The proposed access road to the borrow site will cross several vegetation types, the most notable of which are white spruce/stair step moss forest, common juniper/common bearberry and the riparian vegetation types of balsam poplar/river alder and willow/river alder, all of which are less common in this region. Rare plant surveys were completed in July 2004 in the common juniper/common bearberry and balsam poplar/river alder vegetation types along the proposed access route, and none were found. The southern half of the proposed access is adjacent to a pre-existing linear disturbance cleared towards the proposed pipeline right-of-way.

Vegetation Potential Effects and Mitigation

Development of this borrow site and its associated access road will affect vegetation through clearing and mechanical damage to trees, shrubs, forbs and non-vascular species in the construction phase of the borrow site, the permanent loss of vegetation and underlying substrates through borrow site expansion and potential changes in site drainage and along the access road.

The majority of effects on vegetation will occur as a result of project activities arising from site construction and operations. These effects might include the potential influence of dust deposition on the health and growth of nearby vegetation. Effects on vegetation due to the borrow site and access road will persist into the far future (effect extends beyond 30 years past decommissioning and abandonment) given the slow rate of vegetation growth in the North. Vegetation on the borrow site and along the access road might develop into a different vegetation community than what was present prior to development. In addition, introductions of reclamation species and potential accidental introductions of invasive non-native plants species might occur.

Implementation of primary mitigation measures, as described in Section 8, will help reduce the magnitude of effects on vegetation at this borrow site and along the access road.

Wildlife Setting

Wildlife habitat at this borrow site is characterized by open mixedwood forest. The ground layer includes a good cover of lichens. This habitat type is common in the region. This site is located on an upland terrace about 4.0 km from the Mackenzie River, which provides important winter habitat for moose. Other nearby features that provide important wildlife habitat includes several small lakes and a narrow river valley draining to the Mackenzie River. The site has experienced previous disturbance with several cutlines running through or near the site.

Key wildlife species detected at the borrow site (by sign or visual observation) included caribou, moose, grizzly bear and lesser yellowlegs. Key species were selected because of their importance in the subsistence economy or because they

are listed as species of conservation concern or as species of particular ecological relevance. Other species recorded at the borrow site during field surveys included fox sparrow, American robin, chipping sparrow, snowshoe hare, lemmings and voles.

Habitat quality for key wildlife species, as determined by the presence of key habitat features, such as percent cover of forage species, was generally rated moderate to high at the borrow site (Table 5-17). Overall, the borrow site provides high-quality habitat for barren-ground and woodland caribou, grizzly bear (foraging habitat), marten, lynx, and lesser yellowlegs. The site also provides moderate-quality winter foraging habitat for moose. Little denning habitat was observed for grizzly bears on the site, but an area immediately southeast of the site offers good potential denning habitat on the south facing slopes of an unnamed river valley.

The access road to this site crosses several habitat types between the pipeline right-of-way and the borrow site. The access road south of the Mackenzie River is comprised mainly of habitat similar to the borrow site, that is, upland white spruce with some Alaska birch, although about 5.0% of the road crosses floodplain habitat along the Mackenzie River. This area consists of riparian willow, alder, and dogwood, offering high-quality forage and cover for moose. The access road from the north side of the river to the pipeline right-of-way passes through several habitat types and past several lakes. Habitats include black spruce bogs, riparian willow, mixedwood (white spruce-Alaska birch) and deciduous (Alaska birch) forests, regenerating coniferous (black spruce-tamarack) forest, as well as graminoid wetland and ground birch/water-sedge wetland types associated with lakes. This assortment of habitat types is capable of supporting a range of wildlife species.

Key wildlife species detected along the access road (by sign or visual observation) included caribou, moose, grizzly bear and lesser yellowlegs. Tracks of grizzly bear (sow and cub), black bear, moose, wolf, gulls, geese, and sandhill crane were observed along the access road at the Mackenzie River crossing, as were white-crowned sparrow and semi-palmated plover. Pacific loon, red-breasted merganser, and mew gull were observed at lakes along the access road.

Habitat quality for key wildlife species, as determined by the presence of key habitat features, such as, percent cover of forage species, was generally rated low to moderate along the access road (Table 5-17).

Table 5-17: Habitat Quality for Key Wildlife Species at Borrow Site 5.020P and Associated Access Road

Group	Species	Habitat Use	Habitat Quality[a]	
			Borrow Site 5.020P	Road G-B1-W-5.020P
Mammals	Barren-ground caribou	Winter foraging	High	Low to moderate
	Woodland caribou	Winter foraging	High	Low to moderate
	Moose	Winter foraging	Moderate	High
	Grizzly bear	Fall foraging	High	Moderate
		Spring foraging	High	Moderate to high
		Denning	Low	Low
	Marten	Winter foraging	High	Low
	Lynx	Winter foraging	High	Low to high
	Beaver	Cover	Low	Low to high
		Foraging	Low	Moderate to high
Birds	Scaup	Nesting	Low	Low to moderate
	Peregrine falcon	Nesting	Low	Low
	Arctic tern	Nesting	Low	Low to moderate
	Lesser yellowlegs	Nesting	High	Low to high
	Boreal chickadee	Nesting	Low	Low to moderate

NOTE:
[a]Habitat quality was determined by comparing the vegetation and terrain characteristics at each site to each species' habitat requirements (such as shrub availability for moose).

Some species-at-risk, such as sensitive or threatened species, might occur at the borrow site or along the road corridor. Species-at-risk that were observed, or that might occur based on habitat availability, are summarized in Table 5-18.

Species with regulatory status designation are those that either COSEWIC or the Government of the Northwest Territories has ranked as sensitive to disturbance. They also include species listed under the SARA and the IUCN *Red List of Threatened Species*.

Table 5-18: Species-at-Risk that were Observed or that might Occur at Borrow Site 5.020P and Associated Access Road

Species	Status[b]			
	RWED[c]	COSEWIC[d]	SARA[e]	IUCN[f]
Woodland caribou (boreal population)	Sensitive	Threatened	Schedule 1 – threatened[a]	Lower risk – least concern
Grizzly bear (northwestern Population)	Sensitive	Special concern	Schedule 3 – special concern	Lower risk – least concern
Wolverine	Secure	Special concern	Schedule 3 – special concern[a]	Lower risk – least concern
Northern pintail	Sensitive	–	–	–
Lesser scaup	Sensitive	–	–	–
Surf scoter	Sensitive	–	–	–
White-winged scoter	Sensitive	–	–	–
Lesser yellowlegs	Sensitive	–	–	–
Common snipe	Sensitive	–	–	–
Short-eared owl	Sensitive	Special concern	Schedule 3 – special concern	–
Northern flicker	Sensitive	–	–	–
Boreal chickadee	Sensitive	–	–	–
Blackpoll warbler	Sensitive	–	–	–
White -throated sparrow	Sensitive	–	–	–
American tree sparrow	Sensitive	–	–	–
Harris' sparrow	Sensitive	–	–	–
Rusty blackbird	Sensitive	–	–	–

NOTES:
[a]Indicates status is to be reassigned (i.e., potentially added to Schedule 1) pending results of public consultation, stakeholder consultation, and final ministerial approval.
[b]A hyphen indicates no status has been assigned for that species.
[c]RWED – Resources, Wildlife and Economic Development
[d]COSEWIC – Committee on the Status of Endangered Wildlife in Canada
[e]SARA – *Species at Risk Act*
[f]IUCN – IUCN–The World Conservation Union

Wildlife Potential Effects and Mitigation

Mammals

This borrow site and its associated access road provide high-quality habitat for a number of mammal species, including several key species, such as barren-ground and woodland caribou, moose, grizzly bear, marten, lynx and beaver. Vegetation clearing will result in the loss of a small amount of habitat for key wildlife species, and thus will have a localized and limited effect on regional habitat availability within the GSA. These effects will, however, be long-term because of slow vegetation re-growth at disturbed sites in the North

In addition to direct habitat loss, caribou, moose, marten and lynx might be affected by sensory disturbance during winter, resulting in displacement of individuals from the vicinity of the borrow site and access road. This will result in some additional habitat loss and potential disruption of wildlife movements. These effects will be localized, involve a small number of individual animals, and be limited to the duration of borrow site operations, resulting in no long-term effect on wildlife populations. Because sensory disturbance will occur primarily during winter, grizzly bears will likely not be displaced from the vicinity of the borrow site and access road during their active period.

The borrow site and access road provide low-quality denning habitat for grizzly bears. As a result, it is unlikely that bears would den at the site or along the access road, resulting in little risk of bear mortality during clearing.

Access road development could result in increased trapping of marten, lynx, and beaver, as well as increased hunting and predation of moose and caribou, especially during winter. In addition, animals could be killed or injured by collisions with vehicles. Prohibiting recreational use of the access road by project staff while on the job site, and enforcing speed limits, will reduce potential wildlife mortality. In addition, reclamation of the road following borrow pit development, where agreed upon through community consultation and development agreements, will reduce potential long-term mortality of wildlife.

Implementation of general mitigation measures, outlined in Section 8, will reduce potential effects on mammals during borrow site and access road development and operations.

Birds

This borrow site and its associated access road provide high-quality habitat for a number of migratory bird species, including lesser yellowlegs. However, migratory birds will be absent from the borrow site area from October to April and thus will not be affected by sensory disturbance during winter operations. In

addition, no sensory disturbance will occur at the borrow site during the spring and summer nesting season, as activities at this site are likely to occur only during winter. Effects on migratory species are therefore limited primarily to direct loss of nesting habitat. Clearing will result in the loss of less than 39 ha of habitat at the borrow site and loss of about 40 ha of habitat along the access road. This amount of habitat loss is considered small compared to regional habitat availability for migratory birds in the GSA. The effects of habitat loss on migratory birds are local in extent, but long-term in duration because of slow vegetation regrowth at sites in the North.

Resident species such as the boreal chickadee will be affected during winter by noise and visual disturbances associated with site clearing, road clearing and use, borrow site excavation, and reclamation activities. These effects might result in the displacement of some birds from the immediate vicinity of the site. These effects will be localized and limited to the duration of borrow site operations, resulting in little long-term effect on bird populations.

Because clearing and excavation activities will occur primarily during the winter, development of the borrow site will not disturb migratory bird nests. However, work activities might overlap with the early nesting period of some resident birds, such as owls. Nesting birds will likely avoid the development site if clearing or excavation activities are underway. As a result, little or no bird mortality is expected to occur as a result of activities at the borrow site.

Implementation of general mitigation measures, as outlined in Section 8, will reduce potential effects on birds during borrow site and access road development and operations.

Hydrology Setting

Two small unnamed lakes are located about 0.5 km downslope from the borrow site. The area encompassing the borrow site that contributes runoff to the lakes is about 1.0 km^2. This area was delineated assuming that any runoff from the source will follow along a cut-line (bisecting the borrow site) into the two lakes. This is considered a conservative estimate of the runoff contributing area.

Hydrology Potential Effects and Mitigation

Changes in runoff coefficients might occur with the development of the site. Runoff discharge and velocity will be greater in areas where vegetation has been removed and the land surface graded. An increased runoff coefficient resulting from operations at the site is not expected to increase water levels in local waterbodies.

Groundwater Setting

Groundwater within the borrow pit might provide recharge for the two nearby lakes. Permafrost was encountered at this site. Groundwater flow in a permafrost area is expected to be seasonal and restricted to the active layer.

Groundwater Potential Effects and Mitigation

The removal of borrow materials has the potential to reduce or remove an area of groundwater storage and recharge. This could result in alterations to groundwater flow patterns, increases in surface water runoff and changes to springs, seeps or groundwater-fed wetlands associated with this area of groundwater recharge. At site locations where continuous permafrost exists, groundwater flow is seasonal and restricted to the active layer. The removal of borrow material also has potential to result in the siltation of shallow aquifers, where present, because of an increased sediment load in surface waters recharging the aquifer. These effects can be effectively managed by the implementation of the following mitigation measures:

- maintaining sufficient permeable surface area to permit groundwater recharge in these areas, as necessary
- implementing drainage, erosion and sediment controls, as appropriate, to limit the mobilization of fine sediment particles

Water Quality Setting

Water quality data for this borrow site is expected to be similar to regional data in the GSA described in Section 8.

Water Quality Potential Effects and Mitigation

Currently, there are no plans to wash material extracted from this borrow site. Therefore, no water withdrawals from, or disposals into, local waterbodies are anticipated.

Other potential effects on water quantity and quality from borrow site development include changes in surface water flows or levels due to changes in runoff and changes in suspended sediment inputs due to land disturbance. These effects will be reduced by implementing the following mitigation measures:

- developing and implementing specific erosion and sediment control plans and drainage plans to prevent sediment from the site reaching surface waters
- maintaining a vegetated buffer zone between the site and local waterbodies

The effects on runoff and suspended sediment concentration were assessed on a site-specific basis and found to result in an increase of less than 2.0% in mean annual runoff and less than 10 mg/L in mean annual sediment concentration.

Fish and Fish Habitat Setting

This borrow site is located on the south side of the Mackenzie River and is about 0.5 km upslope of an unnamed watercourse. The classification of the watercourse draining through the borrow site is not known, although it is likely to be a vegetated or Active II channel. Vegetated and Active II channels are characterized by ephemeral or intermittent flows and are expected to be dry or frozen to the bed in winter. As such, these types of channels are not suitable overwintering habitat for fish.

Two small unnamed lakes are located along the northeast boundary of the site. No information on the use by fish of either the unnamed watercourse or the two lakes has been collected.

Fish and Fish Habitat Potential Effects and Mitigation

Potential effects of the borrow site on fish and fish habitat are primarily related to direct disturbance of fish habitat by activities associated with development of the borrow site and extraction and processing of borrow material and indirect effects resulting from sediment in runoff.

This site is sufficiently far from the unnamed lakes as well as the watercourse so as to avoid direct effects on any potential fish habitat.

The topography at the site, maintaining a vegetated buffer zone between the site and local waterbodies, if required, and implementation of site-specific erosion and sediment control plans will prevent sediment from the site reaching surface waters.

Human Environment

This topic contains a description of the protected areas and heritage resource setting for borrow site 5.020P. Regional human environment information is described in Section 8.

There is nobody living in the immediate vicinity of the site.

Protected Areas Setting

This borrow site is located in a general use zone. The proposed access road crosses through the Mackenzie River Special Management Zone.

Protected Areas Potential Effects and Mitigation

This borrow site is located in a general use zone, while the access road crosses the Mackenzie River Special Management Zone. Although this road will be temporary and seasonal, the clearing that is be required for installation of the road will be a permanent change to the landscape. In addition, while it is in use, this road will result in a slight decrease in the land base available for other land uses within this area.

Heritage Resources Setting

This borrow site was inspected as part of the borrow resource component of the field reconnaissance program. No new heritage sites were recorded as a result of the surface reconnaissance and no existing sites have been recorded in the immediate area. The location was considered to have moderate to high potential for discovery of heritage resources.

The nature of the heritage resource potential and results of preliminary investigations at this location were provided to the PWNHC in a report under permit 2003-933.

Heritage Resources Potential Effects and Mitigation

Prior to the development of this site, and if required, a Heritage Resource Impact Assessment will be conducted and provided to the PWNHC. If it is determined that the development will affect any heritage resources, mitigation plans will be prepared.

PUBLIC INVOLVEMENT

No concerns regarding this pipeline segment have been expressed by the local GSA communities in meetings or discussions with Imperial. The public involvement activities are documented in Section 10 of this application.

Figure 5.28 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.