Project C-74 Satellite, Cameron Hills, NT

Environmental Impact Statement

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PROJECT DESCRIPTION

PROJECT COMPONENTS

Paramount Resources Ltd. is planning to construct Project C-74 Satellite (see Table 1 for Project C-74 Satellite components and Figure 1 in Appendix 1 for Project C-74 Satellite location).

POTENTIAL FOOTPRINT

The proposed pipeline corridor, between Project C-74 Satellite's site and the tie-in at the H-03 battery, coincide with existing road access and pipeline corridor. This includes the existing primary winter access route and adjacent pipeline corridor running south to the H-03 battery, and the road and pipeline corridor to the existing C-74 Satellite wellsite (see Figure 1 in Appendix 1). No new access road and no new linear disturbance will be required for Project C-74 Satellite. In total, 2.1 ha of undisturbed area will be semi-cleared for Project C-74 Satellite. In addition, 1.37 ha of undisturbed area will be cleared (Table 1).

PROJECT PLANNING

Various corporate protocols and standards [Developers Assessment Report 2003 (DAR) and Cameron Hills, N.W.T. Environmental Protection Plan 2004 (EPP)] to mitigate potential environmental impacts were considered when planning Project C-74 Satellite. Through the DAR, Paramount presented an anticipated production program for the Cameron Hills Significant Discovery Licence Area (SDLA), which consisted of roughly 50 proposed projects similar in scope to Project C-74 Satellite. The direct, indirect and cumulative effects of the anticipated production program were addressed. The EPP provides general and specific environmental protection measures to manage its environmental affairs effectively and to fulfill regulatory requirements. As well, conditions of recent Land Use Permits (LUPs) issued for projects similar in scope to Project C-74 Satellite in the Cameron Hills were taken into account.

Table 1: Project C-74 Satellite Components

Project Component	Location[Note 2] (Lat/Long)	Total Proposed Area[Note 3] (Hectares)	Previously Disturbed Area[Note5] (Hectares)	Proposed New Disturbed Area (Hectares)	Type of Disturbance[Note 8]
Satellite C-74	60° 10'N 117° 15'W	1.0 (100m X 100m)	0.00	1.0	Cleared
Access Road from main North/South corridor to C-74 Satellite [NOTE 1]	60° 10'N 117° 15'W	--	--	--	--
Pipeline Right-of-way (ROW) C-74 Satellite to main North/South corridor	60° 10'N 117° 15'W	0.37 (10m X 370m) [NOTE 4]	0.00	0.37 [NOTE 6]	Cleared
Pipeline ROW C-74 to main North/South corridor	60° 10'N 117° 15'W	0.37 (10m X 370m) [NOTE 4]	0.00	0.37 [NOTE 6]	Semi-cleared
Pipeline ROW from main North/South corridor from C-74 south to H-03 Battery	60° 10'N 117° 15'W	1.73 (10m X 1,725m) [NOTE 4]	0.00	1.73 [NOTE 6]	Semi-cleared
TOTAL		3.47	0.00	3.47[NOTE 5]	--

NOTES:

1 Corridors under separate Land Use Permits will be used. No new disturbance is proposed.

2 Locations are approximate and may vary slightly as a result of geological/geophysical interpretation, which may alter the alpha-numeric designator.

3 Dimensions reported are the maximum. To minimize disturbance, only the area necessary to safely facilitate planned operations, equipment placement and snow/slash storage will be used.

4 Typically for the pipeline ROW, a cleared area only 10m wide is required for the pipeline; however, some circumstances require a cleared area 10 to 20m wide. To minimize disturbance, the remaining area will be semi-cleared, as required, to safely facilitate planned operations, equipment placement and snow/slash storage.

5 To minimize disturbance, previously disturbed areas will be used as much as possible.

6 For the access road and pipeline ROW, existing seismic lines will be used.

7 Proposed new disturbed area for the access road does not include push-outs. Each push out may add 3 to 6m of width to the ROW edge over an approximate 20m length. Ideally, push-outs will be located approximately every 300m along the access route, but the location will be determined by the Land Use Inspector.

8 Semi-cleared disturbance means that timber will be felled onto the access road, wellsite or ROW using a bulldozer equipped with a cutter blade or hydroax, as appropriate. Felled trees and shrubs will be pushed by a grader with the bottom edge of the blade elevated roughly 4cm above the ground surface to prevent disturbance. All brush and debris will be cleared from the access road, wellsite and pipeline ROW by (1) windrowing the debris and brush to the side of the line or clearing and (2) making breaks in the windrow of a least 10m wide every 60m. All brush and debris cleared from the access road, wellsite and pipeline ROW will be disposed by (1) rolling it back on the line or clearing to help minimize erosion and/or (2) using it for corduroy material and/or (3) burning. On areas free of timber, snow will packed onto the rough, natural surface with a bladed Nodwell (or similar equipment) to drive frost into the ground. To achieve sufficient snow-pack depth, thus a protective surface barrier, corduroy may be added to the snow. As well, water may be used to build-up the protective surface barrier. Cleared disturbance means that, where possible, the aforementioned minimal disturbance techniques will be used; however, where such techniques are not feasible (*i.e.*, sloped terrain, pipe trench, *etc.*), surface disturbance may be required. Where surface disturbance requires the stripping of organic soil, it will be saved and protected by windrowing or stockpiling it on the up slope side of the clearing and allowed to naturally revegetate. The saved organic soil will be replaced when the Project is complete.

POTENTIAL ENVIRONMENTAL IMPACTS AND PLANNED MITIGATION[1]

VEGETATION

EXISTING CONDITIONS

Project C-74 Satellite coincides with wooded bog, wooded/shrubby bog and riparian communities (Figure 2 in Appendix 1). The satellite site and majority of the length of the pipeline overlap wooded/shrubby bog. The pipeline also occurs for smaller distances in wooded bog and riparian communities. Wooded bogs and wooded/shrubby bogs exhibit similarities in terms of hydrologic regimes and species composition but are distinct in structure, with the former containing mature trees in the canopy layer. In both wooded bogs and wooded/shrubby bogs, dominant tree species in undisturbed areas are black spruce (*Picea mariana)* and tamarack (*Larix laricina*). Understories are predominately comprised of Labrador tea (*Ledum groenlandicum*), bog cranberry (*Vaccinium vitis-idaea),* cloudberry (*Rubus chamaemorus*), sphagnum moss (*Sphagnum* spp.), feather mosses (*Hylocomium splendens, Pleurozium schreberi* and *Ptilium crista-castrensis),* reindeer lichens and flattened snow lichen (*Flavocetraria nivalis*).

Vegetation communities differ among the undisturbed and previously disturbed areas. Dominant tree species characteristic of previously disturbed areas are aspen (*Populus tremuloides),* black spruce, tamarack and white spruce (*Picea glauca)* (Golder, 2006). No sensitive or unique habitats appear to coincide with Project C-74 Satellite.

Riparian forests range from deciduous to coniferous depending on moisture regime. In well-drained areas, trembling aspen (*Populous tremuloides*) and a sub-hygric black spruce/ white spruce are found (*Picea mariana* and *P. glauca*) (Golder and Alpine 2001*).* The understory is typically comprised of bog cranberry (*Vaccinium vitis-idaea*), willows (>5 m high) (*Salix* spp.), fireweed (*Epilobium angustifolium*), tall lungwort (*Mertensia paniculata*) and a variety of feathermosses. The understories of wetter spruce stands often contain prickly rose (*Rosa acicularis*), bog cranberry (*Vaccinium vitis-idea),* dwarf birch (*Betula pumila*), twinflower (*Linnaea borealis*) and willow (*Salix* spp.) (Golder and Alpine 2001).

[1] Potential impacts to air have not been discussed in the main body of this report, as air is not covered on the LUP application form. However, experience shows that questions about impacts to air associated with activities not covered under this permit application are likely to arise. Therefore, for the reader's information, potential impacts to air and mitigation are presented in Appendix 2.

Overall, riparian forests have a high potential for rare plants, despite the absence of rare plant records from vegetation surveys conducted in July and September of 2000 (Golder and Alpine 2001). Riparian forest intersected along the pipeline south of Project C-74 Satellite's site, constitutes a sensitive or unique habitat, relative to others occurring in and around Project C-74 Satellite.

PLANNED MITIGATION

To mitigate impacts to vegetation as a result of Project C-74 Satellite, Paramount will employ the following mitigation measures.

- Where possible, the total width of vegetation to be cleared for road and pipeline construction will be reduced by semi-clearing the right-of-way (see footnote 3 in Table 1).
- The boundaries of the satellite site and pipeline ROW will be surveyed and/or clearly marked with stakes and flagging tape prior to construction to prevent unauthorized clearing and/or grading.
- Five years of re-vegetation monitoring on the Cameron Hills gathering system and transborder pipeline ROW showed that heavy slash impedes vegetation establishment Golder (2007). To help promote vegetation growth on reclaimed areas, slash will be spread evenly across ROW clearings.
- Slopes prone to erosion will be seeded with a mixture of regreen wheat x wheat grass (15%), awned wheat grass (25%), fall rye (50%) and slender what grass (10%), as recommended by Golder (2007). Appropriate seed certifications will be made available to the Land Use Inspector.
- Seeding success will be assessed annually as part of an on-going maintenance program for pipeline systems. Re-seeding will occur, if necessary, to achieve $\geq$ 70% ground coverage.

TERRAIN, SOIL AND PERMAFROST

EXISTING CONDITIONS

Project C-74 Satellite coincides with wooded bogs and wooded/shrubby bogs on level terrain. A small amount of riparian habitat also occurs along the road and pipeline corridor for Project C-74 Satellite. Wooded bogs and wooded/shrubby bogs are associated with high water tables and wet soils as a consequence of poor drainage. Previous soil surveys in the Cameron Hills indicated that the Margaret Lake soil series, or Typic Fibrisols, coincide with the proposed location of Project

C-74 Satellite (Figure 2 in Appendix 1). The parent material of Typic Fibrisols is organic sphagnum peat (Golder and Alpine, 2001).

For the limited extent of Project C-74 Satellite that occurs in riparian forest, previous soil surveys indicated that the Slavey soil series occurs (Figure 2 in Appendix 1). The Slavey soil series is composed of imperfectly drained Gleyed Eutric Bronisol on medium fine-textured till (Golder and Alpine, 2001).

Previous permafrost surveys in the Cameron Hills showed that permafrost is most likely to exist in thick, poorly drained, organic soils. Bogs were rated as having a moderate potential for permafrost while glaciofluvial/fluvial deposits and medium fine-textured tills in riparian forests were rated as having a negligible potential for permafrost (Figure 3 in Appendix 1). However, historical pipeline construction in the Cameron Hills area indicated that permafrost predications are not always accurate (see Golder and Alpine, 2001).

PLANNED MITIGATION

To mitigate impacts to soil and permafrost as a result of the use of the existing access roads, Paramount will employ the following mitigation measures.

- A minimum of 10cm packed snow will be maintained on the access road at all times. If this criterion cannot be met, ice roads constructed in a manner authorized by the Land Use Inspector will be used.
- Overland movement on the access road will cease by 0800hours local time on April 1, unless otherwise authorized in writing by an Inspector.
- Overland movement on the access road will cease at the first sign of rutting and/or under direction of the Land Use Inspector.

To mitigate impacts to soil as a result of the proposed pipeline ROW, Paramount will employ the following mitigation measures.

- Spoil material excavated from the trench will be saved by stockpiling it separately from the organic soil.
- Spoil material excavated from the trench will be backfilled by compacting and the last lifts will be crowned over the disturbed area prior to reestablishing vegetation.
- Berms and/or ditches will be constructed across the ROW at intervals $\geq$ 30m on slopes exceeding 5% prior to 0800hours local time on April 1.

- Dykes and diversions will be constructed on the upslope side of exposed mineral soil.
- All terrain vehicle (ATV) use appears to limit vegetation establishment on pipeline ROWs, which in turn increases the potential for soil erosion. In order to promote vegetation establishment on the proposed pipeline ROW and minimize erosion potential, Paramount will employ the following mitigation measures (from Golder, 2007).
    - ATV traffic on slopes and topographical low areas will be restricted to only that necessary when the soil is wet.
    - ATV traffic on slopes will be limited to a single set of tracks, where possible. Should tire spinning be recurring, efforts to create traction will be made.
    - ATV traffic within wetland areas will be limited to planks, where possible.
    - Erosion will be assessed annually as part of the on-going maintenance program for pipeline systems. Areas requiring attention will be addressed by Paramount.

WILDLIFE[2]

EXISTING CONDITIONS

Information on wildlife species occurring in the Cameron Hills and, more specifically, in the vicinity of Project C-74 Satellite, were obtained based on review of literature on species' distributions and habitat preferences, results of a five-year Cameron Hills wildlife monitoring program (Golder 2003, 2004, 2005, 2006, 2007 *in prep*), and incidental records of wildlife observed during site visits in July and September 2000 (Golder and Alpine 2001). The wildlife monitoring program assessed wildlife use of habitat on and adjacent to the Cameron Hills gathering system and transborder pipeline ROW (Golder 2003, 2004, 2005, 2006, 2007).). Species recorded near C-74 Satellite included snowshoe hare, dark-eyed junco, palm warbler, Tennessee warbler, chipping sparrow, yellow-rumped warbler and least flycatcher (Figure 2 in Appendix 1). Species recorded in wooded/ shrubby bogs at other survey locations in the Cameron Hills included moose, red squirrel, woodland caribou, wood frog and hermit thrush (Golder and Alpine 2001). While the riparian community intersected by Project C-74 Satellite was not the focus of wildlife surveys during July or September of 2000, wildlife species recorded at other wooded riparian habitats included swamp sparrow, LeConte's sparrow and Tennessee warbler (Golder and Alpine 2001).

[2] Species at risk will be discussed in a subsequent section.

PLANNED MITIGATION

- Impacts to wildlife as a result of the proposed project will be mitigated through the measures listed under the "Vegetation" and "Terrain, Soil and Permafrost" sections in addition to the following procedures.
- Wildlife will not be fed or harassed. All garbage will be collected and stored in secured containers in order to not attract wildlife. Pet dogs will be prohibited and firearms will not be used to hunt wildlife.
- Vehicle and equipment operators will be instructed to maintain appropriate speeds and to be aware of potential encounters with wildlife. If animals are encountered, they will be given an opportunity to disperse from the route before construction activities proceed.
- If any migratory birds or their nesting areas are encountered during the course of operations, activity will be minimized so as not to disturb these animals.
- The Construction Supervisor will ensure that all representatives of Paramount adhere to these mitigation measures and all conditions of LUPs.

SPECIES AT RISK

Seven wildlife species with ranges that overlap the Cameron Hills have been listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and, therefore, represent special management concerns (Table 2). While planned mitigation for wildlife in general (see above) is intended to improve the outlook for species at risk as well, additional mitigation to target species at risk is presented, where appropriate.

Table 2:Species at risk with ranges that overlap the Cameron Hills

SCIENTIFIC NAME	COMMON NAME	NT STATUS RANK	COSEWIC STATUS RANK	SARA STATUS
Bison bison athabascae	Wood bison	At Risk	Threatened	Threatened on Schedule 1
Coturnicops noveboracensis	Yellow rail	May Be At Risk	Special Concern	Special Concern on Schedule 1
Euphagus carolinus	Rusty Blackbird	May Be At Risk	Special Concern	Not Listed
Falco peregrinus anatum	Peregrine falcon	Sensitive	Threatened	Threatened on Schedule 1
Gulo gulo	Wolverine	Sensitive	Special Concern	Not Listed
Rana pipiens	Northern leopard frog	Sensitive	Special Concern	Special Concern on Schedule 1
Rangifer tarandus caribou	Boreal woodland caribou	Sensitive	Threatened	Threatened on Schedule 1

NOTES:

Species with ranges that overlap the Cameron Hills are listed.

Species likely to use the area in the vicinity of Project C-74 Satellite, based on consideration of life history and habitat preferences, are underlined.

Species documented in July and September 2000 during a site assessment are identified by bold text.

Species documented during Paramount's ongoing wildlife monitoring program are identified by blue text.

BISON BISON ATHABASCAE (WOOD BISON)

EXISTING CONDITIONS

Wood bison spend spring and early summer foraging in mesic grassy meadows and willow savannas. During late summer and fall, they disperse into small groups for the rut and occupy mixed wood forests in addition to meadows. In winter, when wood bison feed almost exclusively on sedges, wet sedge meadows again are heavily used. Wood bison home ranges in the NT are between roughly 170 and 1200km^2, depending on age and gender of the individual and forage availability (Larter and Gates, 1994).

POTENTIAL IMPACTS AND PLANNED MITIGATION

The preference of wood bison for foraging in open grassy areas means they can often benefit from certain alterations in the environment associated with oil and gas exploration. Grasses and forbs used to seed disturbed sites are a potentially significant source of forage (Harper *et al*, 2000). However, the main factor limiting wood bison in the NT is not habitat loss but disease (NT, 2006b). For these reasons, the proposed project is not expected to directly impact wood bison populations. Consequently, mitigation to focus on this species specifically is not planned.

Some potential exists for the project to indirectly affect wood bison due to disturbance from machinery and vehicles. Ungulates, like wood bison, enter a negative energy balance during the late fall and winter. To cope, they minimize energy expenditures to ration their fat reserves by selecting suitable habitat and reducing movement, among other strategies. Industrial activity within and adjacent to key wintering areas increases stress and energy drains for animals. The Cameron Hills likely are not key wintering areas. Nonetheless, the Construction Supervisor will ensure that industrial activities are suitably modified to minimize energy drains, should encounters with wood bison occur.

COTURNICOPS NOVEBORACENSIS (YELLOW RAIL)

EXISTING CONDITIONS

Yellow rails begin their migration north at the end of April or the beginning of May. Nesting yellow rails are typically found in marshes dominated by sedges, true grasses, and rushes, where there is little or no standing water and where the substrate remains saturated throughout the summer. They can be found in damp fields and meadows, on the floodplains of rivers and streams, in the herbaceous vegetation of bogs and at the upper levels (drier margins) of estuarine and salt marshes. Yellow rail's nests are crude scrapes on dry mats of dead vegetation located directly on or slightly elevated above the ground, and are concealed with dead vegetation. Incubation lasts from 17 to 18 days. Young are capable of flying at the age of 35 days. Fall migration begins in late September or early October.

POTENTIAL IMPACTS AND PLANNED MITIGATION

The loss and degradation of wetlands due to agricultural and human development is the greatest threat to yellow rail throughout its breeding range (Environment Canada, 2006a). The project area does not represent preferred habitat. Furthermore, the migratory nature of yellow rails removes them from the NT during the winter, which is the time that construction associated with Project C-74 Satellite will occur. Crude nests are not used year after year; therefore, harm to nests would not occur as a result of winter construction. For these reasons, the proposed project is not expected to impact yellow rail populations. Consequently, mitigation to focus on this species specifically is not planned.

EUPHAGUS CAROLINUS (RUSTY BLACKBIRD)

EXISTING CONDITIONS

The rusty blackbird breeds throughout a range of 7.6 million km^2, which corresponds closely to the boreal forest and includes most Canadian provinces and territories, the state of Alaska, several Great Lakes states and most New England states. Breeding habitat is characterized by forest wetlands, such as slow-moving streams, peat bogs, sedge meadows, marshes, swamps, beaver ponds and pasture edges. The bulky nests typically are located in low conifer trees at heights < 3m. Eggs are incubated by the female for about 14 days and the young fledge roughly 11-13 after hatching. The primary wintering area of the

rusty blackbird is the flood plain forests of the Mississippi Valley (Environment Canada, 2006b).

POTENTIAL IMPACTS AND PLANNED MITIGATION

The most serious threats to the rusty blackbird are thought to be the conversion of the species' primary winter habitats in the Mississippi Valley flood plain forests to agricultural and urban land uses, and bird control programs that have prevailed in the southeastern United States since the 1970's (Environment Canada, 2006b). Breeding habitat for the rusty blackbird does not appear to be imperiled. The migratory nature of rusty blackbirds removes them from the NT during the winter, which is the time that construction associated with Project C-74 Satellite will occur. For these reasons, the proposed project is not expected to impact rusty blackbird populations. Consequently, mitigation to focus on this species specifically is not planned.

FALCO PEREGRINUS ANATUM (PEREGRINE FALCON)

EXISTING CONDITIONS

In the NT, peregrine falcons arrive from their wintering grounds in Central/South America and lay eggs between May and early June. Nesting sites typically are on cliff ledges (15 to 60m above ground) near water and nesting ranges, which are actively guarded, are up to 1km from the nest. Over a period of several years, peregrine pairs will alternate between a few closely-spaced nests but will often use the same nest repeatedly, provided they nest there successfully. Mean duration of incubation is 36 days. Roughly 35 to 40 days after hatching, peregrine chicks begin to fly. Home ranges for hunting overlap nesting ranges and can extend up to 27km from the nest. Important habitat includes open tundra, savanna, prairies and waterways, as peregrines mainly hunt other birds in the air (NT, 2006c).

POTENTIAL IMPACTS AND PLANNED MITIGATION

The project area does not represent preferred habitat for peregrine falcon. Furthermore, the migratory nature of peregrine falcons removes them from the NT during the winter, which is the time that construction associated with Project C-74 Satellite occurs. For these reasons, the proposed project is not expected to impact peregrine falcon populations. Consequently, mitigation to focus on this species specifically is not planned.

GULO GULO (WOLVERINE)

EXISTING CONDITIONS

The wolverine inhabits a diversity of ecozones, including the Boreal Forest and Subalpine regions. They have been observed during a five-year wildlife monitoring program designed to assess wildlife use of habitat on and adjacent to the Cameron Hills gathering system and transborder pipeline ROW (Golder 2003, 2004, 2005, 2006, 2007 *in prep*). Home ranges typically cover hundreds of square kilometers and encompass a variety of habitat types. The wolverine is associated with an available food supply rather than specific landscape attributes. During summer months, wolverines are primarily predatory, with the most common prey being marmots, ground squirrels, mice, voles, birds and insects. During winter months, wolverines are primarily scavengers and rely heavily on large ungulates that have been killed by other predators or that have succumbed to disease or starvation (Petersen, 1997; NT, 2006d).

Wolverines mate in the summer and birth occurs between February and May. Wolverines may be particularly sensitive to human disturbances during these sensitive life stages (Petersen, 1997; NT, 2006d). The female gives birth to and raises her kits in a den. Wolverine dens are of two types: natal dens are used during parturition (mid-February to mid-March) and maternal dens are used subsequent to natal dens and before weaning (mid-March to end of April). Wolverines also use sheltered areas as rendezvous sites after the kits are weaned but while the kits are too young to travel with their mothers (May-June) (Magoun *et al.*, 2004). While data on wolverine denning habits in North America is limited, available information suggests that dens may be found in:

- ravines or drainages where snow accumulates
- snow-covered rocky scree or boulder talus
- snow-covered fallen trees, usually near timberline
- taiga peat bogs with rocky areas or fallen trees, and
- birch (*Betula spp.*) woodland areas near fells or alpine areas (Magoun *et al.*, 2004).

POTENTIAL IMPACTS AND PLANNED MITIGATION

In the NT, factors in the decline of wolverine populations include the elimination of wilderness and intensive human hunting. Exploration and development increases access and opportunities to hunt and trap. Intensive human hunting of game animals also is known to influence the wolverine; however, wolverines have not been affected by loss of prey in the NT (NT, 2006d). To minimize

pressure on wolverine as a result of hunting, Paramount operates a staffed gate at Indian Cabins and records all traffic passing through the gate. Through five years of monitoring, it has been determined that, in general, only Paramount representatives are passing through the gates (Golder, 2007).

Protection of natal denning habitat from human disturbance just prior to and during denning is likely to be critical for the persistence of wolverine in disturbed landscapes. As well, secure rendezvous sites are required (Magoun *et al.*, 2004). For these reasons, the proposed project is not expected to impact wolverine populations. Consequently, mitigation to focus on this species specifically is not planned.

To help ensure a high level of confidence in this prediction, Project C-74 Satellite will be scouted by a local Environmental Monitor[3] prior to disturbance to ensure an active den is not present. In the event that wolverines or active are observed near the proposed construction, activity will be minimized so as not to disturb the animals and appropriate authorities will be notified.

RANA PIPIENS (NORTHERN LEOPARD FROG)

EXISTING CONDITIONS

Northern leopard frogs occur in the NT and with a limited distribution that overlaps the Cameron Hills (< 5% of the NT) (Working Group on General Status of NWT Species, 2006). This species breeds in shallow standing water that is not suitable for fish and is located in an open area. A typical breeding pond is 30 to 60 m in diameter and 1.5 to 2.0 m deep. Summer feeding areas are located along the margins of water bodies. Open and semi-open areas with short vegetation (15 to 30 cm) are preferred. Areas with tall, dense marsh vegetation, grasses, extensive shrub cover or dense trees are avoided. Overwintering sites are well-oxygenated water bodies, such as streams or larger ponds, and that do not freeze solid.

[3] For several years, Paramount has employed local, First Nations Environmental Monitors, who work under the direct supervision of the Construction Supervisor, during wellsite and road scouting. The Environmental Monitor will be responsible for scouting the Project area and reporting his findings to the Construction Supervisor. As a lifetime resident of the area, hunter, trapper and winter track count assistant, the Environmental Monitor has an in-depth knowledge of the land.

POTENTIAL IMPACTS AND PLANNED MITIGATION

Construction for Project C-74 Satellite is scheduled for the winter months. Because suitable wintering habitat is not available in the vicinity of Project C-74 Satellite, this species will not by the impacted by Project C-74 Satellite. No mitigation to target this species specifically is planned.

RANGIFER TARANDUS CARIBOU (WOODLAND CARIBOU – BOREAL POPULATION)

EXISTING CONDITIONS

Through development of a model to predict boreal caribou habitat value in the Deh Cho Region, Northwest Territories, Gunn et al. (2004) found that boreal caribou were strongly associated with black spruce and lichen. Both of these plant species and their associated communities are found in the vicinity of Project C-74 Satellite. While model results showed that high quality winter habitat (defined as 50-100% probability of occurrence) was available in the Cameron Hills, the extent of actual habitat use by caribou, and the size and movements of caribou populations, is uncertain. Over the duration of the five year wildlife monitoring program in the Cameron Hills, caribou sign was recorded only in 2006 (Golder 2003, 2004, 2005, 2006, 2007 *in prep*). In summary, caribou are known to use the Cameron Hills but the extent of that use and its importance to regional caribou populations is unknown at this time.

POTENTIAL IMPACTS AND PLANNED MITIGATION

Through LUPs for projects in the Cameron Hills similar in scope to C-74 Satellite, the Mackenzie Valley Land and Water Board has determined that an area greater than 1.8km/km2 in the areas encompassed by Ecodistrict 250 and 251 in the Northwest Territories should not be disturbed to prevent significant environmental impacts to boreal caribou. Project C-74 Satellite will not increase linear disturbance beyond the aforementioned critical threshold.

While many unanswered questions about the effects of linear development on caribou remain, the scientific community generally accepts that seismic lines affect caribou primarily through indirect mortality, that is, hunting and predation (Wittmer et al., 2005). Linear development alters the distribution of predators and increases hunting efficiency (BCC, 2001). To minimize pressure on caribou as a result of hunting, Paramount operates a staffed gate at Indian

Cabins and records all traffic passing through the gate. Through five years of monitoring, it has been determined that, in general, only Paramount representatives are passing through the gates (Golder, 2007). The Construction Supervisor will ensure that industrial activities are suitably modified to minimize energy drains, should encounters with caribou occur.

WATER AND AQUATIC SPECIES

EXISTING CONDITIONS

The nearest defined water body (a lake) is located approximately 800 m southwest of Project C-74 Satellite's location. A riparian community with an undefined channel (and no flow during July and September 2000) occurs along the pipeline route for Project C-74 Satellite (Figure 2 in Appendix 1; Golder and Alpine 2001). Poorly defined water courses typical of bogs are scattered within the vicinity of Project C-74 Satellite (Figure 2 in Appendix 1).

POTENTIAL IMPACTS AND PLANNED MITIGATION

Potential impacts to water and aquatic species (*i.e.*, alteration to water quality resulting from suspended sediment, waste and/or spills; acute or chronic alteration of beds and banks) are not anticipated to occur as a result of Project C-74 Satellite. Consequently, mitigation specifically focused on water and aquatic species is not planned to be undertaken. However, water may be withdrawn from Water Source Lakes 1 and/or 3 for construction operations. To mitigate impacts to water source lakes such as reduction in lake levels due to water withdrawal, alteration of water quality due to spills or disturbance of bottom sediments and harm to aquatic species, Paramount will employ the following mitigation measures.

- Maximum withdrawal volume from Water Source Lake 1 is 231,640 m^3, as per the *DFO Protocol for Winter Water Withdrawal in the Northwest Territories*. Withdrawal limits have been removed for Water Source Lake 3, as it has limited potential to support over-wintering fish[4].
- Water pumps with intake screens will be used to prevent potential entrainment of fish or other aquatic species, as per DFO (1995).

[4] Bruce Hanna, Habitat Biologist. 22 September 2006. Exception to DFO water withdrawal protocol for Water Source Lake 3, Cameron Hills, NWT. Letter prepared by Fisheries and Oceans Canada for Shirley Maaskant, Paramount Resources Ltd.

- It will be prohibited to deposit any deleterious materials on the ice or in the water of a water source.
- Should any soil or other materials be inadvertently introduced into the water source, they will be removed as soon as possible. Equipment operators will be careful to avoid gauging or otherwise disturbing banks or lake bottoms.

HERITAGE RESOURCES

EXISTING CONDITIONS

A heritage resources impact assessment (HRIA) was conducted in the Cameron Hills Significant Discovery Licence Area (SDLA) during the year 2000 to address Paramount's primary gathering system and transborder pipeline. The scope of the HRIA was substantial, addressing projects similar in scope to C-74 Satellite. The generally low-lying and wet conditions of the project area indicate low archaeological potential. No heritage resources were identified during the HRIA (Figure 2 in Appendix 1).

POTENTIAL IMPACTS AND PLANNED MITIGATION

Potential impacts to heritage resources are not likely to occur as a result of the project due to low archaeological potential in the area in and around Project C-74 Satellite. Nonetheless, Paramount will employ the following measures to ensure no impacts to heritage resources as a result of Project C-74 Satellite.

- A local heritage monitor will ensure that archaeological specimens or sites will not be removed, disturbed or displaced following Paramount's heritage resources guide (Paramount, 2002), which has been endorsed by the Prince of Wales Northern Heritage Centre.
- Should an archaeological specimen be encountered, operations will be suspended and the Prince of Wales Northern Heritage Centre, the responsible authority, will be notified along with the Mackenzie Valley Land and Water Board, the Land Use Inspector and the Ka'a'Gee Tu First Nation.

GENERAL ENVIRONMENTAL PROTECTION

GARBAGE DISPOSAL METHODS

In the Cameron Hills, domestic waste (*i.e.*, food, paper, *etc.*) is incinerated. Other waste generated in the Cameron Hills is stored in covered, metal containers and transported to Alberta. Transported waste is tracked using the waste manifest system, which is designed to ensure that hazardous waste shipments do not go astray, either at borders or after they have crossed them, and that their entire cargoes arrive intact. It also helps to prevent "orphan" shipments: if a shipment is abandoned, or rejected at a plant gate, the manifest system will enable it to be traced back to its exporter/generator. In addition, detailed manifests enable fast and effective emergency response, should a mishap occur. Paramount's Agrologist and Environmental Specialist is responsible for recommending corporate protocols pertaining to garbage disposal (Appendix 3).

FUEL MANAGEMENT

CONTAINMENT FUEL SPILL CONTINGENCY PLANS

Federal and territorial legislation/regulation applicable to containment fuel spill contingency plans include, but are not limited to, the Onshore Pipeline Regulations (OPR-99); the NEB Security and Emergency Preparedness and Response Programs letter dated April 24, 2002; the Emergency Preparedness and Response CAN/CSA-Z731-03 document; Canada Standards Spill Reporting Protocol for Upstream Oil and Gas Operations in the Northwest Territories and Nunavut Regulated by the NEB; the NWT Spill Contingency Planning and Reporting Regulations and the Spill Contingency Planning and Reporting Regulations, N.W.T. Reg. 068-93. Standard corporate procedures to ensure adherence to the aforementioned legislation/regulation are presented in the Hazardous Material Spill Contingency Plan, Cameron Hills Area, NT (March 2006), which currently is under review and should be updated by the end of the next quarter. As well, spill response is included the Cameron Hills Area Emergency Response Plan. Paramount's Emergency Management Coordinator is responsible for recommending corporate protocols pertaining to containment fuel spill contingency plans.

FUEL TRANSFER

To mitigate impacts to the environment as a result of fuel transfers conducted for Project C-74 Satellite, Paramount will adhere to the following measures.

- Paramount will establish designated fuel storage and refueling areas that are ≥100m from any local high water mark, unless otherwise authorized by an inspector and are not separated from water bodies by a steep grade.
- Designated fuel storage and refueling will be contained within berms or equipped with drip trays, spill pads and/or mats.
- Fuel transfer will be attended by a qualified person.

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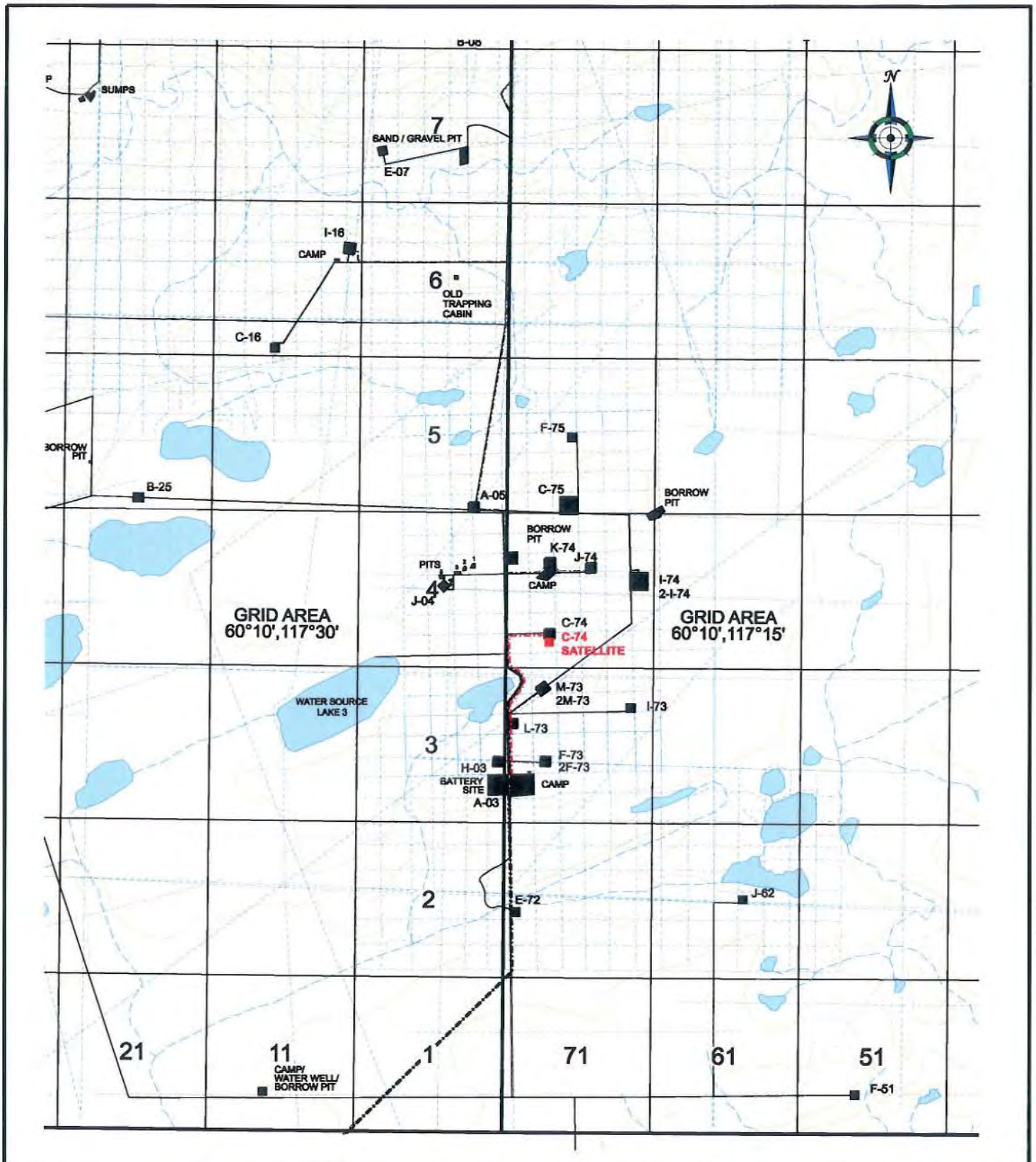
Appendix 1: Figures and Photographs



Prepared by:

UNIVERSAL GEOSYSTEMS
SPATIAL INFORMATION SERVICES

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LEGEND:

PROPOSED PIPELINE RIGHT-OF-WAY
(20m from C-74 Satellite to turn-off, 10m from turn-off to H-03)

PROPOSED SURFACE LEASE (100 x 100 m)

EXISTING PROJECT

Paramount RESOURCES LTD.

Date: 02-MAY-07
Job No.: 04-1150G
Filename: C-74_SAT_Illustration.dgn

CAMERON HILLS

AS-BUILT MAP SHOWING PROPOSED C-74 SATELLITE SURFACE USE FOR LAND USE PERMIT AND WATER LICENSE APPLICATIONS

SCALE 1:50 000

ENVIRONMENTAL SPECIFICATIONS

ROW WIDTH		30m Wide right-of-way for flowlines and powerlines	20m wide right-of-way
ENVIRONMENTAL CONCERN	Undulating ridges	Potential Permafrost ridges; Creek Crossing; Potential Permafrost; Creek Crossing	Riparian area; Creek Crossing; Creek Crossing
ENVIRONMENTAL PROTECTION MEASURES	Revegetate exposed mineral soil	Permafrost Protection Do not disturb surface vegetative mat with dozerblades during freeze-down operations (except over the ditchline) Avoid grubbing on travel side of right-of-way Install heavy walled pipe as required Open cut; Maintain Buffer; Open cut	Vehicle servicing and fueling 100m back from crossing Open cut; Open cut
CLEARING REQUIREMENTS	Marginal merchantable Aspen/Pine	Predominately unmerchantable Black Spruce Salvage trees for rollback and log corduroy	Grass/Sedge; Predominately unmerchantable Black Spruce and some mixed wood Salvage trees for rollback and log corduroy
SOIL HANDLING	Salvage organic soil prior to leveling	Separate surface soil on ditchline, replace after backfill	Separate surface soil on ditchline, replace after backfill
SEED MIX	Natural Regeneration/Encroachment		

MOSAIC SCALE 1:20,000 DATE OF PHOTOGRAPHY: 1994

LEGEND

PROPOSED ROUTE

SOIL VEGETATION WILDLIFE SURVEY LOCATIONS

SHOVEL TEST

Wildlife Abbreviations

DEJU=dark-eyed junco; SOSA=solitary sandpiper; BALA=bald eagle; SWSP=swamp sparrow; LCSP=LeConte's sparrow; TEWA=Tennessee warbler; BLPW=blackpoll warbler; PAWA=palm warbler; LISP=Lincoln's sparrow; CCSP=clay-colored sparrow; CORA=common raven; FOSP=fox sparrow; WCSP=white-crowned sparrow; GRYE=greater yellowlegs; TRES=tree swallow; WTSP=white-throated sparrow; HETH=Hermit thrush; CHSP=chipping sparrow; NOFL=northern flicker; GRJA=grey jay

ENVIRONMENTAL SETTING

TOPOGRAPHY	Undulating Level Ridges	Level	Near level	Level	Incised	Level						Incised	Level		
SOILS	Margaret Lake/ Pitchimi	Margaret Lake	Slavey	Margaret Lake	Slavey	Margaret Lake			Pitchimi/Margaret Lake	Margaret Lake		Slavey	Margaret Lake		
VEGETATION	Mixedwood (Aspen-Jackpine)	Wooded/Shrubby Bog	Riparian	Wooded/ Shrubby Bog	Wooded Riparian Bog	Wooded Bog	Shrubby Bog		Mixedwood/ Riparian	Wooded Bog		Riparian	Wooded/ Shrubby Bog		
SURFACE AND GROUND WATER		CROSSING GSC-11 DRY OVERGROWN BOG		CROSSING GSC-30 NO CHANNEL OR FLOW							CROSSING GSC-15 NO CHANNEL OR FLOW			CROSSING GSC-16 MODERATELY DEFINED CHANNEL WEST SIDE OF BOG	
FISH AND WILDLIFE	Snowshoe hare pellets; DEJU, PAWA, TEWA, CHSP, YRWA, LEFL.														
HERITAGE	Shovel tests as indicated. Examined existing surface exposures. Remainder examined from the air; low to moderate archaeological potential.		Examined existing surface exposure at M-73	Shovel tests as indicated; examined existing surface exposures. Remainder examined from the air; low archaeological potential.		Examined existing exposures on A-05. Examined B-05 from the air; low archaeological potential.			Shovel tests as indicated; examined existing surface exposures. Remainder examined from the air; low archaeological potential.					

MISCELLANEOUS

REFER TO APPENDIX FOR MORE SPECIFIC DETAIL OF EACH WATER CROSSING.

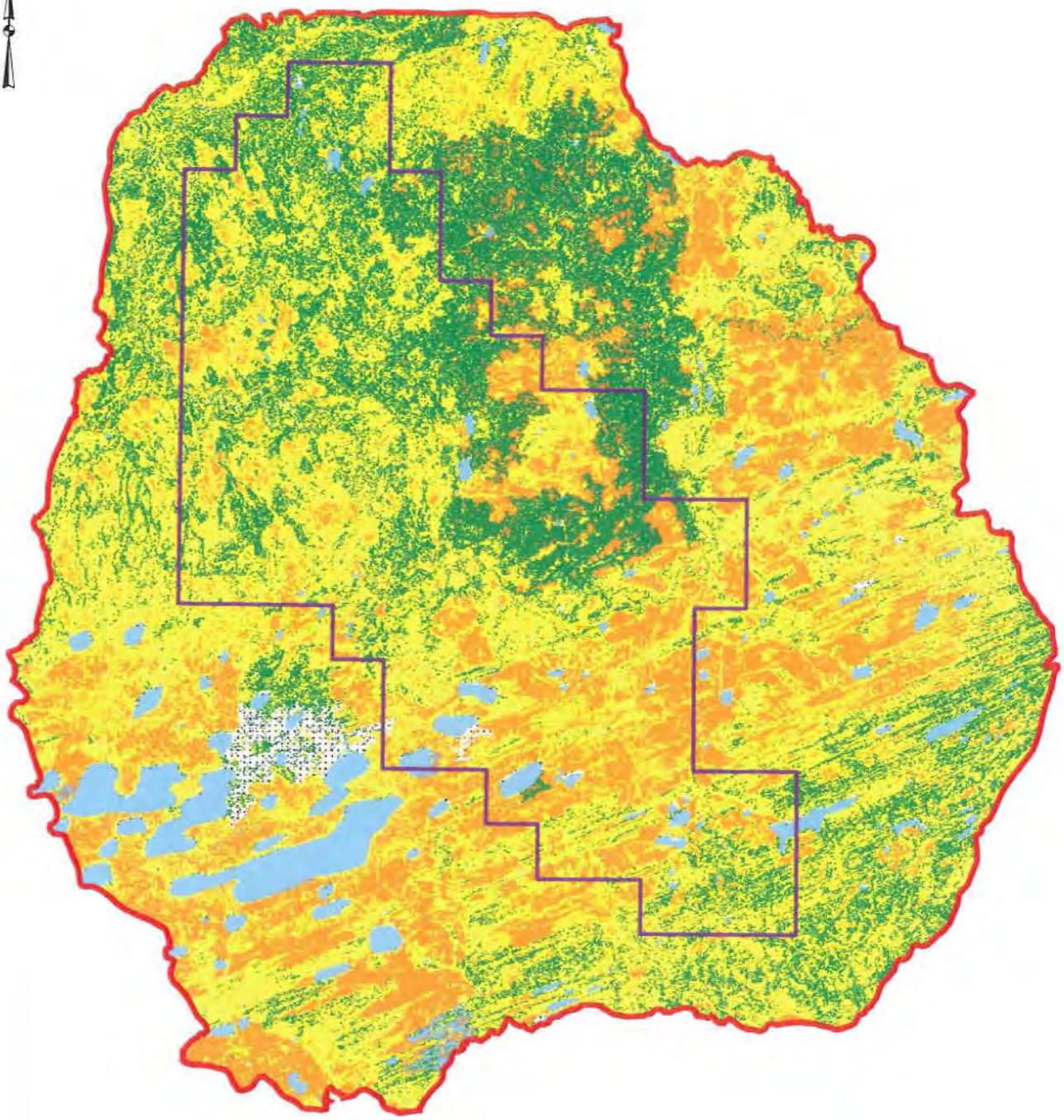
ALL MARGARET LAKE SOILS ARE ASSOCIATED WITH DISCONTINUOUS DIZZY

NOTE: THE FLOWLINE ROUTES FOLLOW EXISTING SEISMIC CUTLINES (i.e., 8m CUTLINE TO BE WIDENED AS APPROPRIATE), UNLESS NOTED AS "NEW CUT" UNDER THE CLEARING REQUIREMENT HEADING.

Paramount Resources Ltd. | Golder Associates | ALPINE

REFERENCE: SURVEY SUPPLIED BY UNIVERSAL SURVEYS LTD. NAD 83 UTM ZONE 11. AIR PHOTOS SUPPLIED BY MBS IMAGERY. ORIGINAL SCALE 1:15,000. PHOTO DATE: 1985

DRAWN: RFM	DATE: 19 April 2001	SCALE: 1:20,000	
CHECKED: DJ	ACAD FILE:	GEOMAGE FILE:	
REVISED:			



LEGEND

Regional Study Area

SDL

Permafrost Potential

Negligible

Low

Moderate

Water

Clouds

REFERENCE

Datum: NAD 83 Projection: UTM Zone 11

3 0 3 6 9

SCALE 1:200,000 KILOMETRES

PROJECT

Paramount resources ltd.

Cameron Hills Project

TITLE

Permafrost Potential in the Regional Study Area

Golder Associates
Calgary, Alberta

PROJECT No. 03-1322.104			SCALE AS SHOWN	REV. 0
DESIGN	CWL	27 Aug. 2003		
GIS	BTR	26 Aug 2003		
CHECK	NK	16 Sept 2003		
REVIEW	DJ	16 Sept 2003		

FIGURE: 7.3-3

H:\03-1322-104\mxd\Cameron_Hills_rsa.mxd

Appendix 2: Air Emissions Mitigation

Impacts to air associated with the activities (diesel fuel combustion and incineration of garbage) covered under this permit application are predicted to be local and temporary. Impacts to air associated with drilling, testing, and production are covered under a separate application to the NEB pursuant to the *Canada Oil and Gas Operations Act*. Nonetheless, experience shows that questions about impacts to air associated with activities not covered under this permit application are likely to arise. Therefore, details on Paramount's air quality protection program are provided below, for the reader's interest.

As a component of environmental protection planning under Section 60 of the *Canada Oil and Gas Production and Conservation Regulations*, Paramount operates a meteorological and air quality monitoring station in the SDLA. Data are measured against the *NWT Ambient Air Quality Objectives* and values exceeding specified levels are reported to the NEB. As well, Paramount's *Air Emissions Mitigation Plan, Cameron Hills Area, NT* currently is being prepared. Pursuant to Section 88 of the Canada *Oil and Gas Production and Conservation Regulations*, Paramount submits an annual environmental report with an air quality component to the NEB. A plain language version of the air quality component is made available to the public. Paramount's Emergency Management Coordinator is responsible for recommending corporate protocols pertaining to containment fuel spill contingency plans (Appendix 3).

Appendix 3: Paramount's Safety and Environment Specialists

In May of 2000, the Corporate Compliance Department[5] at Paramount was given a mandate to make health, safety, environment management and regulatory compliance an integral part of our business operations. As such, it is responsible for providing guidance, training and resource material to all personnel on all matters pertaining to health, safety and environmental management and for ensuring regulatory compliance. Paramount's safety and environment specialists are listed in Table A1.

Table A1: Paramount's Safety and Environment Specialists

Title
Agrologist and Environmental Specialist
Air Quality Engineer
Emergency Management Coordinator
Safety Specialist
Senior Biologist
Senior Hydrogeologist/Hydrologist

[5] Paramount Resources Ltd., Corporate Compliance Department, 4700 Bankers Hall West, 888, 3rd Street SW, Calgary, Alberta, T2P 5C5, Fax 403. 290.6208.

MVLWB Registry

From: Malgosia Turton [Malgosia.Turton@paramountres.com]
Sent: Wednesday, May 02, 2007 3:00 PM
To: permits@mvlwb.com
Subject: Cameron Hills C-74 Satellite Area EIS

C-74 satellite EIS.pdf (8 MB)

Please confirm the receiving of this e-mail with the attachment.

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Assistant, Community & Regulatory Affairs
Paramount Resources
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