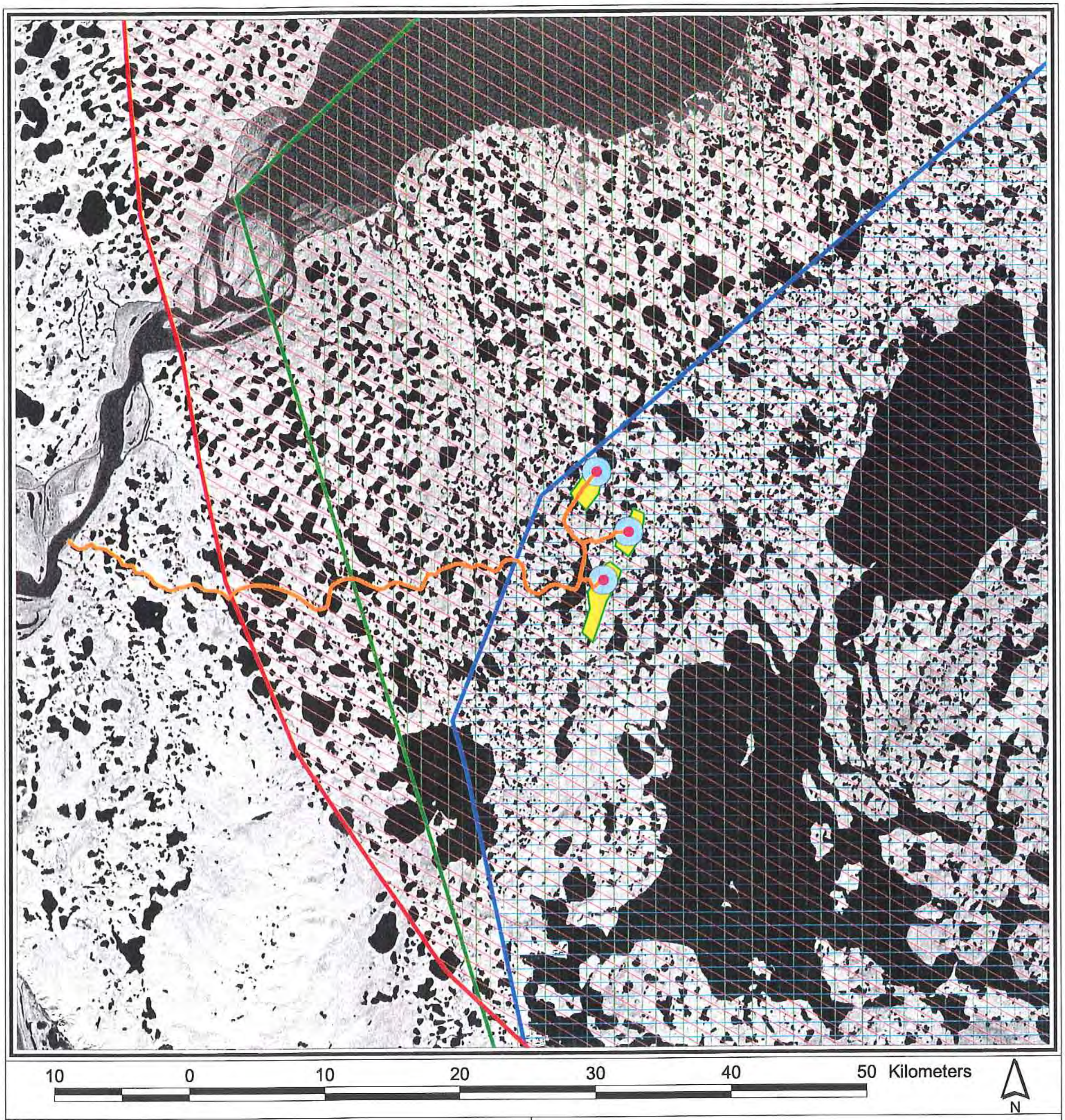


Legend

- Proposed Wells
- Access Roads
- 1 km Buffer from Well Pads
- Nuna Prospects

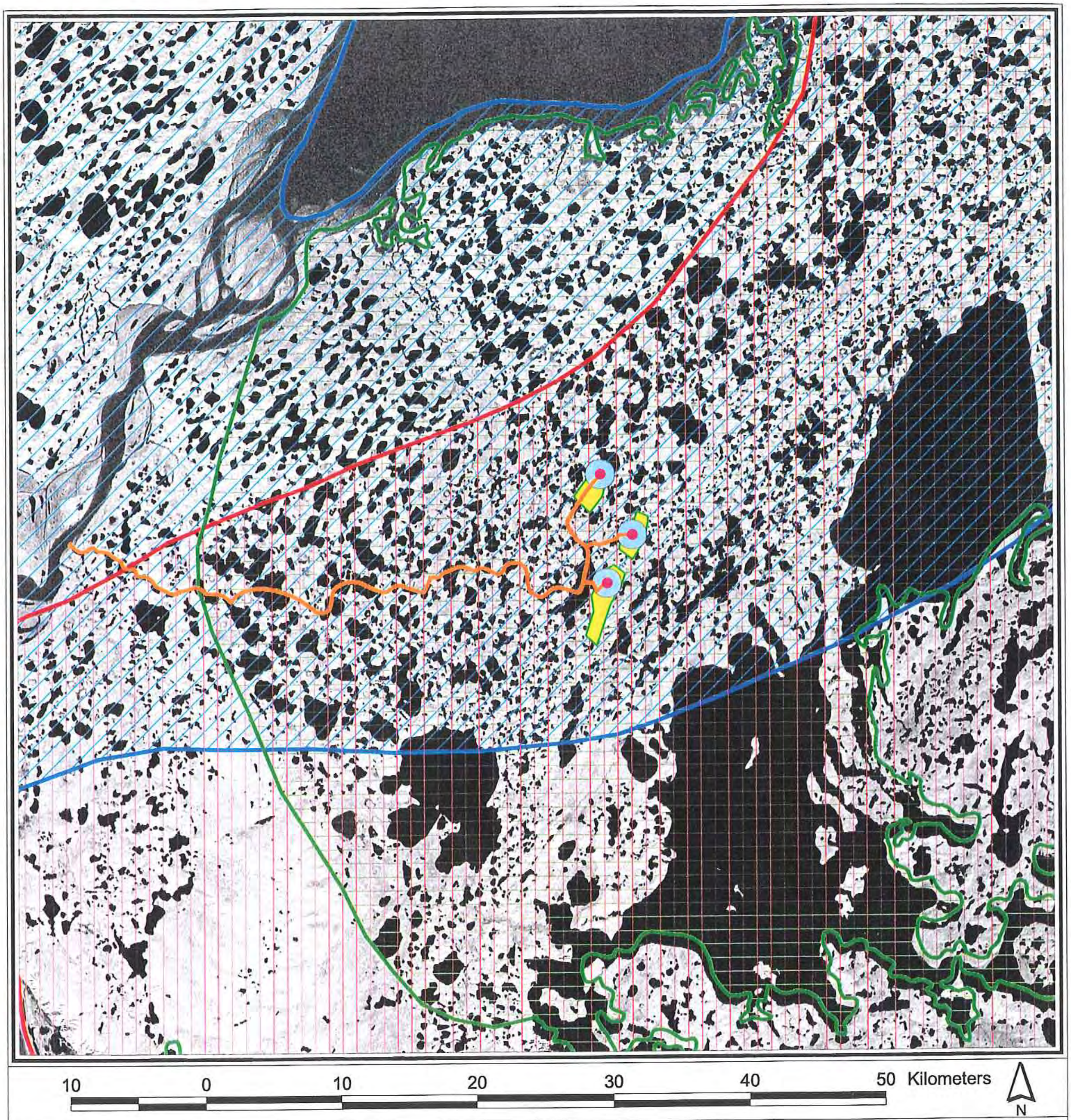
Community Conservation Plans

- 302C Spring Caribou Harvesting Areas
- 314C Winter Wolverine Harvesting Areas
- 315C Winter Caribou Harvesting Areas

Figure 3
Harvesting and Habitat Areas Within or Near the Vicinity of the Drilling Program

Project: 5292-02
Source: Inuvialuit Community Conservation Plans
GIS Cartographer: H Wong
Date: July, 2002
Revision: 0

Inuvialuit Environmental & Geotechnical Inc.



Legend

- Proposed Wells
- Access Roads
- 1 km Buffer from Well Pads
- Nuna Prospects

Community Conservation Plans

- 322C Critical Grizzly Bear Denning Areas
- 701B Bluenose-West Caribou Herd Winter Range
- 704C Fish Lakes and Rivers

Figure 4
Special Management Areas Within or Near the Vicinity of the Drilling Program

Project: 5292-02
Source: Inuvialuit Community Conservation Plans
GIS Cartographer: H Wong
Date: July, 2002
Revision: 0

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9.0 DEVELOPMENT TIMETABLE

Table 10 provides the proposed schedule for the Petro-Canada Nuna Winter 2002/2003 drilling program. Petro-Canada is proposing to commence groundwork in late October 2002.

TABLE 10
DEVELOPMENT SCHEDULE

Project Activity	Estimated Time Frame
Planning	Ongoing
Ice Access and Lease Construction	October – December 2002
Mobilization to First Drilling Location	December 2002
Camp Set-up	December 2002
Well Drilling	January – February 2003
Move to Second Drilling Location (pending results of first drill)	February 2003
Well Drilling	February – April 2003
Final Cleanup	Dependant upon whether one or two wells are drilled, and ice conditions. Well #1 – March 2003 Well #2 – April 2003

* Time lines given in the above table are approximate and subject to change depending upon variables such as weather or ice thickness on proposed routes of travel.

10.0 NEW TECHNOLOGY

The drilling operation will use standard industry practices and technology, and no new technologies will be utilized. These options have been selected because of their successful track record in the north.

11.0 ENVIRONMENTAL OVERVIEW

11.1 Physiography and Bedrock Geology

The proposed Petro-Canada Nuna drilling program is located in the Tuktoyaktuk Coastal Plain Ecoregion of the Southern Arctic Ecozone (ESWG 1995). The landscape surrounding the proposed program consists of broadly rolling uplands, generally 30 m above sea level (Todd and Dallimore 1998). The resulting undulating terrain is studded with innumerable lakes and ponds. Pingos, some very large, also form unique features in the landscape (ESWG 1995). The region is underlain by continuous permafrost with sediments often containing excess ice (i.e. they would be supersaturated with water if they melted) in the form of ice veins, lenses, wedges, and massive ice (Mackay et al. 1972).

The surficial geology of the proposed program area consists of fine and coarse grained river deposits; thermokarst lakebeds; gravelly and sandy hills, rivers and terraces; and hummocky till-capped terrain

(GSC 1987). The sedimentary succession has been extensively deformed by Tertiary faulting and folding resulting in structural elements including variably oriented anticlines and thrust faults, and east- and north-east trending extensional faults (Lane and Dietrich 1995). The hydrocarbon-bearing sequence of the Mackenzie Delta has been identified as an upper layer of weakly consolidated sandstone and conglomerate, and includes the uppermost Quaternary sediments of the area. Underlying this is a layer of primarily fine-grained siltstone and shale.

11.2 Soils

Organic and Turbic Cryosols developed on level to rolling organic, morainal, alluvial, fluvioglacial, and marine deposits are the dominant soils of the Tuktoyaktuk Coastal Plain Ecoregion (ESWG 1995). The organic soils found in the eskers of this ecoregion are generally shallow, highly acidic and nutrient-poor. The mineral soils are also poorly developed and often frozen (ESWG 1995). The low organic matter content of these predominantly mineral soils is associated with low levels of biological activity, limiting the soil capacity to recover quickly from anthropogenic disturbance and pollution (Stonehouse 1999).

Tundra upland soils support tundra vegetation communities that provides wildlife habitat and insulative properties that limit the degradation of permafrost. Permafrost, in turn, limits the downward migration of water allowing soils to remain waterlogged even though there is little precipitation. The depth of the active layer (i.e. the portion of soil that thaws seasonally) varies greatly with the angle of exposure to the sun, the degree of shading, the texture of the soil and the water content of the soil (Mackay 1995). In well-drained sand or gravel, the seasonal thaw may be relatively deep, whereas in wet peaty soils the summer thaw penetrates only a short distance (Porsild and Cody 1980).

Hummocks are the most abundant soil microrelief feature of the ecoregion (Mackay 1995). Over this area, hummocks are generally composed of fine-grained frost-susceptible soils that have been upwardly displaced, and range from those that are completely vegetated (earth hummocks) to those with bare centres (mud hummocks) (Mackay 1980). Hummocks found in the program area are very stable, and may persist for several thousands of years.

11.3 Permafrost

Permafrost is defined as sediments that remain below 0°C for two or more years (Taylor et al. 1996). Permafrost occurs beneath all terrestrial areas and many waterbodies of the Tuktoyaktuk Coastal Plain, generally exceeding 500 m in thickness (Mackay 1999). Active layer depth (depth of seasonal thaw) develops to about 1 m thick (Bigras 1990, Smith et al. 2001). The occurrence of continuous permafrost in the area raises concerns for development, as ice-bonding in the soil matrix can dramatically alter the physical properties of frozen sediments (Todd and Dallimore 1998). In all areas where permafrost is prevalent, permafrost-related processes such as solifluction and soil creep, ice wedge formation, frost shattering of boulders, pingo formation and the heaving of areas formerly covered by water bodies, have a major effect on shaping the landscape (Rampton and Bouchard 1975). Repeated freezing and thawing of these soils creates features on the surface that include cell-like polygons, bulging hummocks, and bare mud boils where the soil is so active that no plants can take root. Intense frost heaving often splits apart the underlying bedrock and forces large angular boulders to the surface (ESWG 1995).

Ice rich soils are insulated and maintained by extensive vegetation cover. However, these soils are susceptible to permafrost degradation as a result of erosion and increased temperatures. Thaw of ice-rich permafrost typically results in varying degrees of ground subsidence, collapse of hummocky microrelief, addition of thaw water to the bottom of the active layer and rapid growth of water-loving vegetation such as sedges, alders and willows (Mackay 1995).

11.4 Hydrology

The Tuktoyaktuk Coastal Plain is strewn with a large number of typically shallow lakes. A large proportion of these lakes were formed during a postglacial warm period when active layer depths resulted in thawing of the upper, ice-rich, permafrost layers (Mackay 1992). The southwestern extent of the Husky Lakes estuary is located within the vicinity of the proposed program area (app. 5 km from south drilling area). The estuary is connected to the Beaufort Sea via Liverpool Bay and represents varying degrees and stratification of salinity and temperature, dependent on freshwater inputs via watershed drainage and ice melt as well as tides, storm surges, and other flow dynamics derived from the Beaufort Sea.

Lakes on the Tuktoyaktuk Coastal Plain tend to remain ice-covered for around 250 days per year, with freeze-up generally occurring in September or October and break-up occurring in late June (Bond and Erickson 1985). Break-up on the peninsula is caused by melting as opposed to flooding of the ice by a warmer water body, as in the Mackenzie Delta. In tundra areas of the Tuktoyaktuk Peninsula subsurface flow, as opposed to overland flow, is the dominant mode of water transport (Quinton and Marsh 1999). During the summer evaporation from lake surfaces is generally greater than precipitation (Pienitz et al. 1997). Seasonal variations in surface water chemistry are therefore related mainly to dilution by snowmelt and runoff and to concentration by evaporation and exclusion from ice and/or permafrost (Pienitz et al. 1997). The slower process of melting and the lack of a flood regime on the Tuktoyaktuk coastal and tundra lakes contribute to greater year-to-year variability in measured physical properties, such as temperature, pH, and conductivity, compared to lakes of the Mackenzie Delta (Fee et al. 1988).

11.5 Climate

The Tuktoyaktuk Coastal Plain Ecozone is classified as having a low arctic ecoclimate (ESWG 1995). The mean annual temperature is approximately -11.5°C with a summer mean of 4.5°C and a winter mean of -26.5°C. Mean annual precipitation ranges 125–200 mm. Precipitation mainly falls as rain, and while it is highly variable in the coastal and delta regions, there is a general increase in amount of precipitation from the coast southwards.

The normal airflow direction over the region is westerly in summer and northwesterly in winter, with potentially severe weather resulting from deviations in this pattern (Dome et al. 1982). Considerable variation can occur over this region, particularly between coastal and inland areas. Generally, the wind strength and duration decrease from the coast southwards. The most common forms of visual obstruction in the winter are steam fog, ice crystal haze, blowing snow and whiteouts (Dome et al. 1982). Spring progresses gradually from south to north with a distinctive eastward movement of the high-pressure system.

11.6 Vegetation

No distinct succession of plant species is observed on the tundra due to the relatively infrequent occurrence of natural disturbances, such as fire, that create places for plants to grow (Wein 1976). Germination and seedling survivorship are low (Bell and Bliss 1980, Hobbie and Chapin 1998). Therefore, plant recruitment is more of an opportunistic process (Svoboda and Henry 1987).

Plant diversity is relatively limited on the tundra. The major community type on the tundra is dwarf shrub-heath, which covers 77% of the vegetated surface, while tussock tundra covers 14%, sedge meadows 6%, and lake-edge communities only 3% (Hernandez 1973). The dwarf shrub-heath community is dominated by dwarf birch (*Betula nana*), smooth willow (*Salix glauca*), crowberry (*Empetrum nigrum*), lingonberry (*Vaccinium vitis-idaea*), mosses and lichens. The tussock tundra is dominated by sheathed cotton grass (*Eriophorum vaginatum*), B. nana, cloudberry (*Rubus chamaemorus*), V. vitis-idaea, northern Labrador tea (*Ledum palustre decombens*), mosses and lichens. Sedge meadows are dominated by Carex spp., mosses, and lake-edge communities.

Using the landscape classification created following a summer biophysical assessment of the Mackenzie Delta region (IEG 2002), vegetation communities potentially affected by Petro-Canada's project were identified (Table 11 and Figure 5).

Landcover classes, including vegetation within the vicinity of the proposed program (1 km zone of influence surrounding 150 X 150 m well pad) (Figure 5) and for the areas occupied by oil and gas leases within the Inuvialuit Settlement Region (Figure 6) are described below. The area covered by each landcover class, as well as the percentage of the area covered by each class, at local and regional scales are outlined in Table 11. The landcover classes depicted in figures and listed in tables below are described in more detail in Appendix D.

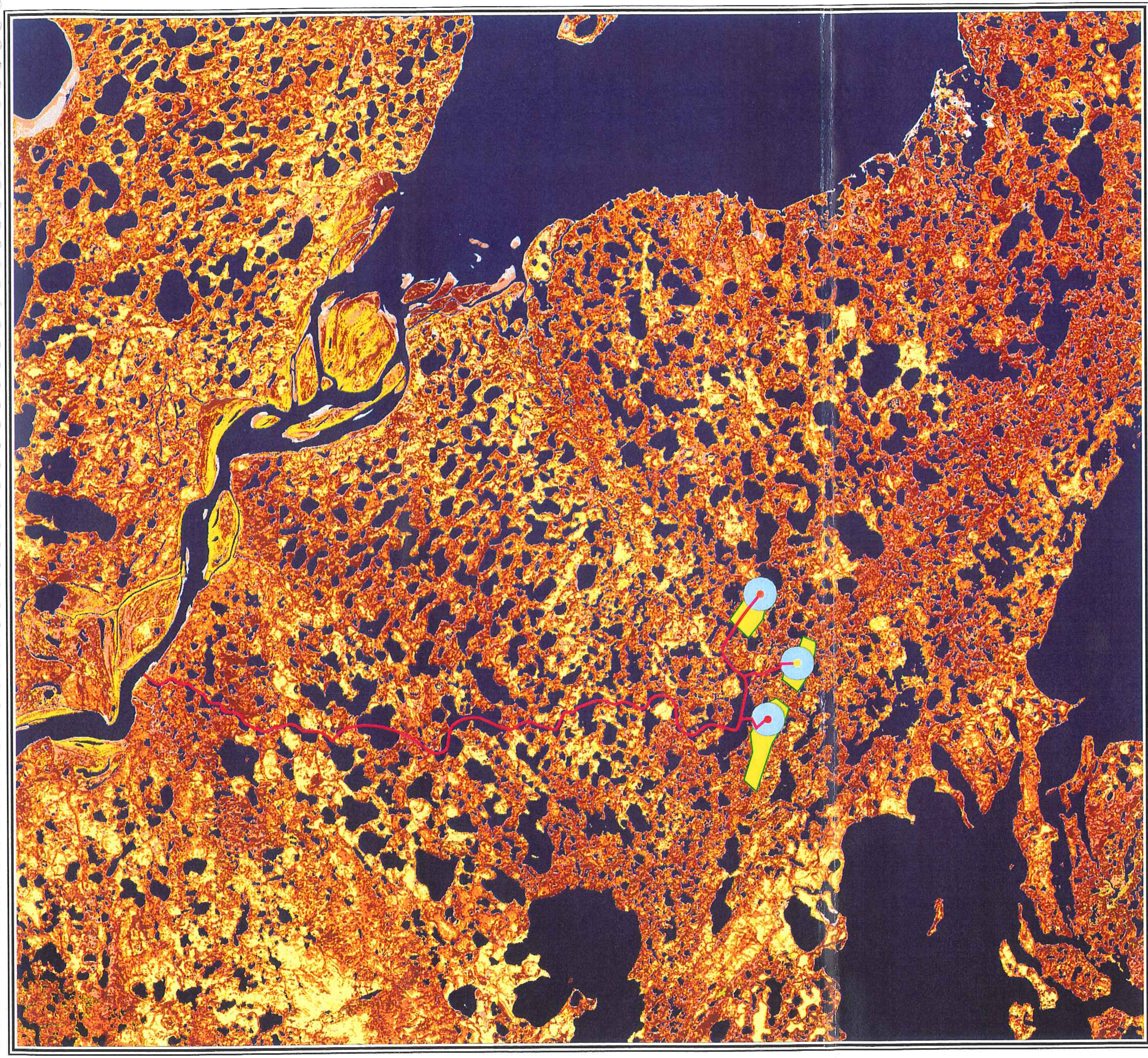


Figure 5
Biophysical Map of Local Project Area Mackenzie Delta, NWT

Legend

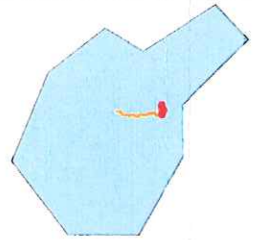
Proposed Wells
- Nuna 1
- Nuna 2
- Nuna 3

Access Roads
1 km Buffer from Well Pads
Nuna Prospects

Landcover Class
- Graminoid
- Sedge
- Tussock Tundra
- Low Birch
- Low Willow/Alder
- Tall Willow/Alder
- Woodland Conifer
- Forest Conifer
- Other Terrestrial
- Ice, Water, & Aquatic Vegetation

0 5 10 15 20 Kilometers

N



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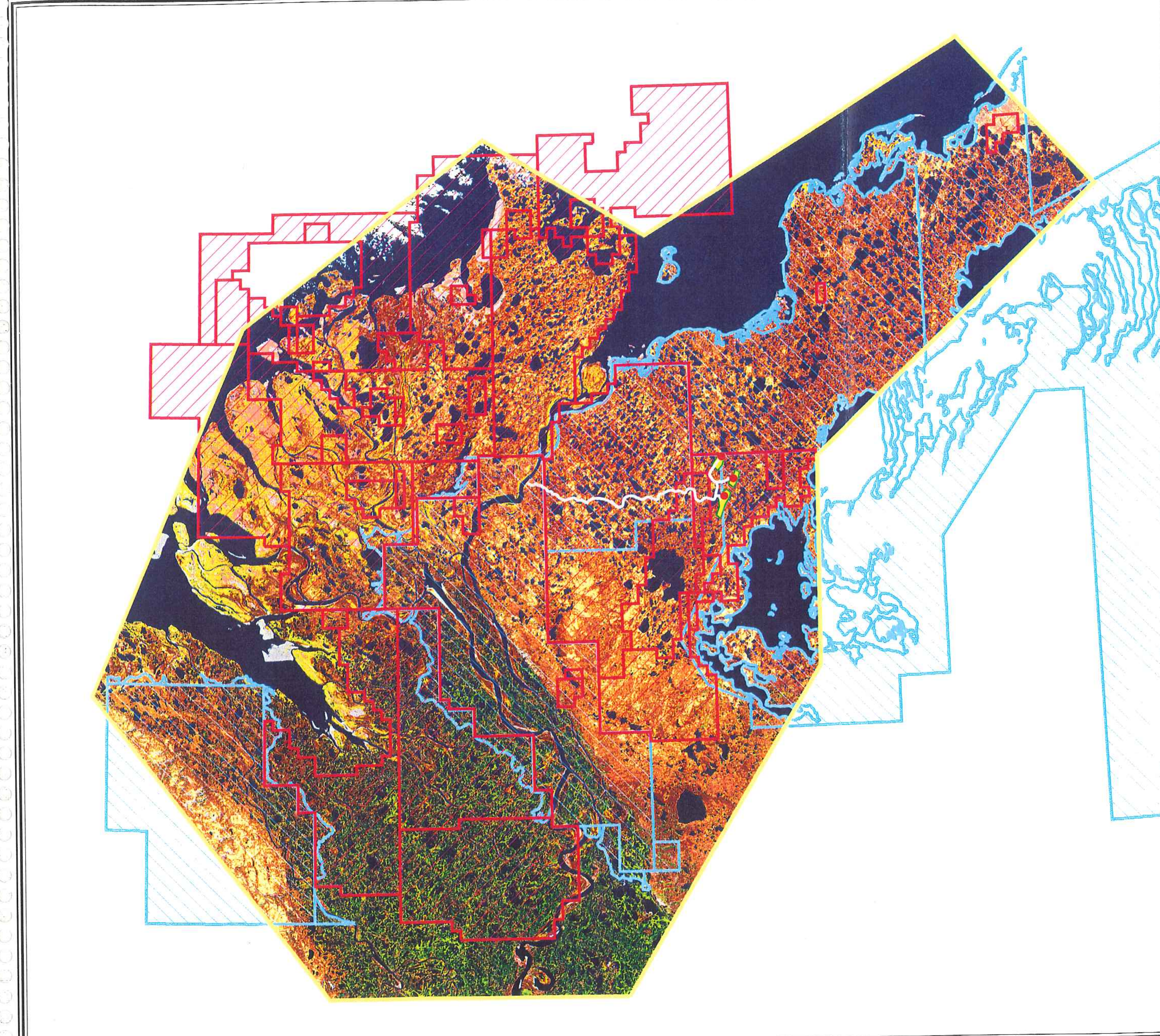


Figure 6
Biophysical Map of the Area Occupied by Oil & Gas Leases Mackenzie Delta, NWT

Legend

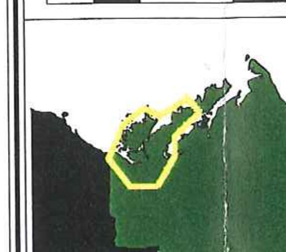
- Proposed Wells
- Access Roads
- Nuna Prospects
- Regional Study Area
- Federal Leases
- Inuvialuit 7(1)a/b Lands

Landcover Class

- Graminoid
- Sedge
- Tussock Tundra
- Low Birch
- Low Willow/Alder
- Tall Willow/Alder
- Woodland Conifer
- Forest Conifer
- Other Terrestrial
- Ice, Water, & Aquatic Vegetation

10 0 10 20 30 40 50 60 Kilometers

N



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