

Preliminary
Environmental Screening

Proposed Inuvik Airport
Runway Extension

Final Report

October 9, 2009

Government of the Northwest Territories
DoT Airports Division

09-2154

Submitted by
Dillon Consulting Limited

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PRELIMINARY ENVIRONMENT ASSESSMENT SCREENING REPORT

PROJECT REGISTRATION

A. PROJECT IDENTIFICATION	
Project Name/Title:	Preliminary Environmental Screening of the Inuvik Airport Runway Extension
Project Location:	Inuvik, Northwest Territories
Project Proponent:	Department of Transportation, Airports Division Government of the Northwest Territories
CEAA Trigger:	Federal Funding
CEAR No.:	
TC File No.:	
Estimated Cost:	
EA Start Date:	July, 2009
NOC Posting Date:	
B. CONTACTS	
Name:	Mr. Bill Chapple
Title:	Project Manager
Address:	4922 48th Street P.O. Box 1320 Yellowknife, NT X1A 2L9
Phone:	(867) 873-7809
Email:	Bill.chapple@gov.nt.ca

Notification of Departments and Agencies

The following departments and agencies were consulted regarding the project.

Departments and Agencies Notified Regarding the Project

Departments/ Agencies	Notified on	Trigger or Federal Interest	Role (RA/ FA or N/A)
Inuvialuit Corporate Group	22-Jul-09	The Inuvik Airport is not on Inuvialuit Private Lands.	N/A
Gwich'in Land and Water Board	22-Jul-09	Gwich'in Land and Water Board will not be involved in the Environmental Assessment as the project is located inside municipal boundaries.	N/A
Mackenzie Valley Environmental Impact Review Board	22-Jul-09	Mackenzie Valley Environmental Impact Review Board will not be involved unless there is significant public concern or if the project is referred to them from another agency.	N/A
Government of Northwest Territories (Department of Municipal and Community Affairs)	22-Jul-09 / 27-Jul-09 / 3-Aug-09	The Preliminary Screening will not go through Municipal and Community Affairs Department as they are not involved with the ownership and jurisdiction of the Airport.	N/A
Town of Inuvik	22-Jul-09 / 28-Jul-09	The Town of Inuvik requires a development permit application and other permits will likely be required from Territorial and Federal Agencies.	N/A
Department of National Defense	22-Jul-09 / 31-Jul-09 / 18-Aug-09	DND does not have its own specific requirements associated with EA that would apply if no other assessment process is established.	N/A
Canadian Environmental Assessment Agency - Ontario	22-Jul-09 / 28-Jul-09	The MVRMA stipulates that the CEA Act does not apply in the Mackenzie Valley except where it is agreed that it is in the national interest to refer a proposal to a joint review panel under the Act or in certain transboundary contexts.	N/A
Canadian Environmental Assessment Agency - NWT	31-Jul-09 / 4-Aug-09	As DND is funding, the ultimate responsibility to determine if the project is excluded from assessment under the Act and the level of assessment required, is a DND decision as the responsible authority. A due diligence EA on DND's behalf is recommended.	N/A
Joint Secretariat	4-Aug-09	Confirmed the Inuvik airport is located within the Gwich'in Settlement Area, therefore CEAA does not apply.	N/A

1. INTRODUCTION

The Government of the Northwest Territories - Department of Transportation (DoT), Airports Division is proposing to extend the runway of the Inuvik Mike Zubko Airport from 1,828 metres (6,000 feet) to 2,750 metres (9,000 feet), and to reconstruct and resurface the existing DND taxiway E. The anticipated project components and location is illustrated in **Figure 1-1**.

The project has come at the request of the Department of National Defence (DND) as part of their Forward Operating Location operational requirements which identified the need for a longer runway to safely land F18 aircrafts in Inuvik. DND will provide funding for the project.

A geotechnical investigation will be completed to determine soil properties and site conditions at both ends of the runway and the taxiway to determine final project location and design.

The proposed extension will not change the current operation of the airport except during the winter months (approximately mid September to the end of April) when snow and ice control conditions have not permitted CF18 landing on a 1,828 metres (6,000 feet) runway. This will not amount to a large increase in air traffic but will result in CF18s using the Inuvik airport occasionally during winter where at present they would not have been deployed.

1.1 Location

The Town of Inuvik is located on the east channel of the Mackenzie River, approximately 100 kilometres south of the Beaufort Sea, in the Mackenzie Delta. Inuvik is situated 846 air kilometres north of Whitehorse, 1,086 air kilometres northwest of Yellowknife and 1,931 air kilometres north of Edmonton. The geographic situation of Inuvik is shown in **Figure 1-2**.

The Inuvik Airport is located at 68° 18' 19" north latitude, 133° 29' 14" west longitude and situated within the municipal boundary, approximately 11 kilometres south of the main town site near the Dempster Highway. The location of the Airport in relation to the Town of Inuvik is shown in **Figure 1-3**.

The Town of Inuvik and the Inuvik Airport fall inside the Gwich'in Settlement Area (Marilyn Cockney 2009, Inuvialuit Corporate Group, *pers. comms*). The Settlement Area has a land area of 56,935 km² located entirely in the Northwest Territories - bordered by the Inuvialuit Settlement Region to the north, the Sahtu Settlement Area to the southeast, and the Yukon Territory to the west (shown in yellow in **Figure 1-2**). However, while the Gwich'in Settlement Area encompasses the Town of Inuvik and the Inuvik Airport these areas do not fall under Gwich'in authority as they are located inside the municipal boundary and are covered by Town of Inuvik jurisdiction (Robert Alexie 2009, Gwich'in Land and Water Board, *pers. comms*).

In addition, the Town of Inuvik and the Inuvik Airport fall within the Mackenzie Valley land claim area, which includes all of the NWT excluding the Inuvialuit Settlement Region and Wood Buffalo National Park. The Mackenzie Valley land claim established an environmental assessment regime where all land is codified in the *Mackenzie Valley Resources Management Act* (MVRMA) and administered through the

Mackenzie Valley Environmental Impact Review Board. The MVRMA stipulates that the *Canadian Environmental Assessment Act* does not apply in the Mackenzie Valley except where it is agreed that it is in the national interest to refer a proposal to a joint review panel under the Act or in certain transboundary contexts (Anik Genier 2009, CEAA, *pers. comms.*).

The Airport land is zoned ‘Special Development Zone – SD’ and ‘Hinterland – H’ by the Town of Inuvik zoning by-laws. The purpose of the Special Development Zone is to respect existing land uses and to maintain the greatest flexibility in deciding how the zone may develop in the future. In regards to the airport, the Special Development Zone seeks to regulate the uses of land in the surrounding vicinity. The Hinterland Zone is to allow for the careful management of lands outside the built-up area of Inuvik to ensure growth occurs with ‘sound planning practices’ and ‘prudent environmental considerations’.

Figure 1-1 Project Components and Location

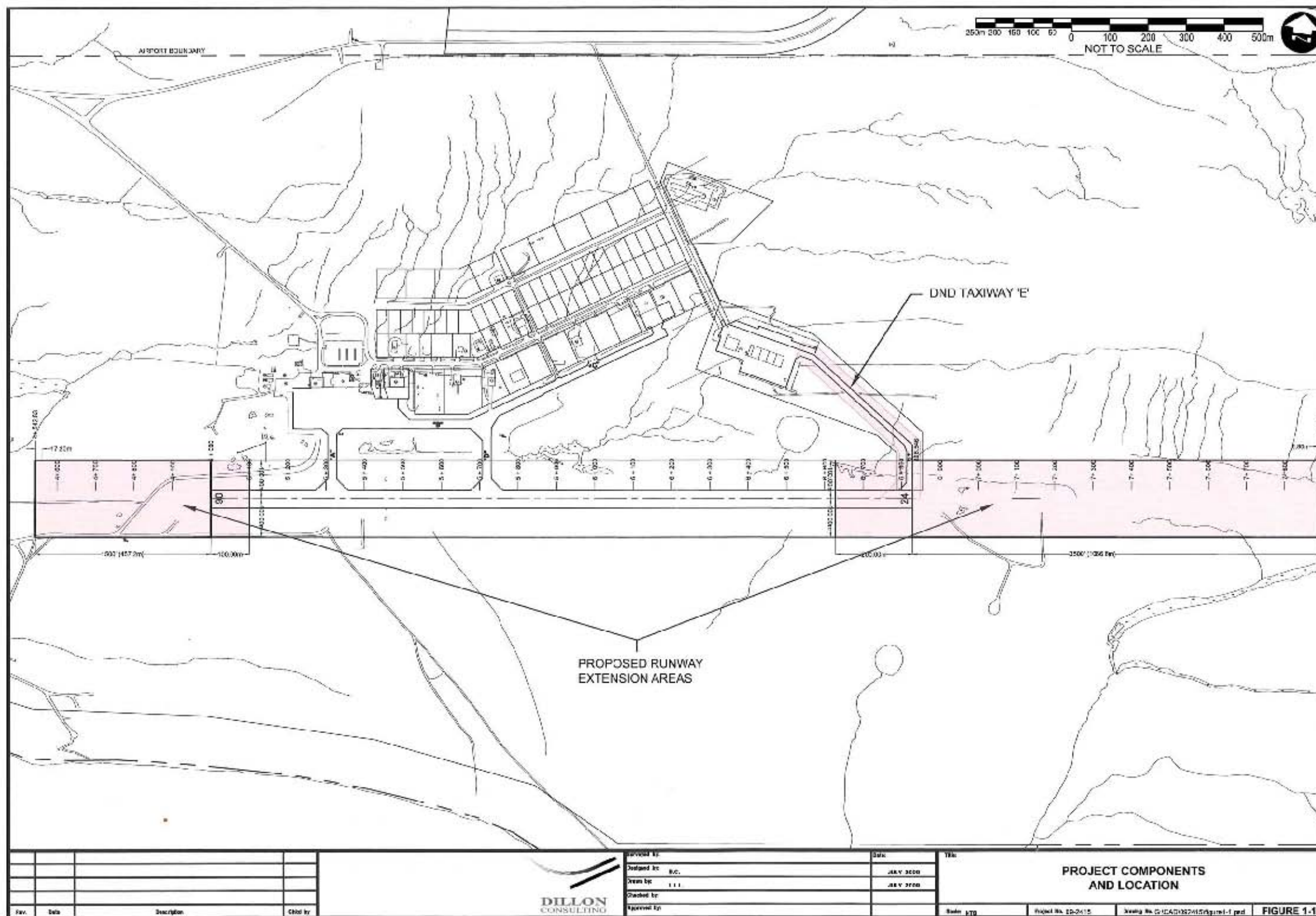


Figure 1-2 Inuvik Geographic Location

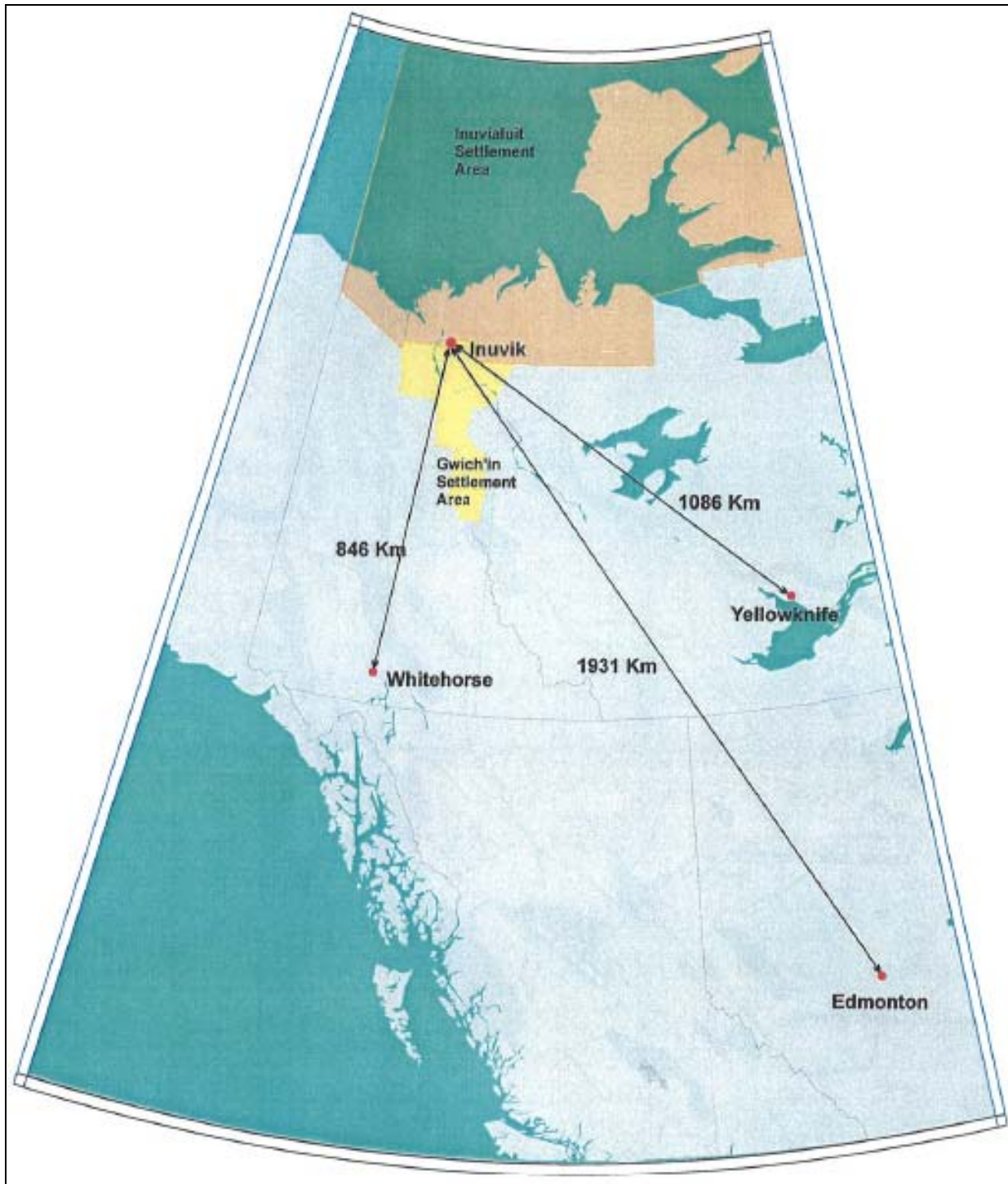
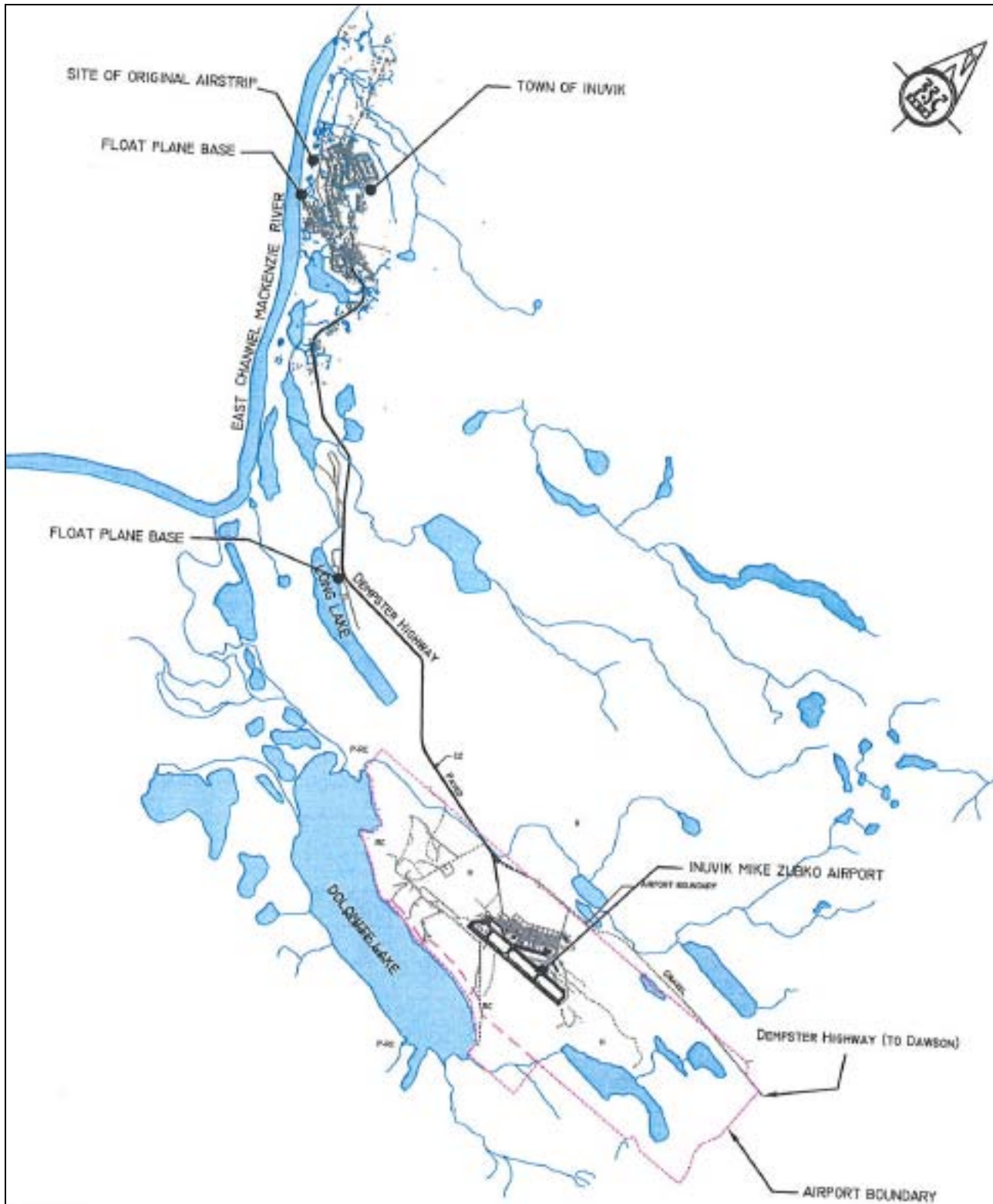


Figure 1-3 Inuvik Airport Location



1.2 Background

The Inuvik Mike Zubko Airport was constructed in 1969 and consists of a single paved runway (06-24) which is 1,830 metres (6,000 ft) long and 45 metres (150 ft) wide. Inuvik Airport is a regional hub serving the surrounding communities. The role of the Inuvik Airport is to provide:

- A point of entry through links with Whitehorse, Edmonton and Yellowknife;
- An interchange point for domestic service to outlying communities;
- A Forward Operating Location for the Department of National Defence F-18 aircraft;
- A point of service for aircraft operations providing passenger, cargo and mail service;
- A major base for exploration and resource development initiatives; and
- A transfer point for air medevac operations.

In the late 1980's, after the Canadian Forces closed its base in Inuvik, the airport was named as a DND Forward Operating Location for the F18's and became the re-supply base for the western portion of the North Warning System.

In recent years DND has identified the potential need to enhance the airport's runway infrastructure to better support the landing and take-off requirements of their CF-18 aircraft and to increase the length of the operational season. Currently, CF-18 use of the airport runway is acceptable, however there are some limitations to operations and there is the need to increase safety.

Current airport operations used to support CF-18 aircraft includes the use of arresting gear. This gear described as a mechanical system designed to rapidly decelerate an aircraft is used as a take-off and landing safely device. At land-based airfields these systems are for expeditionary or emergency use. Typical systems consist of a cable laid across the aircraft landing area, designed to be caught by an aircraft's tailhook. During a normal arrestment, the tailhook engages the wire and the aircraft's kinetic energy is transferred to whatever is attached to the ends of the wire.

The proposed increase in runway length at the Inuvik Airport will provide a greater level of safety for CF-18 aircraft landing and take-off to and from the airport. Arresting systems will be maintained at the airport even after the proposed runway extension is complete however depending on where the runway extension(s) is constructed it may need to be moved to a more acceptable point on the runway (i.e. 1250 feet from first useable runway). Additionally the increased length of the runway will allow DND to operate in Inuvik more often during the winter months (mid-September to the end of April time frame) when snow and ice control (SNIC) conditions have historically precluded CF-18 operations. Although the potential to operate during the winter months will not amount to a large increase in CF-18 traffic to Inuvik it will potentially result in CF-18's being deployed during the winter when which is currently limited due to a 6000 ft runway.

Currently the existing taxiway from the DND hanger to the runway is unsatisfactory for use when the surface conditions are wet or slippery. The slope of the taxiways combined with heavy aircraft can result in dangerous conditions for the aircraft and aircrew. Upgrading the taxiways should address the ability to safely taxi aircraft in adverse surface conditions.

2. PROJECT DESCRIPTION

2.1 Project Description

The proposed project will include two primary components:

Extension of Runway

The existing runway 24 (Figure 1-1) will be extended an additional 914 metres (3,000 ft) and maintain the existing runway width of 45.7m (150 ft). The extension will either be at the end of the existing runway or both ends depending on site conditions determined through geotechnical investigations. The runway extension will be completed within existing airport lands and will be constructed to existing runway standards as regulated by Transport Canada. The runway extension will be constructed on pre-cleared and levelled land and is proposed that the runway extension will be build with a similar design to the existing runway where rock fill material will be quarried and end dumped onto the existing tundra. A sufficient amount of granular fill will be placed over the existing permafrost subgrade assuring that the permanent frost line will be lifted into the gravel fill creating a permanently frozen and stable subgrade. Runway extension surfacing will completed using asphaltic concrete

Rehabilitation of Existing Taxiway

DND taxiway E (Figure 1-1) will undergo side slope and surface rehabilitation. Rehabilitation will include the stabilization of existing taxiway side slopes by adding appropriate fill material and re-grading from surface to ground. The removal of the old surface will be completed during side slope rehabilitation and replacement with a new surface of asphaltic concrete will be completed once new side slopes and surface base have been established and graded to meet Transport Canada and DND design specifications. Taxiway rehabilitation will completed using the most appropriate heavy equipment.

2.2 Project Scheduling

The following table is a preliminary schedule for the project.

Table 2-1 Project Schedule

Environmental Assessment	Fall 2009
Geotechnical investigation	Fall/Winter 2009/10
Public Consultation	Fall/Winter 2009/10
Development Application	Fall/Winter 2009/10
Detailed design	Spring 2010
Site preparation	Summer 2010
Construction of: <ul style="list-style-type: none">• extension to runway• rehabilitation of taxiway	Summer 2010

3. ENVIRONMENTAL ASSESSMENT PROCESS

In accordance with the *Canadian Environmental Assessment Act* (CEAA), the Federal government is required to undertake Environmental Screenings of any projects where a federal authority “grants money or any other form of financial assistance to the project” (CEAA Section 5. (1)(b)). The Department of National Defence (DND) will provide funding for the proposed project. However, as stated above, the project falls within MVRMA lands which stipulates that CEAA does not apply (Anik Genier 2009, CEAA, *pers. comms.*). Therefore, a CEAA environmental assessment screening report is not required.

In the absence of a CEAA Environmental Assessment requirement, it was anticipated that either the Mackenzie Valley Environmental Impact Review Board, the Gwich'in Land and Water Board, the Government of Northwest Territories (Department of Municipal and Community Affairs) or the Town of Inuvik would have an environmental assessment approval process for the project to follow. Personal contact with each agency found the following:

- The Mackenzie Valley Environmental Impact Review Board does not have an environmental assessment requirement as they do not become involved in environmental assessments unless there is significant public concern or if the project is referred to them from another agency (Mackenzie Valley Environmental Impact Review Board, 2009, *pers. comms.*);
- The Gwich'in Land and Water Board does not have an environmental assessment process to follow as the project is located inside the municipal boundary and covered by Town of Inuvik jurisdiction (Robert Alexie 2009, Gwich'in Land and Water Board, *pers. comms.*);
- The Government of Northwest Territories (Municipal and Community Affairs Department) does not have an environmental assessment process for this project as they do not deal with ownership and jurisdiction of Airports (Yvonne Carpenter, 2009, Government of Northwest Territories (Department of Municipal and Community Affairs), *pers. comms.*); and
- The Town of Inuvik will require a development permit application for the project but do not have a specific environmental assessment process for the project to follow (Sara Brown, 2009, Town of Inuvik, *pers. comms.*).

Therefore, in the absence of another environmental assessment approval process, the ultimate responsibility to determine if the project is excluded from assessment under CEAA and the level of assessment required, is a DND decision as they are the federal funding agency (Susan Tiege, 2009, Canadian Environmental Assessment Agency, *pers. comms.*). A due diligence environmental assessment on DND's behalf is recommended.

Therefore, this screening report will follow the environmental assessment framework specified by the Canadian Environmental Assessment Agency. The environmental assessment will screen for due diligence on the part of the Government of Northwest Territories (Division of Transport) on behalf of DND. The environmental assessment will be provided as a supporting document during application for the Town of Inuvik development plan and for review by other interested agencies.

4. SCOPE OF PROJECT

A screening is a systematic approach to documenting the environmental effects of a proposed project and determining the need to eliminate or minimize (mitigate) the adverse effects, to modify the project plan or to recommend further assessment through mediation or an assessment by a review panel.

As specified above, a formal CEAA screening report is not required for this project. Instead, a due diligence environmental assessment following the CEAA framework has been conducted.

Project Components Description

The CEAA framework specifies the scope of the project must be “in relation to a physical work, any construction, operation, modification decommissioning, abandonment or other undertaking in relation to the physical work that is proposed by the proponent or that is likely to be carried out in relation to that physical work” CEAA Section 15 (3). **Table 4-1** outlines the core and ancillary components of the project.

Table 4-1 Scope of Project – Summary Table

PROJECT PHASES/ COMPONENTS	DESCRIPTION
Pre-Construction:	
- Geotechnical investigation and drilling program	A geotechnical investigation and drilling programme will be completed on the project site. Boreholes will be drilled to a depth of at least 9 metres to determine the sub-surface conditions - including soil description, soil classification, bedrock depth (if encountered), SPT Testing, permafrost conditions, and groundwater conditions.
Construction:	
- Site preparation and runway base construction	Existing runway 24 will be extended an additional 914 metres (3,000 ft) to the east and/or west. Preparation to level the site will be undertaken. Fill will be sourced from a nearby quarry (one quarry is located on the airport site and two additional quarries are located within 30 kilometres) and will be placed and levelled on site. The runway base will be constructed by end dumping appropriate rock base material over the existing land to the appropriate elevation to match existing runway surfaces and bank slopes. Standard equipment and operation techniques will be utilized.
- Construction of runway surface	The extended runway base will be surfaced by pouring and levelling asphaltic concrete. Standard equipment and operation techniques will be utilized.
- Rehabilitation of taxiway	The existing DND taxiway will undergo side slope and surface rehabilitation. The rehabilitation will require removal of the existing surface, infilling and regrading of existing side slopes to meet new design requirements and pouring and levelling a new surface of asphaltic concrete. Standard equipment and operation techniques will be utilized.
- Access Road	Although likely not required a temporary construction access road may be constructed adjacent to the proposed airport runway extension area to allow equipment to access work areas without the potential for interruptions to airport operations
- Surface Water Management	Surface water management designs will be incorporated into construction of the runway and taxiway perimeter side slopes and base elevations to direct surface water runoff into existing natural drainage paths and minimize surface water pooling. Standard equipment and operation techniques will be utilized.
Operation and Maintenance	The proposed runway extension will not change the current operation or maintenance activities of the existing Airport.
Decommissioning	Decommissioning effects are not anticipated as the project has been designed as a permanent feature and is intended to be repaired or replaced at the end of its lifecycle which is anticipated out beyond 70+ years. At the end of its lifecycle, decommissioning, repair or replacement will be done in a manner consistent with up-to-date construction/demolition and environmental standards.

3.1 Scope of Assessment

The factors considered in the environmental assessment, pursuant to section 16 (1) of the CEAA, included the following:

- The environmental effects of the Project, including the environmental effects of accidents or malfunctions 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;
- The significance of the environmental effects referred to above; and
- Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project.

The scope of factors that were considered in the environmental assessment, in relation to the scopes of the project identified above, included potential effects (including cumulative effects) on the following environmental components:

Biophysical Environment:

Air quality	Vegetation
Soils	Wetlands
Surface water	Fish and fish habitat
Groundwater	Wildlife and wildlife habitat
Noise and vibration	Species at risk

Socio-Economic Environment

Heritage and archaeological features	Public safety
Land use	Transportation
First nations	Economics

5. PROJECT SITE INFORMATION

The following provides a description of existing environmental conditions in the study area.

5.1 Description of Biophysical Environment

5.1.1 Terrain and Topography

The Inuvik Airport is located on the east channel of the Mackenzie Delta within the Anderson Plain division of the Interior Plain physiographic region of the Borderlands, approximately 100 kilometres south of the Beaufort Sea (Inuvik Airport Development Plan 2002).

The airport is situated on a flat plateau on the north shore of Dolomite Lake located within the Campbell Lake Dolomite Upland Ecoregion - a rather small area recognized as a distinctive tectonic element in the sedimentary complex of north western Canada. The airport site slopes gently from north to south. The outcrops adjacent to the airport consist of the oldest known rocks in the area. These are interbedded, gray to pale red, silty dolomites (dated by paleomagnetism as late Precambrian), gray and green shale, and light gray quartzite (Johnson 1981).

5.1.2 Soils

The general soil profile for the site consists of a layer of organic material, ranging in thickness from 0.1 to 2.4 metres, underlain by a brown silt with varying amounts of sand, clay, and stones. This layer, ranging in thickness from 1.5 to 3.3 metres, is underlain by a gray silty gravel with some sand and clay. The peat is composed of a mixture of fine particles and fibres with some larger woody particles. Below the peat, the matrix of silt with sand, stones, and clay is well bonded by ice, and not visible to the eye. Stones ranging in size from 2.5 to 15 centimetres and an occasional boulder of 45 to 60 centimetres occur in the silt and silty gravel strata (Johnson 1981).

5.1.3 Surface water

Surface water resources on the site include lowland areas and small drainage channels running in a southeast direction. Two small shallow lakes originally lay on the runway alignment, one to the east and one to the west of the runway, however both were filled in during airport construction in 1969. The surface water resources in the Mackenzie Delta are ice covered for up to 8 months of the year and only flow seasonally during spring runoff and periods of high precipitation (Aurora Research Institute 2008).

Dolomite Lake (also known as Airport Lake) is located adjacent to the south and west boundaries of the airport site. The lake is approximately five kilometres in length and receives intermittent surface water drainage from several wetland ponds and lakes located within airport lands east of the existing runway. The lake is typically ice covered from November to June.

5.1.4 Groundwater

Groundwater supply and quality information in the study area is not currently known but will be determined during a geotechnical survey completed in the fall/winter of 2009/10.

As the area is serviced by piped water, groundwater supplies are not relied on for potable/drinking water.

5.1.5 Climate

Inuvik experiences a Continental Arctic climate characterized by cool temperatures in summer and extremely cold winters. The temperature range is approximately 40°C while the annual precipitation is about 250 millimetres which occurs most frequently during the summer (**Table 5-1**) (Environment Canada 2008).

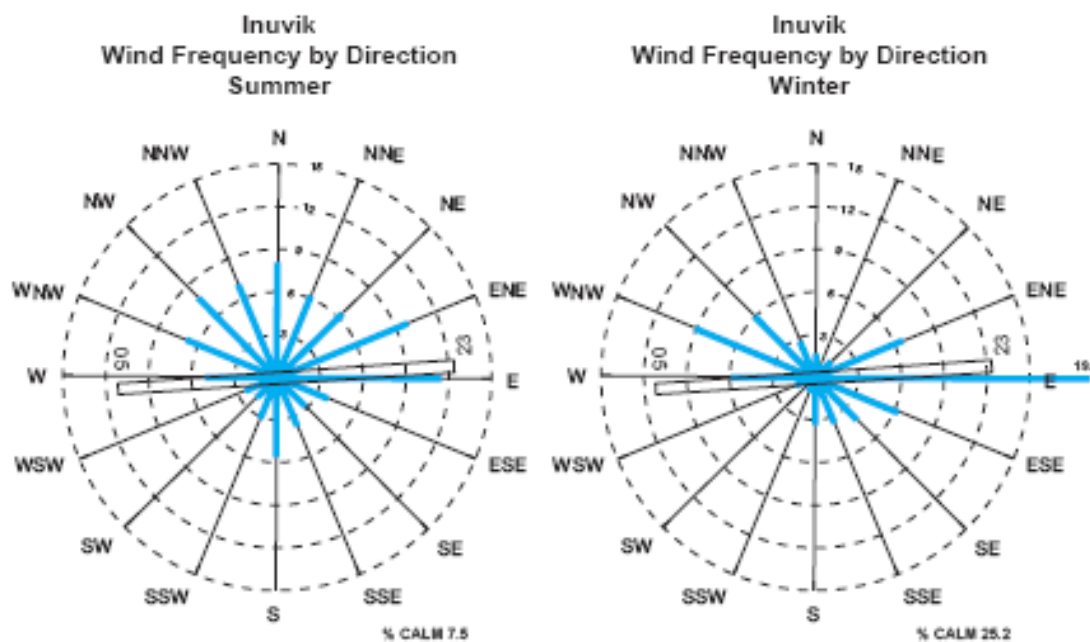
Table 5-1 Inuvik Climate

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high (°C)	5.4	5.2	6.1	13.8	25	32.8	32.8	32.5	26.2	15	10.6	5	-
Average high (°C)	-23.2	-22	-17.5	-7.1	5	17.3	19.8	16.1	7.8	-4.8	-16.8	-21.3	-3.9
Average low (°C)	-31.9	-31.7	-28.8	-18.4	-4.7	5.3	8.5	5.9	-0.4	-11.6	-25.1	-30.1	-13.6
Record low (°C)	-54.4	-56.7	-50.6	-46.1	-27.8	-6.1	-3.3	-6.1	-20.1	-35	-46.1	-50	-
Precipitation (mm)	13.8	11.6	11	10.5	17	22.1	33.2	39.9	28	28	17.8	15.7	248.4

(Environment Canada 2009)

The prevailing wind direction is east and east-northeast winds. West-northwest winds and northwest winds also prevail, particularly during strong wind events (**Figure 5-1**) (Nav Canada 2005).

Figure 5-1 Inuvik Wind Frequency and Direction



(Nav Canada 2005)

5.1.6 Air quality

Monitoring equipment was installed near the Inuvik Airport, at an existing Environment Canada monitoring station in 2001 as part of the National Air Pollution Surveillance Network. The equipment measures monthly values of sulphur dioxide, oxides of nitrogen and ozone. Air quality in Inuvik was recorded as 'excellent' typical for a remote and northern environment, although the effects of dust were noticeable throughout the spring and summer months (Northwest Territories Environment and Natural Resources 2008).

5.1.7 Noise

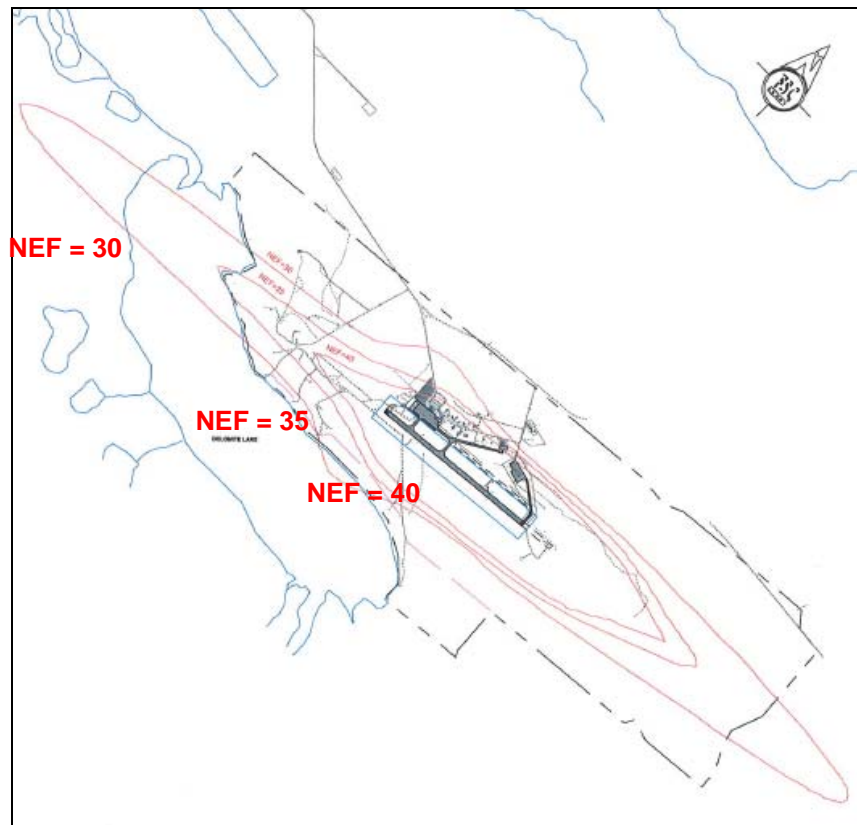
Transport Canada conducted a Noise Exposure Forecast (NEF) Contour for the Inuvik Airport Development Plan in 2002. Contours of equal NEF index values (measured in effective perceived noise decibels – EPNdB) are the accepted means of portraying exposure to aircraft noise. The NEF Contours are measured using information on type of aircraft using the airport, their flight paths and proximity to the ground, and operation information (*i.e.*, number of arrivals and departures, time of day). Noise impacts are based on the busiest months of the year to represent the maximum effect of aircraft noise. The noise impacts of all aircraft using the airport are calculated and summarized for a typical day. The expected community response to noise levels is given in the following table.

Table 5-2 Community Response Prediction

Response Area	Response Prediction
Over 40 NEF	Repeated and vigorous individual complaints are likely. Concerted group and legal action might be expected.
35-40 NEF	Individual complaints may be vigorous. Possible group action and appeals to authorities.
30-35 NEF	Sporadic to repeated individual complaints. Group action is possible.
Below 30 NEF	Sporadic complaints may occur. Noise may interfere occasionally with certain activities of the resident.

Figure 5-2 presents the results of the Transport Canada NEF for the Inuvik Airport. A NEF level of 40 was calculated for the airport area, reducing to a 30 NEF level to the areas east and west of the runway. The results were calculated based on a busy period during oil and gas exploration activity in Inuvik. The heavier, jet-type aircrafts are the primary influence on the shape and extent of the NEF contours at the Inuvik Airport.

Figure 5-2 Noise Exposure Forecast Contours



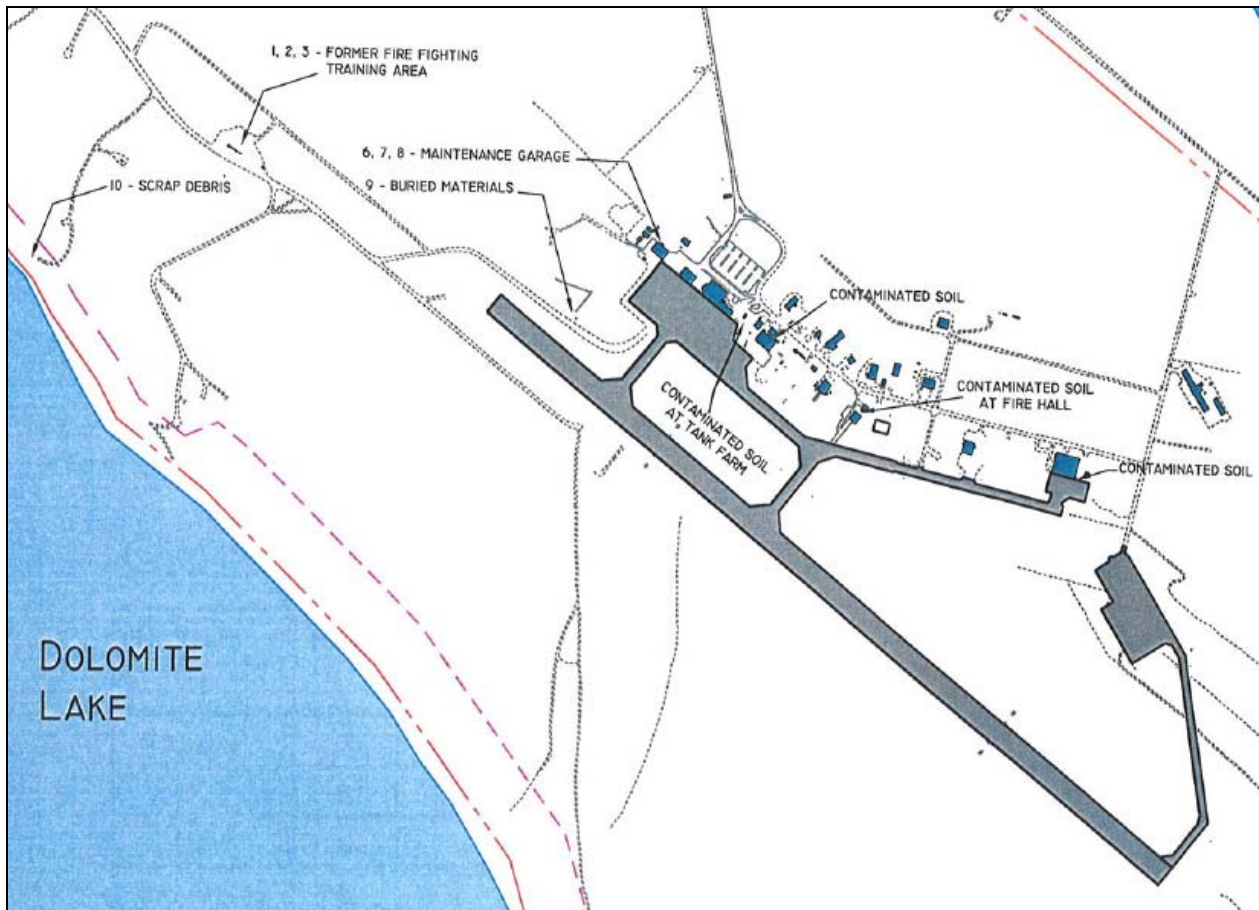
5.1.8 Contaminated Sites

The Inuvik Airport has been operating since 1969. A number of activities occurring on Airport land since this time have resulted in contaminated sites. The contaminated areas include:

- Soil contamination under and around the existing maintenance garage from years of small spills being washed into the floor drains. The maintenance garage was constructed so that whatever was spilt or washed down inside the garage drained into the floor drain and into the ground underneath the building;
- Soil contamination at the firefighting training area;
- Drums containing prime oil buried at the firefighting training area and east of the main quarry;
- Soil contamination at the Localizer / Distance Measuring Equipment Building;
- Soil contamination at the main quarry garbage dump;
- Barrelled asphalt was stored at the maintenance garage during airport construction; and
- The RCMP hanger had a spill of heating oil in 1995.

Sites of contamination are identified in **Figure 5-3**.

Figure 5-3 Areas of Contamination at the Project Site



5.1.9 Vegetation

The project is located in the southern two-thirds of the Mackenzie River delta ecoregion, classified as having a high subarctic ecoclimate (GNWT 2004). Most of the land in the ecoclimate remains frozen year round with only the top layer thawing during the short summer resulting in limited vegetation variety. The dominant vegetation consists of open, stunted stands of black spruce and tamarack and occasionally white spruce. The dominant shrubby understory layer consists of dwarf birch, willow, crowberry, and alder. The herb and bryophyte layers were dominated by cottongrass, lichen, and peat moss. Poorly drained vegetation communities consisted of tussocks of sedges (*Carex* sp.), cottongrass, and sphagnum (peat) mosses.

Lowland areas are scattered throughout the study area consisting of peat bogs with sphagnum (peat) moss, sedges (*Carex* sp.), and lichens, with dwarf birch and Labrador commonly present in the shrub layer. Stunted black spruce and tamarack are present surrounding the lowland areas.

A list of vegetation species observed in the study area is provided in **Table 5-3**.

It is estimated that nine per cent (or approximately 97 species) of the vascular plants in the NWT have been introduced from Eurasia or elsewhere in North American. This number is expected to increase with more disturbances to the land (Working Group on the General Status of NWT Species 2006). A number of invasive species were observed on the project site.

Table 5-3 Vegetation Observed in the Study Area

Scientific Name	Common Name
Trees	
<i>Betula papyrifera</i>	white (paper) birch
<i>Larix laricina</i>	tamarack (larch)
<i>Picea glauca</i>	white spruce
<i>Picea mariana</i>	black spruce
Shrubs	
<i>Alnus crispa</i>	green alder
<i>Andromeda polifolia</i>	bog rosemary
<i>Arctostaphylos rubra</i>	alpine bearberry
<i>Betula pumila</i>	dwarf birch
<i>Empetrum nigrum</i>	crowberry
<i>Ledum groenlandicum</i>	bog Labrador tea
<i>Potentilla fruticosa</i>	shrubby cinquefoil
<i>Rosa acicularis</i>	prickly rose
<i>Salix reticulata</i>	rock willow
<i>Salix</i> sp.	willow species
<i>Shepherdia canadensis</i>	Canada buffalo-berry
<i>Vaccinium scoparium</i>	grouseberry
<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Viburnum edule</i>	low-bush cranberry
Herbs	
<i>Arnica alpina</i>	Alpine artica
<i>Artemisia norvegica</i>	sagewort
<i>Calamagrostis canadensis</i>	bluejoint (reedgrass)
<i>Carex aquatilis</i>	water sedge
<i>Carex scirpoidea</i>	single-spike sedge
<i>Carex</i> sp.	sedge species
<i>Eleocharis</i> sp.	spike rush species
<i>Elymus</i> sp.	wheatgrass species
<i>Epilobium angustifolium</i>	fireweed
<i>Epilobium latifolia</i>	narrow-leaved fireweed
<i>Equisetum arvense</i>	common horsetail
<i>Erigeron</i> sp.	fleabane species
<i>Eriophorum</i> sp.	cottongrass
<i>Hordeum jubatum</i>	foxtail barley
<i>Melilotus alba</i>	white sweet clover

<i>Melilotus officinalis</i>	yellow sweet clover
<i>Petasites</i> sp.	colt's-foot
<i>Poa</i> sp.	bluegrass species
<i>Rubus arcticus</i>	dwarf raspberry
<i>Rubus chamaemorus</i>	cloudberry
<i>Senecio</i> sp.	groundsel species
<i>Taraxacum officinale</i>	common dandelion
<i>Trigochin</i> sp.`	arrow-grass species
Moss/Lichens	
<i>Cetraria cucullata</i>	curled cetraria
<i>Cladina mitis</i>	green reindeer lichen
<i>Cladina rangifera</i>	grey reindeer lichen
<i>Cladonia borealis</i>	red pixie-cup lichen
<i>Cladonia pyxidata</i>	pixie-cup lichen
<i>Dicranum</i> sp.	cushion moss species
<i>Hylocomium splendens</i>	step moss
<i>Pleurozium schreberi</i>	red-stemmed feather moss
<i>Sphagnum</i> sp.	peat moss species
<i>Stereocaulon paschale</i>	cottontail foam

5.1.10 Wetlands

Lowland areas are scattered throughout the study area consisting of peat bogs with sparse amounts of open water and depths of less than 0.5 metres. A thick organic layer is expected in these areas. The surface water in these lowland areas are ice covered for up to 8 months of the year and only hold water seasonally during spring runoff and periods of high precipitation (Aurora Research Institute 2008).

5.1.11 Fish and Fish Habitat

There are no fish or fish habitat in the study area. Dolomite Lake is the nearest fish bearing water body which is 2.6 kilometres southwest of the airport. Racca and Hannay (2004) investigated Dolomite Lake during a study to test fish deterrents under ice in the Mackenzie Delta area. **Table 5-4** lists the most common fish species found in Dolomite Lake during this investigation.

Table 5-4 Common Fish Species Found in Dolomite Lake

Scientific Name	Common Name
<i>Coregonus clupeaformis</i>	Lake whitefish
<i>Coregonus nasus</i>	broad whitefish
<i>Stenodus leuichthys</i>	inconnu
<i>Salvalinus namaycush</i>	lake trout
<i>Esox lucius</i>	northern pike

5.1.12 Wildlife and Wildlife Habitat

The study area is within the Mackenzie Delta, which is the largest delta in Canada and provides habitat for a number of wildlife species. Characteristic wildlife includes muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), mink (*Neovison vison*) and many species of waterfowl (GNWT 2004). The Project Area is highly developed and disturbed from airport related activities, but the limited natural vegetation that exists provides suitable wildlife habitat and it is possible that some small mammals and birds are accustomed to the disturbed environment. Sandhill cranes (*Grus americana*) were observed in the wet area north of the DND Taxiway 'E' and songbirds were observed throughout the area; however, the study area is not known to, or expected to, serve as valued habitat for migratory birds. Spruce grouse, a resident bird species, were also observed in the study area.

5.1.13 Species at Risk

The NWT is developing a Provincial Species at Risk legislation which is anticipated to be completed by 2010. The *Species at Risk (NWT) Act* will be based on the results of the NWT General Ranking Program and will establish the mechanisms to assess special status at the territorial level (Government of NWT 2008). The federal *Species at Risk Act (SARA)* legally protects "at-risk" wildlife (wildlife listed on Schedule 1 of SARA) and their habitats and residences (Government of Canada 2002). This protection applies to migratory birds and "at risk" species that occur on federal lands in Canada (National Parks, lands used by the Department of National Defence, reserve lands in Canada, and the majority of land in the three territories).

Four species listed under SARA, the woodland caribou (*Rangifer tarandus caribou*), peregrine falcon (*Falco peregrinus*), Eskimo curlew (*Numenius borealis*) and the rusty blackbird (*Euphagus carolinus*) have the potential to occur in or around the Study Area (Government of Canada 2007, Government of NWT 2008). Additionally, there are four other species considered to be of "special concern" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) which may occur in the Project Area including the polar bear (*Ursus maritimus*), grizzly bear (*Ursus arctos*), wolverine (*Gulo gulo*) and short-eared owl (*Asio flammeus*). SARA or COSEWIC listed species with the potential to occur in the Study Area are listed in **Table 5-5**.

Approximately 14 per cent of NWT species of vascular plants may be at risk. The majority of these plants of global conservation concern are asters and mustards. No rare plants were observed during the site visit, however seven species of plants listed as sensitive by the NWT General Status have been identified with the potential to occur in the project area (**Table 5-5**). These plants are not currently legally protected under SARA or COSEWIC as the NWT is currently developing their own Wildlife Act, however it has been suggested they are sensitive and have the potential to become protected in the near future.

Table 5-5 Special Status Species with the Potential to Occur in the Study Area

Species	SARA Status	COSEWIC Status	NWT General Status	Comment
WILDLIFE				
Woodland Caribou (boreal population)	Threatened	Threatened	Sensitive	The woodland caribou (boreal population) live in the forests east of the Mackenzie Mountains. The boreal population prefer to live in forested areas and in areas with no human disturbance so are unlikely to frequent the study area (Government of NWT 2008). No woodland caribou or areas of high quality habitat were observed in the study area during the site visit.
Peregrine Falcon	Threatened	Threatened	Sensitive	The boreal/ <i>anatum</i> subspecies of the peregrine falcon breeds in the forested areas of the NWT. They prefer sheltered ledges or crevices on cliffs, near water and with good foraging areas (Government of NWT 2008). Although no peregrine falcons were observed in the area during the site visit, nesting sites have been recorded south of the area (Inuvik Airport Development Plan).
Eskimo Curlew	Endangered	Endangered	At Risk	The eskimo curlew breeds in habitat consisting of upland tundra, treeless dwarf shrub and grass tundra, woodland transition zones, and grassy meadows. There has been no evidence of nesting in the NWT since 1866, but there have been a few confirmed occurrences of sightings in the last 20 years (Government of NWT 2008). No Eskimo curlew or suitable habitat were observed in the study area during the site visit.
Rusty Blackbird	Special Concern	Special Concern	May be At Risk	Rusty blackbirds require wetland areas for breeding and feeding. They are found near slow moving streams, peat bogs, marshes swamps, and beaver ponds; they will rarely enter the interior of forests (Government of NWT 2008). No rusty blackbird observations were made in the study area during the site visit.
Short-Eared Owl	Schedule 3	Special Concern	Sensitive	The short-eared owl is currently listed under Schedule 3 of SARA as “special concern” and requires further assessment by COSEWIC for possible inclusion under Schedule 1 (Government of Canada 2008). Short-eared owls can be found in open grasslands, prairies and tundra. In summer, they can be found in long grasses similar to the color of their feathers. In the winter, the usually solitary birds can be found at airports in large groups (Government of NWT 2008). No short-eared owl observations were made in the study area during the site visit.

Polar Bear	No Status	Special Concern	Sensitive	COSEWIC has recommended that the polar bear be listed as "special concern" under SARA. Polar bears are comfortable on land and in water. In general, these bears will follow ice flows and seals. Females will make dens on land in order to have and raise their young (Government of NWT 2008). The polar bear (South Beaufort Sea population) could have the potential to occur near the Project Area however no polar bear or areas of high quality habitat were observed in the study area during the site visit.
Grizzly Bear	No Status	Special Concern	Sensitive	COSEWIC has recommended that the grizzly bear be listed as "special concern" under SARA. Grizzly bear habitat includes open or semi-forested areas commonly in alpine or sub-alpine terrain and on the tundra. Grizzly bears are sensitive to human disturbance so are unlikely to use the study area (Government of NWT 2008). No grizzly bear observations were made in the study area during the site visit.
Wolverine	No Status	Special Concern	Sensitive	COSEWIC has recommended that the wolverine be listed as "special concern" under SARA. Wolverines can live in a wide variety of habitats including boreal forests, alpine tundra, and barren lands. They require large areas of undisturbed wilderness so are unlikely to be found within the study area (Government of NWT 2008). No wolverines or areas of continuous suitable habitat were observed in the study area during the site visit.
VEGETATION				
Arctic fescue	No Status	No Status	Sensitive	Preferred habitat includes pioneer and disturbed area, slopes; imperfectly drained moist areas, or on seepage slopes, or dry, or moderately well drained areas No arctic fescue were observed in the study area though potential suitable habitat is present
Arctic willowherb	No Status	No Status	Sensitive	Preferred habitat includes wet clay in tundra barrens; wet meadows, around the edges of ponds, depressions; imperfectly drained moist areas; disturbed terrain No arctic willowherb were observed in the study area though potential suitable habitat is present
Greenland Rockcress	No Status	No Status	Sensitive	Preferred habitat includes calcareous, gravelly barrens; imperfectly drained moist areas or dry, moderately drained areas; colonizing species No greenland rockcress were observed in the study area though potential suitable habitat is present
Purple mountain heather	No Status	No Status	Sensitive	Preferred habitat includes turfy, rocky places; tundra, slopes, ridges; imperfectly drained moist areas or moderately well drained areas No purple mountain heather were observed in the study area though potential suitable habitat is present
Red-tip lousewort	No Status	No Status	Sensitive	Preferred habitat includes moist calcareous tundra; wet meadows, along streams, floodplains, marshes; sandy ground with moist turf No red-tip lousewort were observed in the study area though potential suitable habitat is present

Dane's gentian	No Status	No Status	May Be At Risk	Preferred habitat includes sandy beaches and gravelly mud flats; wet meadows, imperfectly drained moist areas or dry; rocks and gravels No dane's gentian were observed in the study area though potential suitable habitat is present
Moss heather	No Status	No Status	May Be At Risk	Preferred habitat includes sheltered, rocky places in arctic /alpine areas; imperfectly drained moist areas; snow patches No moss heather were observed in the study area though potential suitable habitat is present

Government of NWT, Environment and Natural Resources (2009)

5.2 Description of Socio-Economic Environment

Inuvik is the regional centre for the Beaufort Delta Region (BDR), and the barge and air transport hub for many communities. With a population of almost 3,500, the community is the largest in the BDR and is distinctive as multi-ethnic with many Gwich'in, Inuvialuit, Dene, Métis and non-Aboriginal members. Inuvik, Fort McPherson, Tsiigehtchic, Aklavik, Tuktoyaktuk, and the high Arctic communities of Sachs Harbour, Holman and Paulatuk are the eight communities located in the BDR. Because of its importance as both the regional and the oil and gas exploration centre of the BDR, in 2001 Inuvik had the highest labour force participation and employment rates, and the lowest unemployment rate among the BDR communities. Inuvik is also the main headquarters for the oil and gas industry operating in the Beaufort Sea/Mackenzie Delta.

5.2.1 Heritage and Archaeological Features

The Prince of Wales Northern Heritage Centre has been consulted to ensure that there will be no impacts to archaeological sites as a result of the project. No known archaeological sites have previously been documented or are expected to occur within 150 metres of the proposed project area (Prince of Wales Northern Heritage Centre 2009 *pers. comms*).

5.2.2 Land Use

The current land use conditions surrounding the land to the north and east of the study area are commercial with little vacant land, and limited to the airport facilities and activities typical of a small regional airport.

To the south of the airport, land uses include local recreational uses of Dolomite Lake and several 'squatter' cabins on the lake shore. Other land uses in the region are limited primarily to trapping, hunting, recreation, and tourism.

No permanent residential uses exist within the study area.

The Airport is zoned 'Special Development Zone – SD' and 'Hinterland – H' by the Town of Inuvik zoning by-laws. The purpose of the Special Development Zone is to respect existing land uses and to maintain the greatest flexibility in deciding how the zone may develop in the future. In regards to the airport, the Special Development Zone seeks to regulate the uses of land in the surrounding vicinity. The Hinterland Zone is to allow for the careful management of lands outside the built-up area of Inuvik to ensure growth occurs with 'sound planning practices' and 'prudent environmental considerations'.

5.2.3 Land Use by First Nations

The Inuvik Airport site is located within the Gwich'in Settlement Area, and less than 50 kilometres from the border of the Inuvialuit Settlement Region. As discussed above, while the Gwich'in Settlement Area encompasses the Inuvik Airport it does not fall under Gwich'in land claim jurisdiction as it is located inside the municipal boundary (Robert Alexie 2009, Gwich'in Land and Water Board, *pers. comms*).

Both the Gwich'in and Inuvialuit people reside throughout the wider regional area. Their land uses in the airport area are limited primarily to trapping, hunting, recreation, and tourism on land surrounding Dolomite Lake.

5.2.4 Transportation

Inuvik air services provide an essential transportation link with southern Canada and other northern centres. Jet service is provided to the south via Norman Wells and Yellowknife. As a hub in the western arctic, Inuvik Airport provides air services in support of businesses, tourism, forest fire management operations, community resupply for surrounding communities, and mining and exploration.

Two unlicensed water/ice aerodromes are operated within the wider regional area – one at Shell Lake (Long Lake) between Inuvik Airport and Inuvik town, and one on the East Channel of the Mackenzie River.

The Dempster Highway, also referred to as Yukon Highway 5 and Northwest Territories Highway 8, runs to the north of the project area, connecting the Klondike Highway in the Yukon to Inuvik. During the winter months, the highway extends another 194 kilometres to Tuktoyaktuk, on the northern coast of Canada, using frozen portions of the Mackenzie River delta as an ice road. By road, Inuvik is located 1,220 kilometres north of Whitehorse, 3,098 kilometres northwest of Yellowknife and 3,210 kilometres north of Edmonton.

6. ENVIRONMENTAL EFFECTS AND MITIGATION

This section describes the potential environmental effects of the project recognizing the project physical works/activities and nature of the existing environment.

Table 6-1 outlines the potential project components/environmental feature interactions that the assessment was based on. The table considers existing conditions of the study area as presented in Section 5. The effects on the environment are expected to result from clearing and excavation activities associated with the construction phase of the project.

Environmental Effects Analysis, Mitigation Measures & Assessment of Significance

Table 6-2 summarizes the potential effects of the project on the environmental features of the study area. For each of the identified environmental features, the table describes the potential for effect, proposed mitigation and assesses the significance of these effects.

Table 6-1 Potential Project – Environment Interaction Matrix

PROJECT PHASES / COMPONENTS	ENVIRONMENTAL COMPONENTS																													
	DIRECT ENVIRONMENTAL EFFECTS															INDIRECT ENV. EFFECTS			OTHER											
	Land					Water					Air			Natural Systems					Socio-Economic		Cultural									
	Terrain and Topography	Soil Quality	Sediments	Erosion / Slope Stability	Other	Surface Water Quality	Surface Water Quantity	Groundwater Quality	Groundwater Quantity	Other	Air Quality	Climate Change	Other	Vegetation	Wetlands	Species at Risk	Migratory Birds	Wildlife / Wildlife Habitat	Fish and Fish Habitat	Other	Human Health / Safety	Navigation Related	Land Use	Other	Cultural Heritage	Aboriginal Use	Archaeological Site	Noise	Vibration	
Pre-construction:																														
- Geotechnical investigation and drilling program	-	●	-	○	-	○	-	-	-	○	-	-	●	-	-	-	-	-	-	-	-	○	-	-	-	-	-	●	●	●
Construction:																														
- Site preparation	●	●	○	●	-	●	○	-	-	●	●	-	●	●	-	-	●	○	-	○	○	○	-	-	-	-	-	○	●	●
- Construction of runway extension	-	●	○	○	-	●	●	-	-	○	○	-	●	●	-	-	●	○	-	○	○	○	-	-	-	-	-	●	●	
- Rehabilitation of taxiway	-	-	○	-	-	○	●	-	-	○	○	-	-	●	-	-	-	○	○	-	○	○	-	-	-	-	-	●	●	
- Access Road	○	○	○	-	-	○	○	-	-	○	-	-	○	○	-	-	○	○	-	○	○	○	-	-	-	-	○	○	-	
- Drainage / Ditch	-	○	○	-	-	●	●	-	-	-	-	-	○	●	-	-	●	●	-	-	○	○	-	-	-	-	○	-	-	
Operation and maintenance	-	-	-	-	-	-	-	-	-	●	●	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	●	●	
Decommissioning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Accidents and malfunctions	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	●	-	-	-	-	-	-	-	
Effects of the environment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

- Potential direct impact
- Potential indirect impact
- No impact anticipated

Table 6-2 Environmental Effects Analysis and Proposed Mitigation Measures

Potential Effects	Mitigation Measures	Residual Effects
<p>AIR QUALITY AND CLIMATE CHANGE</p> <p><u>Construction</u></p> <p>Effects on air quality due to the generation of dust during construction works (i.e., clearing, excavating and grading land, temporary soil stockpiles, and placement of fill materials).</p> <p>Effects on air quality due to CAC and GHG emissions during the operation of equipment during construction.</p> <p><u>Operations</u></p> <p>Current impacts to air quality will not increase during operation as the proposed project will not significantly alter the current operation of the Airport</p>	<ul style="list-style-type: none"> • Project construction will be conducted in compliance with environmental permits and approvals relating to air quality. • Before construction, the DoT will develop an Air Quality Plan for the construction phase of the project. The plan will: <ul style="list-style-type: none"> - Identify feasible mitigation measures that will be implemented to prevent generation and transmission of dust during the pre-load and construction phases of the project; - Commit to known and effective, measures for mitigating construction related air emissions, including diesel particulate matter (PM), as identified by relevant regulatory agencies; - Where possible, implement an anti-idling policy for construction equipment; - Commit to dust minimization strategies, such as wheel wash, sweeping, watering and covering storage piles or unpaved surfaces and dust suppression techniques on roads; and - Identify site-specific considerations, where applicable, such as proximity to sensitive environmental or human receptors. • To mitigate against potential impacts of dust on local air quality during construction activities, best management practices (BMPs) will be applied including, but not limited to the following: <ul style="list-style-type: none"> - Avoid double handling of fill and stockpiled materials and cover loads containing fine materials; - Stockpiled materials will be protected by covering surfaces or applying water; - Use water trucks to dampen temporary and permanent unpaved access routes and staging areas at regular intervals; - Limit the time that unpaved surfaces are exposed; - Speed limits on unpaved roads will be limited to 15 km/hr, where practical; and - Provide tire wash facilities to minimize tracking of road dust onto paved roads. 	<p>Not likely significant</p>

Potential Effects	Mitigation Measures	Residual Effects
	<ul style="list-style-type: none"> • To mitigate against potential impacts of emissions on local air quality during construction activities, BMPs, including but not limited to the following, will be used: <ul style="list-style-type: none"> - Operate the most efficient equipment and at their optimum rated loads; - Follow routine equipment maintenance procedures; - Development of protocols for turning off equipment and vehicles, when not in active use, in order to minimize idling emissions; and - Ensure that all heavy-duty diesel on-road vehicles (i.e., licensed vehicles, such as dump trucks) are in good working order while operating on the project site and the contractor can demonstrate that all vehicles meet a maximum exhaust opacity requirement of 10%, as measured by the SAE J1667 test procedure. 	
<p>SOILS <u>Construction</u></p> <p>Effects on soil and landforms due to the placement of fill to level the runway and taxiway areas.</p> <p>Effects on soil due to potential spills of deleterious substances during construction.</p>	<ul style="list-style-type: none"> • Project construction will be conducted in compliance with environmental permits and approvals relating to soil quality; • Fill to be used on site will be sourced from a nearby quarry (one quarry is located on the airport site and two additional quarries are located within 30 kilometres); • BMPs to be applied to reduce the risk of damage to soil include but are not limited to the following: <ul style="list-style-type: none"> - Standard equipment and operation techniques will be utilized; - The site will be restored to the pre-existing slope profile following construction; - Adequate time in the schedule will be allocated to provide for acceptable compaction of fill material on the runway; - Minimize disturbance of vegetation and soil (i.e. grading, benching, and scarification), by marking work boundaries; - Minimize the length and steepness of slopes to reduce erosion and sediment loss; - Immediately stabilize and seed/revegetate newly disturbed areas following the completion of each construction component; and - Minimize vehicle activity on disturbed site surfaces during and after wet weather. 	<p>Not likely significant</p>

Potential Effects	Mitigation Measures	Residual Effects
	<ul style="list-style-type: none"> • The following general BMPs relate to management and prevention of soil contamination: <ul style="list-style-type: none"> - Staff will be trained in the correct handling and management of potentially harmful substances. - Spills will be removed from the site immediately and disposed of in accordance with Inuvik policies - All hydrocarbon or chemical products shall be disposed of in such a way that will not directly or indirectly contaminate soil; and - An Emergency Response Plan will be developed and implemented. 	
<p>SURFACE WATER QUALITY AND QUANTITY</p> <p><u>Construction</u></p> <p>Effects on surface water quality are unlikely as site drainage is naturally diverted around the proposed runway extension. However there is a small potential for increased sedimentation during construction.</p> <p>Effects on surface water quality due to potential spills of deleterious substances during construction.</p> <p><u>Operations</u></p> <p>Effects on surface water quality due to increased suspended solids, nutrients, metals, and organic compounds as a result of reduced infiltration from project operation.</p>	<ul style="list-style-type: none"> • Construction works and operations for the Project will be conducted in compliance with environmental requirements and BMPs in order to avoid impacts to water quality; • Storm water management infrastructure will be designed, constructed and maintained to control sediment, filter deleterious substances, and managing increased rates of storm water runoff; • A Surface Water Quality and Sediment Control Plan will be developed before project construction to reduce potential impacts on water quality; • The following general BMPs relate to management and prevention of contaminated materials from entering surface water drainage and watercourses: <ul style="list-style-type: none"> - Construction equipment will be cleaned in designated areas that are equipped to prevent contaminated water from entering a natural watercourse; - Install impervious secondary containment for fuel or chemical storage areas; - All hydrocarbon or chemical products shall be disposed of in such a way that will not directly or indirectly contaminate and watercourse; - An Emergency Response Plan will be developed and implemented; - Staff will be trained in the correct handling and management of potentially harmful substances; and - Spills will be removed from the site immediately and disposed of in accordance with Inuvik policies. 	<p>Not likely significant</p>

Potential Effects	Mitigation Measures	Residual Effects
	<ul style="list-style-type: none"> • BMPs to be applied to reduce the risk of erosion processes occurring and sediments entering watercourses downstream of Project activities include but are not limited to the following: <ul style="list-style-type: none"> - Plan Project works to occur during periods of minimal precipitation; - Minimize disturbance of vegetation and soil (i.e. grading, benching, and scarification), by marking work boundaries; - Minimize areas of exposed soil. Excavated materials will be placed as far as possible from a watercourse channel; - Minimize the length and steepness of slopes to reduce the risk of erosion and sediment loss; - Immediately stabilize and seed/revegetate newly disturbed areas following the completion of each construction component; - Sediment control fencing (or equivalent) will be used as sediment and debris control measures around Project works; - Soil excavation stockpiles will be contained and/or covered to prevent water and wind erosion; - Regularly assess the function of erosion control devices and correct any deficiencies; and - Minimize vehicle activity on disturbed site surfaces during and after wet weather. 	
<p>FISH AND FISH HABITAT Effects on fish and fish habitat in Dolomite Lake due to a change in the quantity and/or quality of water discharges from the project site.</p>	<ul style="list-style-type: none"> • All reasonable measures will be taken to prevent substances that may be harmful to fish from entering the aquatic environment, paying particular attention to discharges of suspended sediments, construction waste, and other deleterious substances; • Appropriate measures will be applied to adequately mitigate the effects of the creation of impervious surfaces on volume of surface runoff, rate of runoff, and water quality. These will meet performance targets established in the Stormwater Management Plan for the project; • Construction works and operations for the Project will be conducted in compliance with environmental requirements and BMPs in order to avoid impacts to water quality; • Storm water management infrastructure will be designed, constructed and maintained to control sediment, filter deleterious substances, and managing increased rates of storm water runoff; and • A Surface Water Quality and Sediment Control Plan to reduce potential impacts on water quality. 	No likely effect

Potential Effects	Mitigation Measures	Residual Effects
<p>NOISE AND VIBRATION</p> <p><u>Construction</u></p> <p>Construction equipment operation and activities may increase noise and vibration emissions.</p> <p><u>Operations</u></p> <p>Current noise and vibration impacts will not increase during operation as the proposed project will not significantly change the current operation of the Airport. However, the runway extension may extend noise and vibration impacts to new potentially sensitive areas at the ends of the runway.</p>	<ul style="list-style-type: none"> • Best Management Practices to mitigate against construction related noise and vibration impacts include the following: <ul style="list-style-type: none"> - Whenever possible, construction activities will be carried out within the hours normally permitted by the noise bylaws of the Town of Inuvik; - Turn off equipment when not in use; and - Select equipment or processes that have had additional noise control features, such as better mufflers and enclosures on diesel or gas powered equipment, exhaust silencers on air tools etc; and - Ensure machinery is in good condition prior to construction and that contractors do not utilize excessively noisy equipment. Carry out regular maintenance on all equipment. • Ensure compliance with land use zonings for areas surrounding the airport. 	<p>Not likely significant</p>
<p>CONTAMINATED SITES</p> <p>Effects due to disturbance of known contaminated sites and as those that may be identified during project construction.</p> <p>Effects due to the potential spill of deleterious substances during construction.</p>	<ul style="list-style-type: none"> • Contaminated site investigations will be performed on site during the geotechnical and site characteristic investigation. Mitigation measures may include avoidance or removal and treatment. • Contaminated sites will be investigated and managed in compliance with the Contaminated Sites Regulation (<i>Environmental Management Act</i>). • The following general BMPs relate to management and prevention of spills of hazardous substances: <ul style="list-style-type: none"> - Contain and remove accidental spills of hazardous substances - All hydrocarbon or chemical products shall be disposed of in such a way that will not directly or indirectly contaminate the site. - An Emergency Response Plan will be developed and implemented. 	<p>No likely effect</p>

Potential Effects	Mitigation Measures	Residual Effects
	<ul style="list-style-type: none"> - Staff will be trained in the correct handling and management of potentially harmful substances. - Spills will be removed from the site immediately and disposed of in accordance with Inuvik policies 	
<p>HERITAGE AND CULTURAL RESOURCES</p> <p>No known archaeological sites within 150m of the proposed project area have previously been documented. However, effects may occur if an archaeological or heritage site is discovered during project construction.</p>	<ul style="list-style-type: none"> • Should a potential archaeological site be found during construction activities, staff from the Prince of Wales Northern Heritage Centre will be notified and further measures, if required, will be determined during consultation with them. 	No likely effect
<p>SAFETY</p> <p><u>Construction</u></p> <p>Effects on aviation safety due to construction at the airport.</p> <p>Effects on public safety due to construction vehicles and equipment using public roadways.</p> <p><u>Operations</u></p> <p>Operation of the project will enhance aviation safety as the runway extension will enable F18 aircrafts to land without the use of specialized landing assistance equipment.</p> <p>As the proposed project will not</p>	<ul style="list-style-type: none"> • Safe construction practices that minimize risk to aircraft operations are to be in the construction plan and finalized in association with final tender documents and contract obligations on the part of the contractor; • Plan and stage construction to maximize aviation, contractor and public safety; • Ensure compliance with the Workplace Safety and Health Act; • Establish a safety plan and committee; • Existing signs and fencing will be monitored and maintained to ensure no public access to the airport; • Construction activities are to take place primarily on Airport property. Any construction traffic using roadways will be staggered throughout the day and will abide by established provincial road restrictions; • Implement a traffic control program; and • Ensure compliance with Transport Canada’s Airport Safety Regulations. 	Not likely significant

Potential Effects	Mitigation Measures	Residual Effects
<p>significantly change the current operation of the Airport, risk to public safety will not increase during project operation.</p>		
<p>ACCIDENTS AND MALFUNCTIONS</p> <p><u>Construction</u></p> <p>Effects from accidents or malfunctions during construction. Potential effects include spills of deleterious substances; vehicle, machinery, equipment or aviation accident; or damage to utilities.</p> <p><u>Operation</u></p> <p>As the proposed project will not significantly change the current operation of the Airport, risks of accidents or malfunctions will not increase during project operation.</p>	<ul style="list-style-type: none"> • Staff and contractors will immediately report any spill of any toxic or hazardous material verbally to the DoT representative for the Project, and the Emergency Response Program. • Staff and contractors will immediately take necessary steps to abate the emergency and provide labour, equipment, materials and absorbents to contain and remove the impacts, clean up the affected area, dispose of waste materials at an approved disposal site, and restore the areas to the satisfaction of the environmental regulatory agencies. • An Environmental Management Plan for the Project will ensure there are mitigation measures in place to avoid and minimize the potential for traffic hazards during construction including compliance with the transport and storage of dangerous goods (e.g. fuel and lubricating oils), as per the Transportation of Dangerous Goods Act (section 11.3.3) and worker safety (section 11.3.10). • Construction will be planned and staged to maximize aviation, contractor and public safety; • A safety plan and committee will be established; • Ensure compliance with Transport Canada’s Airport Safety Regulations; • The Project’s Construction Environmental Management Plan will include the following sub-plans specifically relevant to preventing and addressing accidents and malfunctions: <ul style="list-style-type: none"> - Spill Management and Emergency Response Plan; - Construction and Hazardous Waste Management Plan; - Contractor Awareness and Education Plan; and - Health and Safety Plan. • The following general BMPs relate to management and prevention of spills of hazardous substances: <ul style="list-style-type: none"> - Contain and remove accidental spills of hazardous substances; - All hydrocarbon or chemical products shall be disposed of in such a way that will not directly or 	

Potential Effects	Mitigation Measures	Residual Effects
	<p>indirectly contaminate the site;</p> <ul style="list-style-type: none"> - An Emergency Response Plan will be developed and implemented; - Staff will be trained in the correct handling and management of potentially harmful substances; - Spills will be removed from the site immediately and disposed of in accordance with Inuvik policies; and - Safe construction practices are to be in the construction plan and finalized in association with final tender documents and contract obligations on the part of the contractor. 	
<p>EFFECTS OF THE ENVIRONMENT ON THE PROJECT</p> <p><u>Construction</u></p> <p>Effects from the environment during construction. Effects include ice/snow storms and extreme cold, flooding and earthquakes.</p> <p><u>Operation</u></p> <p>As the proposed project will not significantly change the current operation of the Airport, effects from the environment will continue to be managed as at present.</p>	<ul style="list-style-type: none"> • Management for extreme climatic and environmental conditions will be undertaken as per the current operation of the Airport; • Staff and contractors will observe year-round weather warning systems and will notify any potential weather dangers; • Construction materials will be secured and a high standard of site cleanliness will be implemented during construction; • Protection for workers, airport users and airport personnel will be provided during construction; and • Temporary shutdowns and/or evacuation will be implemented during dangerous situations. 	

5.4 Cumulative Effects

Cumulative environmental effects result from the residual effects of a project when combined with those of other past, existing and imminent projects and activities.

The study team is not aware of major planned land development projects within the study area. The Inuvik Region, particularly the Mackenzie Delta area, is currently experiencing a significant increase in oil and gas exploration and extraction activities. A pipeline along the Mackenzie River valley has been proposed to deliver natural gas to the south.

The proposed project is not expected to have a negative environmental effect in combination with other projects or activities in the region.

5.5 Any Other Matter

No other matters of relevance to the screening were identified.

5.6 Environmental Effects Summary Checklist

The following summary checklist has been prepared which takes into consideration all project phases.

Table 5-3 Environmental Effects Checklist

Environmental Component	Potential Project Effects						Residual Effects	
	Potential Adverse Effect?			Can Be It Be Mitigated?			Is it Significant?	
	Yes	No	Uncertain	Yes	No	Uncertain	Yes	No
Topography		●						
Species/Habitat of Special Status		●						●
Vegetation	●			●				●
Wildlife / Habitat	●			●				●
Fish and Fish Habitat		●						
Soils	●			●				●
Groundwater		●						
Surface Water / Hydrology		●						●
Wetlands		●						●
Climate and Air Quality		●						●
Noise		●						●
Vibration		●						●
Land Use		●						
Human Health/Safety	●			●				●
Socio-economic Conditions		●						
Physical/Cultural Heritage	●			●				●
Aboriginal Use of Traditional Lands/Resources		●						
Other Factors								
Accidents and Malfunctions	●			●				●
Effects of Environment on the Project	●			●				●

7. CONSULTATION

7.1 Consultation with the Public

No consultation was undertaken as part of this environmental assessment.

7.2 Consultation with other Provincial Departments and Agencies

Consultation with Provincial Departments and Agencies is summarized in Table 7-1.

Table 7-1 Consultation with Provincial Departments and Agencies

Date	Agency	Name	Contact #	Comments
22-Jul-09	Inuvialuit Corporate Group	Marilyn Cockney	867-977-7106 and email	The Inuvik Airport is not on Inuvialuit Private Lands.
22-Jul-09	Department of Environment and Natural Resources Inuvik	Tobby Halley – renewable officer	867-678-6681	Wildlife permit for airport site assessment is not required.
22-Jul-09	Gwich'in Land and Water Board	Robert Alexie	867-777-7960 and email	Gwich'in Land and Water Board will not be involved in the Environmental Assessment as the project is located inside municipal boundaries.
22-Jul-09	Gwich'in Land and Water Board	Mandy Sumler – Lands Manager	867-777-7913	Approvals expected go through Government of Northwest Territories (Department of Municipal and Community Affairs) or Mackenzie Valley Environmental Impact Review Board.
22-Jul-09	Mackenzie Valley Environmental Impact Review Board		867-766-7050	Mackenzie Valley Environmental Impact Review Board will not be involved unless there is significant public concern or if the project is referred to them from another agency.
22-Jul-09	Government of Northwest Territories (MACA)	Yvonne Carpenter	867-777-7120	Stated that Preliminary Screening may go through Municipal and Community Affairs but need to check information and confirm with colleagues.
22-Jul-09	Town of Inuvik	Sara Brown	867-777-8608	The Town of Inuvik requires a development permit application and other permits will likely be required from Territorial and Federal Agencies. The Gwich'in Land and Water Board are not expected to be involved directly but will likely be a reviewer of the proposal or EA.
27-Jul-09	Government of Northwest Territories (MACA)	Yvonne Carpenter	867-777-7120 and email	The Preliminary Screening will not go through Municipal and Community Affairs Department as they are not involved with the ownership and jurisdiction of the Airport. Suggested the Airports Division of the Government of Northwest Territories will have more information.

Date	Agency	Name	Contact #	Comments
28-Jul-09	Town of Inuvik	Sara Brown – Land development supervisor	867-777-8608	Airport is within municipal boundaries and development permit require – which will require some consultation – issues encroachment on Airport lake and road and current status of land transfer from commissioners to towns.
29-Jul-09	Aurora Research Institute	Paulo Flieg, Manager Scientific Services	867 777-3298 e-mail	Correspondence associated with research permit and environmental information about airport site
3-Aug-09	Government of Northwest Territories (MACA)	Yvonne Carpenter	867-777-7120	Consultation with cabin owners was previously done regarding land transfer application but further consultation will be required.
4-Aug-09	Joint Secretariat	Eli Arkin (through Susan Tiege)	Email	Confirmed the Inuvik airport is located within the Gwich'in Settlement Area, therefore CEAA does not apply.
14-Aug-09	Town of Inuvik	Mr. Grace OConner	867-777-8602	Dolomite Lake and Airport Lake are the same. Airport Lake is within commissioners land but a land transfer has been in process for couple of years. Shell lake within air path and is used for float plans.
14-Aug-09	Town of Inuvik	Danny Johnston	867-777-8614	Discussed availability of mapping of zoning by-laws. PDF copies of Town Zoning maps emailed to Dillon.

7.3 Consultation with other Federal Departments and Agencies

Consultation with Federal Departments and Agencies is summarized in **Table 7-2**.

Table 7-2 Consultation with Federal Departments and Agencies

Date	Agency	Name	Contact #	Comments
22-Jul-09 / 31-Jul-09	Department of National Defense	Scott Hamilton	613-992-3928 and email	CEAA does not apply, the Mackenzie Valley Environmental Impact Review Board may not and DND does not think that Government of Northwest Territories or Town of Inuvik will either - however need to determine project specifics and the EA requirements that Government of Northwest Territories or Town of Inuvik may require. DND does not have its own specific requirements associated with EA that would apply if no other assessment process is established.

Date	Agency	Name	Contact #	Comments
22-Jul-09 / 28-Jul-09	Canadian Environmental Assessment Agency - Ontario	Anik Genier	613-957-0277 and email	In the NWT, EA regimes established in land claims within the Mackenzie Valley, which include all of the NWT other than the Inuvialuit Settlement Region and Wood Buffalo National Park, are codified in the Mackenzie Valley Resources Management Act (MVRMA) and administered through the Mackenzie Valley Environmental Impact Review Board. The MVRMA stipulates that the CEA Act does not apply in the Mackenzie Valley except where it is agreed that it is in the national interest to refer a proposal to a joint review panel under the Act or in certain transboundary contexts.
31-Jul-09 / 4-Aug-09	Canadian Environmental Assessment Agency - NWT	Susan Tiege	780-495-2450 and email	As DND is funding, the ultimate responsibility to determine if the project is excluded from assessment under the Act and the level of assessment required, is a DND decision as the responsible authority. A due diligence EA on DND's behalf is a possibility.
18-Aug-09/ 28-Aug-09/ 14-Sept- 09/ 22-Sept-09	Department of National Defense	Lance Gelinas	613-992-3928 and email	Informed DND that Dillon is completing a due diligence EA for the Department of Transportation, Airports Division, on behalf of the Department of National Defense. Requested DND information on several points to complete the EA - i.e., description of the project, project background, any changes in current operations, public consultation and scheduling.
31-Aug-09	Department of National Defense	LCol. David Mason	e-mail	Provided brief description of runway extension rationale
14-Sept-09	Department of National Defense	Major Chris Matthews	e-mail	Provided brief description of runway extension rationale and taxiway upgrades

7.4 Consultation with Aboriginal Peoples

No consultations with First Nations were conducted.

8. MONITORING PLAN AND FOLLOW-UP

The *Canadian Environmental Assessment Act* (CEAA) defines follow-up as, “a program for verifying the accuracy of the EA of a project, and determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project.”

Monitoring and follow-up programs identified for the project include environmental monitoring programs to ensure the effective implementation of typical project related mitigation and best management practices.

DoT has the overall responsibility to ensure that the mitigation measures they have taken into account in the determination of the significance of effects are implemented for their respective projects as scoped. DoT is responsible for the implementation of mitigation measures, monitoring programs, and the conduct of required monitoring and follow-up, as required by the EA documentation.

References

- Aurora Research Institute (2008) Lakes and Waters in the Mackenzie Delta. Available at: <http://wiki.nwtresearch.com/Sdh2ift3w2mx4b145rubunn45/scirep6.ashx>. August 2009
- Environment Canada 2008. Nav Canada 2005. Airport Climatology for the Yukon. Available at: <http://www.navcanada.ca/ContentDefinitionFiles/publications/lak/yukon/5-Y35EW.PDF>. August 2009
- Government of NWT and Natural Resources Environment (2009) Species at Risk in the NWT. Available at: http://www.enr.gov.nt.ca/live/pages/wpPages/Species_at_Risk.aspx. August 2009
- Government of the Northwest Territories Department of Transportation. Inuvik Mike Zubko Airport Development Plan (2002).
- Johnson, E. A. (1981). Peatland Vegetation Organization and Dynamics in the Western Subarctic, Northwest Territories, Canada. Available at: http://www.ucalgary.ca/~johnsone/pub/Jasieniuk&Johnson_1982.pdf. August 2009
- Northwest Territories Environment and Natural Resources (2008). Keeping and Eye on Our Air, Northwest Territories Air Quality Report. Available at: <http://www.enr.gov.nt.ca/live/documents/documentManagerUpload/2008%20Keeping%20an%20Eye%20on%20Air%20Report.pdf>. August 2009
- Racca, R. G. and Hannay, D. E. (2004) Testing Fish Deterrents For Use, Under-Ice In The Mackenzie Delta Area, JASCO Research Ltd, R. Bruce Murray and William B. Griffiths, LGL Limited, and Michael Muller, IEG Inuvialuit Environmental and Geotechnical Inc. Environmental Studies Research Funds Report No. 145. Calgary. 118p
- Working Group on the General Status of NWT Species (2006) NWT SPECIES 2006-2010 General Status Ranks of Wild Species in the Northwest Territories. Available at: http://www.enr.gov.nt.ca/live/documents/documentManagerUpload/NWT_Species2006.pdf. August 2009
- ## **Personal Communications**
- Anik Genier (2009) Canadian Environmental Assessment Agency
- Mackenzie Valley Environmental Impact Review Board, 2009
- Marilyn Cockney (2009) Inuvialuit Corporate Group
- Prince of Wales Northern Heritage Centre (2009)
- Robert Alexie (2009) Gwich'in Land and Water Board
- Sara Brown (2009) Town of Inuvik
- Susan Tiede (2009) Canadian Environmental Assessment Agency
- Yvonne Carpenter (2009) Government of Northwest Territories (Department of Municipal and Community Affairs)
- Lance Gelinas (2009) Air Division Headquarters, Department of National Defence, Winnipeg

LCol. David Mason (2009) 1 Cdn Air Division Headquarters, Department of National Defense

Major Chris Matthews (2009) A3 Fighter Coordination, 1 Cdn Air Division Headquarters, Department of National Defense

Daniel Johnson (2009) Town of Inuvik