airstrip to all flight operations…and return the site to its natural state within one year" (Banff Bow Valley Study 1996). Other past, present and future activities in the vicinity of the airstrip include:

- Removal/restoration of the Buffalo Paddock (completed in 1997)
- Removal/restoration of the Cadet Camp (completed- 2001)

- Removal/restoration of the Parks Canada and Public corrals (completed in 1997)
- No summer use of the Banff Mt. Norquay Ski facility (no summer use confirmed)
- Perimeter fence around the Timberline Lodge (subject to future redevelopment plan)
- Reduction in the size of the Industrial Compound

The two primary justifications for these closures were to restore wildlife movement through corridors (Norquay-Cascade and Fenland-Indian Grounds) and to increase habitat security. The reduction of wildlife conflicts was also a justification (Timberline Lodge perimeter fence).

There is preliminary evidence to suggest that facility closures and decommissioning have had a positive effect on wildlife, increasing movement of wolves and cougars through the Norquay-Cascade and Fenlands corridors, including the airstrip (Duke 2000; Duke *et al.* 2000). Wolf use of the Norquay-Cascade corridor has increased significantly since 1997, and neither snow depth nor ungulate density explains this increase (Duke *et al*. 2001). It is likely that any increase in large carnivore movement results from a positive cumulative effect of multiple closures, particularly the removal of fences that posed a physical barrier to movement. Airstrip decommissioning will contribute to this improvement.

Post decommissioning, the project will have a positive incremental effect on wildlife, adding to the already documented impacts of previous closures and decommissioning. During decommissioning, predicted project impacts are negligible relative to human presence in the area. This will not contribute to cumulative effects.

The cumulative effects of all of the closures and relocation of facilities in the Norquay-Cascade corridor are positive for wildlife use of the corridor.

7.3 Potential Cumulative Impacts to Aviation Safety

Cumulative impacts to aviation safety from decommissioning the Banff 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 Banff VFR Route, namely:

- Closing the Flight Services Station at Springbank Airport; and,
- Potential increasing air traffic (e.g. mountain aviation tours) between the Calgary area and remote mountain terrain along the Banff and Golden/Invermere VFR routes.

Closing the Flight Services Station at Springbank will reduce the level and type of service available to pilots who are planning VFR flights along the Banff VFR route, particularly local weather information. Personal contact with flight services personnel will be eliminated, and it is possible that local information such as Pilots Reports may not be as accessible for local private pilots. With the closure of Springbank, pilots will have to obtain weather information from an automated service out of Edmonton. Radio contact with local flight services personnel will also be eliminated for reporting changes to flight plans and flight notes.

As these services decrease, it is also anticipated that air traffic will increase as mountain tourism and population increase. Increasing aviation traffic elevates risk to aviation safety as the likelihood of a mishap such as unforeseen bad weather or equipment failure becomes more likely over time. It is therefore concluded that the cumulative effects from decommissioning the Banff airstrip are negative in direction and of 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 Banff airstrip. As part of the plan, site monitoring must be conducted annually for three years following decommissioning to monitor reclamation success. Site visits early and towards the end of the growing season can determine slumping effects, germination success, percent cover, weeds, *etc.* on revegetated areas and areas where herbicide application was used. In addition, any identified populations of rare species should be monitored during this time.

The criteria for assessment of revegetation success 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 this time. Successful rehabilitation of the airstrip will also determine when the "X" markings may be removed.

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 (BNP 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 and the Banff Flying Club;
- 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 (BNP 2001). A draft Terms of Reference was prepared for the Banff 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 Banff 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 Banff airstrip have been legally prohibited since the enactment of the 1997 *National Park Aircraft Access Regulations.* The airstrip was closed in 1997, when an environmental screening assessment was completed that evaluated the environmental effects of closure. Continued use of the airstrip contravenes these regulations, as well as the BNP Management Plan. Decommissioning of the airstrip is needed to remove the physical aspects and to provide the required visual markings of a closed and decommissioned airstrip that are universally recognized by pilots (BNP 2001). Justice Campbell (1997) has directed a Comprehensive Study be conducted under *CEAA* prior to a decision to decommission the airstrip.

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 Banff National Park (BNP 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);
- Cessation of all maintenance activities; and
- Notification in the Canada Flight Supplement that the airstrip is closed.

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 hydrology, 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 impacts and residual impacts for each VEC.

There were no long-term, 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 post decommissioning.

The potential impact to aviation safety includes the elimination of a potential landing area for emergency/diversionary landings along the Banff VFR Route, which could result in an increased risk for VFR aviators. It is predicted that the long-term residual effect on aviation safety is negative and 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. It is likely that an increase in large carnivore movement results from a cumulative positive effect of multiple facility closures in the Norquay-Cascade corridor.

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 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 AST	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 to L
	Change in vegetation structure and composition	yes	positive	
	Introduction/Removal of exotic plants	yes	positive	
Wildlife	Increased risk of mortality	yes	negative[c]	L
	Direct habitat alteration / loss	yes	positive	
	Indirect change in habitat quality from alteration of ecological processes	yes	positive	
	Habitat alienation from sensory disturbance	yes	neutral[c]	negligible
	Disruption of traditional movement patterns	yes	neutral[c]	negligible
Recreational use and Aesthetics	No impacts to approved recreational uses anticipated Temporary aesthetic impact during decommissioning activities	no		
Historical resources	Disruption of potential archaeological sites	no		
Aviation safety	Elevation of risk to pilot safety from removal of airstrip for emergency/diversionary use along VFR route	yes	negative	L[d]

[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 will conduct a risk assessment to confirm this rating.

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APPENDIX A

TERMS OF REFERENCE

APPENDIX B

REHABILITATION PLAN

REHABILITATION PLAN

During decommissioning activities at the Banff airstrip, it is expected that approximately 3 ha will be disturbed. In efforts to encourage native species establishment, a rehabilitation plan has been developed to make sure restoration activities are set in a trajectory that, over time, will lead to montane native grassland (HD4 ecosite phase). This rehabilitation plan has been prepared with special attention to native species use and ecological integrity. The plan provides target areas for rehabilitation, soil replacement volumes, suggested native vegetation species, and best management practices for rehabilitation.

The first priority of Banff National Park's Vegetation Management Plan 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 emphasis ecosystem replacement with a combination of natural succession and the use of native species (Regional Vegetation Network 1997). 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 that is 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.

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 that will be disturbed during decommissioning will be reclaimed and revegetated. All existing turf will remain intact.

Sites that require rehabilitation/reclamation in whole or in part include:

- Grass runway;
- Taxiway;
- Potentially contaminated sites (associated with fuelling areas);

- All gravel surfaces including road, gravel plane parking/tie down areas, under plane shelters etc. and

- Patches of thin vegetation (denuded during winter snow clearing) will be top-seeded with the native seed mix, but will not be excavated.

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 topsoil.

The decommissioning of buildings and gravel surfaces may displace some of the surface material. These areas must be filled with till and 5 cm of topsoil in order to level out the site and to provide growth medium for planted species. A minimum 5 cm of topsoil is recommended as soil depth in order to approximate the surrounding areas typical of the Montane region. Based on current area calculations, approximately 360 m^3 of topsoil will be required.

Topsoil is in short supply in BNP and replacement soils for this Project must be brought in from outside the Park. According to Parks Canada Directive 17, *Environmental Guidelines for Development Projects*, all soils brought into the Park must be clean and weed free. Seeding with the recommended Parks seed mix will occur immediately after the topsoil is applied in order to reduce the potential for weed invasion.

Fill volume estimates of material to be removed and added are summarized in Tables B.1 and B.2.

Table B.1 Fill Volume Estimates - Material to be Removed

	Areas (m^2)	Volumes (m^3)
Access Road[(a)] (removal if required)	2922	345
Plane Parking Area	821	82.1
Near Plane Shelter	1166	192
Fuel Tank Area[(b)]	100	na
Outhouse Pit[(c)]	1.44	4.4
Phone Booth Area	235	30.6
Dirt Pile Area	128	10.25
Double Area @ Tree	166	20
Road on Detail	746	76.3
Road & Disturbed Areas West of Boulders	542	109
Water Standpipe	2.25	1.2
Windsocks (2)[(d)]	3.14	6.3
Total*		880

(a) Average width of 5 m, average depth of gravel 10 cm.
(b) Volume unknown due to potential contamination, extent to be determined by Phase 1 and 2 audits.
(c) Assumes 3 m depth.
(d) Assumes concrete mounting blocks 1 m diameter and 1 m deep.
* See footnote (b), above.

Table B.2 Fill Volume Estimates - Clean Replacement Materials (excluding topsoil).

	Areas (m^2)	Volumes (m^3)
Access Road[(a)] (removal if required)	2922	175
Plane Parking Area	821	41
Near Plane Shelter	1166	135
Fuel Tank Area[(b)]	100	na
Outhouse Pit[(c)]	1.44	4.3
Phone Booth Area	235	19
Dirt Pile Area	128	6.4
Double Area @ Tree	166	11.7
Road on Detail	746	48
Road & Disturbed Areas West of Boulders	542	82
Water Standpipe	2.25	1.0
Windsocks (2)[(d)]	3.14	6.0
Total*		530

(a) Assumes removal of 10 cm material, replacement with 5 cm clean fill with 5 cm topsoil.
(b) Volume unknown due to potential contamination, extent to be determined by Phase 1 and 2 audits.
(c) Assumes 3 m depth.
(d) Assumes concrete mounting blocks 1m diameter and 1 m deep.
* See footnote (b), above.

The following process is recommended for soil rehabilitation during decommissioning:

- Ensure runway areas with established vegetation will not be disturbed during rehabilitation. Prior to any excavation activities, mark and avoid locations of the provincially rare plant *Sisyrinchium septentrionale* and *Potentilla hookeriana* (southern portion of the runway) conduct a search for additional plants of this species in adjacent areas in mid-June and mid-July (Wilkinson 2000) Rare plants should be flagged with a buffer of at least 3 meters. Inform and educate decommissioning contractors about their presence;

- Excavate the built-up area around the hangers and fuel tanks first and, once the fill has been removed, deep rip at 90 degree angles to ameliorate subsurface compaction. The depth of excavation will be determined by the level (if any) of contamination around the aboveground fuel storage tank. The area should then be partially refilled to near grade with clean fill lightly packed to minimize future subsidence, topped with a thin veneer of topsoil (5 cm) and lightly packed to reduce the potential for settling and erosion;

- Remove any contaminated soil and dispose of it at provincially certified sites;

- Truck in weed free topsoil from the Cochrane-Calgary locale (Pengelly pers. comm.). A surface layer of 5 cm is recommended to approximate local conditions. The surface should be kept slightly rough to provide a variety of microsites as found in naturally occurring landscapes;

- Remove single pit outhouse, fill, pack and add topsoil in the same manner as outlined for the hanger area; and

- Grade and remove gravel surfaced access road (approximately 550 m in length with an average width of 5 m and depth of 10 cm). The gravel should be graded and removed to the Cascade pits for future use within the Park. The underlying surface should be scarified to break up the surface and alleviate compaction, followed by a top dressing of soil.

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:

- Ensure revegetation occurs as soon as practical after rehabilitation of the site. In order to allow for successful regeneration, consider timing rehabilitation for the period when known elk use of the airstrip is at its lowest level (Wilkinson 2000).

- Re-seed the hangar and plane tie-down, fuelling sites, washroom, registration box/phone booth, first aid box/garbage enclosure, windsock, and soil pile areas with appropriate native plants after removing these facilities. Use plants recommended by Wilkinson (2000), and approved by Parks Canada. Species recommended by Wilkinson include *Festuca campestris, Elymus lanceolatus, Elymus trachycaulus, E. trachycaulus* ssp. *subsecundus, Koeleria macrantha, Stipa richardsonii, Helictotrichon hookeri, Potentilla gracilis, P. pensylvanica, Geum triflorum, Achillea millefolium, Antennaria parviflora, Erigeron glabellus* ssp. *Pubescens, Astragalus striatus, Linum lewissi, Campanula rotundifolia,* and *Anemone mulitifida.* A recommended seed mixture is presented in Table D.3.

- Seed the recommended seed mix evenly at a rate of 55-60 kg/ha ensuring all disturbed areas are covered, and seeding ties into the existing vegetation. Broadcast seeding should be considered as a viable and economic alternative to hydroseeding.

- Apply a slow release fertilizer (Biosol 6-1.3-3.5) at the time of seeding at a rate of 1000 kg/ha to aid in vegetation establishment.

- Re-seed and revegetate the area north of the gravel access road that is dominated currently by non-native *Festuca rubra, Taraxacum officianale,* and *Bromus inermis* (Wilkinson 2000). This area will not be excavated, but treated for removal of weeds with approved methods and reseeded.

- Through consultation with Parks Canada, determine if non-native species management is appropriate. If approved by Parks Canada, it is recommended that the noxious weed *Chrysanthemum leucanthemum* be eradicated from the north end of the eroded depression area west of the runway, east of the runway and near the fuel tanks (Wilkinson 2000). Also eradicate *Cirsium arvense* from adjacent the road and south and east of the depressional area. Eradication methods should follow recommendations from the Environmental Screening entitled *Control of Non-native Plants through an Integrated Program of Physical and Chemical Control Methods* (Banff National Park 2000), as well as Parks Canada Management Directive 2.4.1, *Integrated Pest Management*.

Rehabilitation efforts will ensure that trees, shrubs and forbs associated with the HD4 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 (Ian Pengelly, pers. comm.) suggests a seed mixture that is suited to poor, dry, and compacted soils. The species in this mixture (listed in Table B.3) are available from "Prairie Seeds Inc" out of Nisku Alberta. 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.3 Recommended Seed Mix

% by Weight	Common Name	Scientific Name
20	"Durar" Hard Fescue OR Rocky Mountain Fescue	*Festuca saximontana or F. brachyphylla*
20	"Reubens" Canada Bluegrass	*Poa compressa*
15	Hairy Wildrye	*Elymus innovatus*
10	Junegrass	*Koeleria macrantha (cristata)*
10	Awned Wheatgrass	*Elymus trachycaulis ssp. subsecundus*
10	"Revenue" Slender Wheatgrass	*Elymus trachycaulis*
5	"Norlea" Perennial Ryegrass	*Lolium perenne*
5	"Elbee" Northern Wheatgrass	*Elymus lanceolatus*
5	"Sodar" Streambank Wheatgrass	*Elymus lanceolatus ssp.*

Source: Ian Pengelly, Parks Canada (pers. comm.)

Table B.4 Combined Performance Rating for Recommended Seed Mix Species

Species	Winter hardiness	Erosion control	Longevity	Palatability	Browse Tolerance	Moisture Preference	Soil preference
Festuca ovina	very high	high	Long lived perennial	high to low	high to medium	dry to moist	Sandy, gravelly to loamy, well drained
Poa compressa	high	high	Cool-season long-lived perennial	high	high	wet to dry	Tolerates coarse texture
Elymus innovatus	high	high to medium	Perennial grass	high	medium	dry to moist	Coarse to fine textured, well drained
Poa alpina	very high	medium	Cool-season long-lived perennial	high	high	dry to moist	Gravel to loam textured, well drained
Koeleria macrantha (cristata)	high	medium	Long-lived perennial	high	medium	dry to moist	Wide range
Agropyron subsecundum	high-medium	high	Short-lived perennial	high-medium	medium	moist to dry	Well drained
Agropyron trachycaulum	high	high	Relatively short-lived perennial	medium	high	moist to dry	Medium textured, well drained
Lolium perenne	high	medium	Short-lived perennial	high	high	moist to wet	Wide textural range, moderately to poorly drained
Agropyron dasystachum	medium	high	Hardy, long-lived perennial	medium	high	moist to dry	Medium to coarse textured
Agropyron riparium	high	very high - high	Long-lived cool season perennial	low	high	moist to dry	Well drained, wide range of textures

Source: Hardy BBT Limited 1989

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 Banff airstrip.

- Halt all decommissioning 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;
- 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;

- Ensure all equipment entering the site is in excellent operating condition and cleaned of all vegetative material. If possible, machinery should be steam cleaned;

- Know the name and number of the appropriate authorities to report spills (Environmental Management Officer (403) 762-1409 or (403) 762-4506);

- Follow the Park's Toxic Spill Emergency Plan should a hazardous spill occur. Immediately report and manage any leakage or spillage with appropriate spill contingency equipment and measures;

- 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 rehabilitation and revegetation efforts. Presence during clearing, filling, and seeding phases are recommended;

- Conduct site monitoring (annually for 3 years) to ensure rehabilitation efforts are successful and that there are no weed infestations. Site visits early and towards the end of the growing season can determine slumping effects, germination success, percent cover, weeds, etc.; and

- Use formal pest control in the event of a weed infestation. 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
PINACEAE	
Picea glauca	White Spruce
POACEAE	
Agropyron pectiniforme	Crested Wheatgrass
Bromus inermis	Smooth Brome Grass
Elymus innovatus	Hairy Wild Rye
Elymus lanceolatus	Northern Wheatgrass
Elymus trachycaulus ssp. subsecundus	Bearded Wheatgrass
Festuca campestris	Foothills Rough Fescue
Festuca rubra	Red Fescue
Festuca ovina	Blue Fescue
Hordeum jubatum	Foxtail Barley
Koeleria macrantha	June Grass
Muhlenbergia richardsonis	Mat Muhly
Poa compressa	Canada Bluegrass
Poa pratensis	Kentucky Bluegrass
Stipa richardsonii	Richardson's Needle Grass
CYPERACEAE	
Carex praegracilis	Graceful Sedge
Carex stenophylla	Low Sedge
SALICACEAE	
Populus tremuloides	Aspen Poplar
BRASSICEAE	
Lepidium spp.	Peppergrass
ROSACEAE	
Geum triflorum	Three-flowered Avens
Potentilla fruticosa	Shrubby Cinquefoil
Potentilla gracilis	Graceful Cinquefoil
Potentilla hookerani	Hooker's Cinquefoil

Latin Name	Common Name
Prunus pensylvanica	Pin Cherry
FABACEAE	
Astragalus striatus	Standing Milk-vetch
LINACEAE	
Linum lewissi	Wild Blue Flax
CAMPANULACEAE	
Campanula rotundifolia	Common Hairbell
IRIDACEAE	Pale Blue-eyed Grass
Sisyrinchium septentrionale	Pale Blue-eyed Grass
ASTERACEAE	
Achillea millefolium	Yarrow
Antennaria parviflora	Small-leaved Everlasting
Artemesia frigida	Pasture Sagewort
Chrysanthemum leucanthemum	Oxeye Daisy
Cirsium arvense	Canada Thistle
Taraxacum officianale	Common Dandelion

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-colored sparrow
Taxidea taxus	American badger
Ursus americanus	Black bear
Ursus arctos	Grizzly bear

APPENDIX D

RECORD OF COMMUNICATIONS

Record of Communications

Date	Contact	Organization	Summary
13/03/2001	Bruce Leeson	Parks Canada	Meeting. Discussed information gaps and process.
20/04/2001	Ron Tessolini, Warden	Parks Canada	Telephone discussion. Requested most recent data on wildlife movement through the Norquay-Cascade corridors.
20/04/01	Tom Hurd, Warden	Parks Canada	Email. Requested winter 2000/01 tracking data for Norquay-Cascade corridor.
24/04/2001	Al Westhaver/Kevin Van Tighem, Wardens	Parks Canada	Meeting. Discussed fire ecology in the airstrip area and general matters pertaining to decommissioning in Banff.
25/04/2001	Dave Hunter, Warden	Parks Canada	Telephone discussion. No Phase I or II contaminated site assessments have been completed at the site. Parks does not know of any spills on site. Tanks were federally registered on behalf of Banff Flying Club. No information on contents of tanks, or maintenance activities on hangers. No water wells on site.
30/04/2001	Ian Pengelly, Warden	Parks Canada	Telephone discussion. No major topsoil sources in Park. Topsoil usually from Calgary/Cochrane area. Buffalo Paddock was scarified and Banff stable manure applied. Concern regarding weeds from stable source.
07/05/2001	Dave Poll, Environmental Science and Assessment Coordinator	Parks Canada	Telephone discussion. Discussed use of topsoil vs. manure for reclamation purposes.
10/05/2001	Bruce Lowry	Environment Canada-Edmonton Office	Telephone discussion. There are archives of weather data for Banff airstrip. Sent weather data and # of days below VFR but it was never received.

Date	Contact	Organization	Summary
10/05/2001	Sheila	Edmonton Flight Services	Telephone discussion. Automatic weather stations exist at the Banff 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 Banff Airstrip. Info is archived onto CDs but it is time consuming to retrieve this info at a cost. Provided weather station descriptions for Banff via fax.
13/05/2001	Bruce Meyers, Executive Director	Stats Canada	Telephone Discussion. Do not have DATR (Daily Air Traffic Records) information for Banff airstrip, only non-commercial flights use these strips. Suggested calling Parks Canada and Transport Canada for this information.
14/05/2001	Jacques Laflamme	Environment Canada-Edmonton Office	Telephone Discussion. Requested archived weather data for Banff 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.
15/05/2001	Al Westhaver, Warden	Parks Canada	Telephone discussion. Discussion regarding effects of Banff airstrip decommissioning on ability to conduct controlled fire.
04,09,10/06/2001	Norm Reed	Radium Hot Springs airstrip	Telephone discussion. Only 1/3 of pilots fill out registry. Much of the traffic goes to Invermere. He is to send a fax of the registry.
25/06/2001	Lorne	Springbank Flight Services tower	Telephone discussion. Requested information between Springbank and Invermere. Directed to call Nick Walker, GM of Operations at Nav. Canada for this information.

Date	Contact	Organization	Summary
25/06/2001	Doug Soloway	Transport Canada	Telephone discussion. Suggested calling other airstrip managers for information along the VFR routes. No official stats for Banff airstrip.
27/06/2001	Nick Walker	Navigation Canada	Telephone discussion. Navigation Services only has information for take offs and landings for Springbank. Suggested calling Ron Sealy, Chief of Springbank Tower for Springbank airstrip info. Also suggested calling operators and owners of other airstrips suggesting Transport Canada should have stats.
28/06/2001	Ron Sealy, Chief of Springbank Tower ESS	Springbank ESS	Telephone discussion. Could obtain take-off and landing information for the airstrip. There were about 20 aircraft /day to the Invermere area.
03/07/2001	Cliff White, Warden	Parks Canada	Telephone discussion. Discussion regarding time elapsed since last fire in the airstrip vicinity.
03/07/2001	Darryl Zell, GIS	Parks Canada	Telephone discussion. Requested GIS data on the land area of ecosites by Bear Management Unit.
04/07/2001	Janet Babin	Invermere airstrip	Telephone discussion. Invermere does not keep air traffic records. There are privately owned hangars and glider activity at the airstrip.
04,09,10/07/2001	Barb Hyllestad	Babin Ltd.	Telephone discussion. Faxed airstrip registry for Fairmont Hot Springs for the years 1999-2001.
09/07/2001	Greg Switenky	Town of Golden	Telephone discussion. Requested info for Golden Airstrip. No information is recorded. Suggested Kamloops flying centre. Monterre air flies to Calgary up to 4 days/week, lands in Golden if there is a pick up or drop off. Could be 8 trips a week into Golden. Alpenglow Aviation and Alpine Helicopters use airstrip frequently. There are 5-6 independent hangars at the airstrip.

Date	Contact	Organization	Summary
09/07/2001	Bernie Schisser	Banff Flying Club	Telephone discussion. Requested any available information.
09/07/2001	Dan Rogers	Kamloops Flight Services/Flight Information Centre	Telephone discussion. Requested available information on air traffic at Golden. Suggested to confirm that there is no information for Golden. Rough estimate of 10% of traffic call in to flight services. Stats kept for traffic at Kamloops airstrip only.
09,10/07/2001	Clint	Cranbrook Flight Services	Telephone discussion. Obtained number of pilot contacts for 1998, 1999, 2000, 2001 for Fairmont Hot Springs, Invermere, Radium Hot Springs. Pilots are not required to call into flight services.
16/07/2001	Ian Pengelly, Vegetation and Fire Ecologist	Parks Canada	Telephone discussion. Discussed reclamation seed mix for airstrip.

PHOTOS

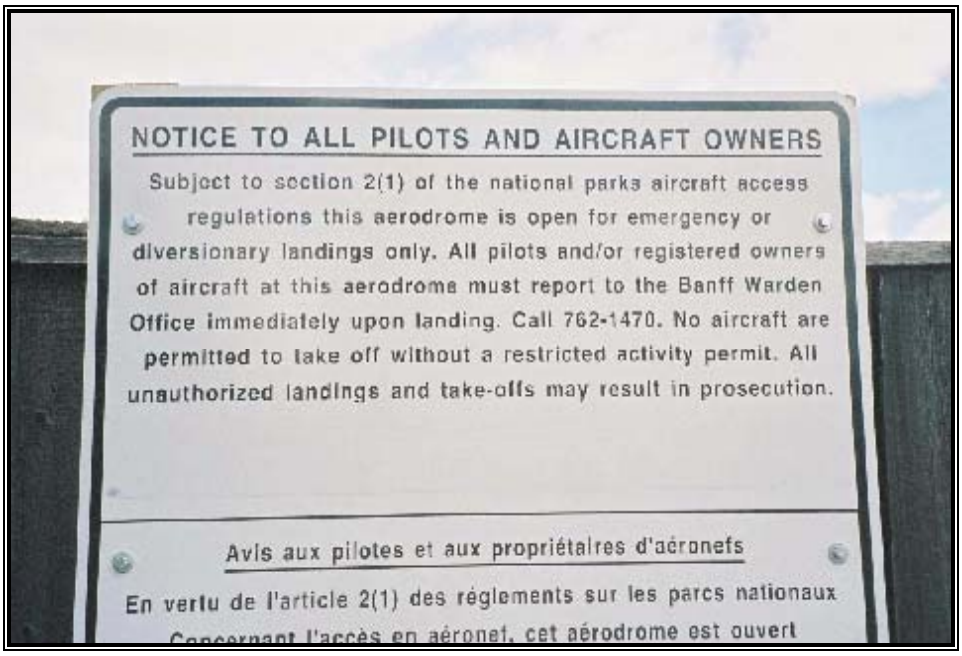

Photo1. Park notification of aircraft regulations

Photo 2. Windsock, looking west on runway

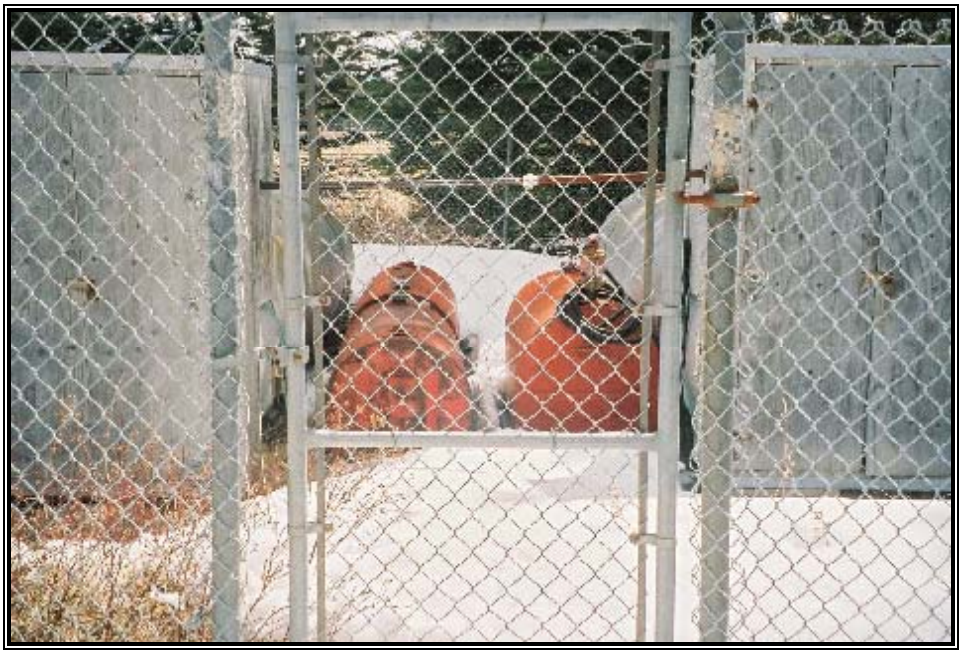

Photo 3. Aboveground storage tank and fuelling facilities

Photo 4. Aircraft parking areas

Photo 5. Airplane shelter

Photo 6. Gravel access road bordering northwest side of runway

Photo 7. Registration and other boxes

Photo 8. Sparse grasses and weeds on runway as a result of winter ploughing, looking east on runway towards Fairholme Range

Photo 9. Shrubby grassland and aspen stands adjacent to runway

Photo 10. Close-up view of NY1 slopes west of runway