5.5 Base Camps and Personnel

To support construction, EnCana will use the Arctic Star barge camp, which can accommodate 80 personnel. The Arctic Star is owned, and will be operated by, E. Gruben's Transport Ltd. (EGT). The camp will be located north of Lousy Point (Figure 2). Only the construction crew will be operating from the barge camp and the total number of personnel in the camp is expected to be approximately 30.

For the drilling operation, EnCana will utilize the 65-person camp that is paired with Akita-Equtak Rig 62. The camp is a self-contained unit, with offices, bedrooms, a galley, recreation area and first aid area. The rig camp uses diesel-fired generators, has a potable water-maker and a sewage treatment system. Approximately 50 persons will be required for drilling operations.

EnCana will also utilize Swimming Point as a logistics and base camp. Arctic Oil and Gas Services Ltd. (AOGS) operates Swimming Point and has leased it to Chevron Canada Resources (CCR). EnCana has subleased space from CCR. Approximately 20 personnel may be based at Swimming Point during the program.

5.5.1 Wastewater Treatment

As operator of the Arctic Star, EGT will be securing a water licence to withdraw water to be used at the barge camp, and to discharge treated wastewater.

Wastewater from the rig camp will be treated using using a Filterboxx system. The Filterboxx is an extended aeration activated sludge biological wastewater treatment system. A holding tank (approximately 64 m^3) is also being installed, which can store up to five days of wastewater, assuming the camp is running at full capacity. Wastewater can be recirculated from the tank through the wastewater treatment unit. The Filterboxx unit has been ordered by Akita/Equtak Drilling, with expected delivery and installation prior to the program start date.

In the unlikely event the system cannot be delivered and installed prior to the program start-up, the camp's existing wastewater treatment system would be used. The existing system is an EcoTech extended aeration system and is capable of processing approximately 15 000 litres per day.

A certified technician/engineer will be hired to manage the potable water system, as well as the wastewater treatment system. The technician will have access to an on-site laboratory to test samples frequently and regularly to ensure compliance. Testing on-site will allow the technician to manage the system more closely and make adjustments, as and when required. Routine third-party testing will also be conducted, as per the conditions established by the water license.

Upon meeting licensed criteria, treated wastewater will be discharged to the land surface at the rig camp or, if approved by the Inspector, will be

spread on overland sections of roads as part of the routine access maintenance. Any discharge to land will be kept a minimum of 30 m from any waterbody. Discharge is estimated at less than 150 litres/capita/day for a total estimated discharge 9 m^3/day.

As a contingency, if treated wastewater does not meet criteria required to discharge to land, EnCana may discharge to the East Channel of the Mackenzie River, provided the treated effluent met the necessary criteria. An estimate of the minimum average flow rate on the East Channel at Lousy Point is approximately 17 884 800 m^3/day in winter (Appendix A). Assuming an estimated discharge rate of 150 litres/capita/day, dilution would be greater than 10 000:1. A second alternative, if wastewater could not be discharged to the river, would be to chlorinate and subsequently dechlorinate the wastewater to bring it into compliance with discharge criteria. As a final option, EnCana may discharge treated wastewater to a sump. The sump would be constructed separately from the drilling sump. This is not a preferred option, and would only be undertaken if the other processes failed.

While EnCana may haul wastewater to a municipal facility early in the program, as initial tests of the wastewater stream are being conducted, this is not a preferred option given the cost and safety issues associated with hauling waste over long distances in winter.

5.6 Equipment, Fuel and Material Use and Management

5.6.1 Solid and Hazardous Waste Management

Metal, plastic and oily and other hazardous wastes will be separated on-site. Separated recyclable materials and plastics will be hauled to an appropriate handling facility for recycling or disposal upon program completion. Hazardous wastes will be transported, by an approved carrier, to an appropriate southern facility for disposal. The rig camp is also equipped with an incinerator. Combustibles and food waste will be incinerated on-site, with the resulting ash being disposed of in the Inuvik landfill. Contaminated snow will be transported to Swimming Point for processing in an oil-water separator and the oil will be incinerated.

5.6.2 Fuel Storage

Fuel will be required for both the drilling and construction components of the program.

Fuel consumption for the Arctic Star camp and construction equipment is expected to be approximately 5 300 litres/day (4 160 litres/day for equipment and 1 140 litres/day for the camp). The Arctic Star has an on-board tank, with secondary containment, capable of storing 75 710 litres, providing approximately 14 days of fuel for camp and construction equipment.

Two fuel sloops would also be used on the access to supply the lead construction equipment. Each sloop has 6 tanks, with each tank having a capacity of approximately 1 900 litres. The tanks have secondary containment and would be staged on an area that has been iced and bermed. All tanks will contain diesel fuel.

Fuel consumption for the rig and camp is estimated to be 12 000 liters/day. Fuel would be delivered weekly, and an additional 7 days of fuel would be kept on-site for contingency. A tank on the rig will be used to store 35 000 liters, and 40 000 liters will be stored in the camp (20 000 liters for each power unit x 2 power units). All fuel storage units on the rig are spill protected and contained.

Four fuel tanks, each with a capacity of 60,000 litres, would also be kept within a bermed area on the ice pad at the lease. The fuel tanks include secondary containment and all fuel on the lease site will be diesel.

Approximately six drums of aviation fuel may be stored on the lease site, as a contingency supply for pilots. The drums would be on the ice pad, in the fuel storage area, and would be fully bermed.

5.6.3 Other Materials Storage

A number of compounds will be used during drilling operations. Products to be stored on-site are listed in Appendix B.

5.6.4 Equipment Required

Construction				Drilling	
Cat 950G Loader	1	Grader	1	Drilling rig	1
250 Komatsu	1	Hitatchi 300 Excavator	1	Oilfield service rentals, as required	
5 Ton Plow Truck	2	Tandem Dump Trucks	3	Satellite dish/communication system	1
Flood Trucks	4	¾ Ton Diesel Supercabs	5	Light towers	
Gator with Vacuum tank	1	1 Ton Deisel Crew Cabs	5	Support equipment (water tanks, etc)	
Delta II	1	Pumphouses	2	Picker or crane	1
Delta III	2	Fuel Sloop on Sleigh	2	Rig camp	1
Water Trucks	3	Warm-up Shacks	2	Well testing unit	1
Fuel Truck	1	150 kilowatt Light Plant.	3	Telehoist	1
BR-180 Snowcat	1	Crew Bus - 30 man	1	Man-rider	1
D3 Cat	1	Spacer Barge	1	Rathole Rig	1
D6 Cat w/ Water Sleigh	1	Snowmobiles For Scouts	4		
Shothole Rig	1	Service Truck	1		
Dynamite Magazine	1	Profiler	1		

6 DEVELOPMENT SCHEDULE

The estimated timeframe for each stage of the project is listed in Table 5. The timelines given are approximate and are subject to change depending upon variables such as weather or ice thickness.

TABLE 5 DEVELOPMENT SCHEDULE

PROJECT ACTIVITY	ESTIMATED TIME FRAME
Planning	April - December 2003
Mobilize Rig 62 to Tuktoyaktuk	September 2003
Mobilize Arctic Star	September 2003
Access and Lease Site Construction	December - January 2003
Well Drilling	January - March 2004
Testing and Completion	March - April 2004
De-mobilization	April 2004
Clean-up	Winter operations complete by 5 April 2004 Follow-up July or August 2004
Sump Monitoring	Annually, August 2004-2007

7 NEW TECHNOLOGY

No new technology will be employed on the drilling program.

8 ALTERNATIVES

The Pembina Institute for Appropriate Development recently completed a qualitative and quantitative life-cycle value assessment of drilling waste management options in the Mackenzie Delta for the Mackenzie Delta Partnership. The study found that the sump and cap option outperformed most other waste management options currently available in the Mackenzie Delta. Given the options available to EnCana are similar to those available for the Mackenzie Delta Partnership, EnCana determined the most appropriate disposal option at this time is also to use an in-ground sump. EnCana is continuing to explore other options however. EnCana will be participating in the ESRF Technical Advisory Group workshop to further discuss drilling waste options and industry is considering continuing work with the Pembina Institute to examine further options for disposal for all Mackenzie Delta activities over a longer timeframe. EnCana is currently taking a lead in this initiative.

9 TRADITIONAL AND OTHER LAND USES

The drill location, and associated barge camp and main access, fall within the Inuvik, Aklavik and Tuktoyaktuk conservation planning areas (AICCP, IICCP, TCCP 2000). The program overlaps with a number of special management areas, as listed in Table 6 and shown in Figure 3.

Other land uses in the area include the Kunnek Resource Development Corporation. The area appears to have been extensively used traditionally, especially along the channel banks and coastline, as evidenced by the heritage sites found in those areas. Potential impacts of the program on these activities on traditional and other land uses, and mitigation measures, are described in Section 12.0: Proposed Mitigation and Anticipated Environmental Impacts.

TABLE 6 SPECIAL MANAGEMENT AREAS IN THE VICINITY OF THE PROPOSED PROGRAM AREA

Site Number	Name	Description
305C	Spring Fish Harvesting	Key area for subsistence fishing during the spring
304C	Spring Goose Hunting	Key area for subsistence hunting of geese in the spring
302C	Spring Caribou Harvesting	Key harvesting area for caribou in the spring
306C	Summer Caribou Harvest	Key area for subsistence harvesting of caribou in the summer
307C	Summer Fishing Areas	Key area for subsistence fishing during the summer
309C	Fall Caribou Harvest	Key area for subsistence harvesting of caribou in the summer
310C	Fall Fishing Areas	Key area for subsistence fishing in the fall
311C	Fall Seal Harvest	Key area for subsistence harvesting of seals in the fall
312C	Fall Goose Harvest	Key area for subsistence harvesting of geese in the fall
315C	Winter Caribou Harvest	Key area for subsistence harvesting of caribou in the winter
316C	Winter Fishing Areas	Key area for subsistence fishing in the winter
711E	Beluga Management Zone 1A	Traditional beluga harvesting/concentration area; no oil and gas exploration or facility construction is allowed
718D	Central Mackenzie Estuary	Overwintering, feeding and nursery area for a variety of fish; concentration area for beluga
322C	Critical Grizzly Bear Denning Areas	Important from October to May for denning grizzly bears
714DE	Kugmallit Bay	Important past and present beluga whale subsistence harvesting area from 15 June to 15 August; area of whale concentration in summer; working group is concerned that activities take place during sensitive time of the year
715C	Key Migratory Bird Habitat	Important nesting/breeding habitat for birds; grizzly and polar bear denning; subsistence harvesting of beluga and waterfowl

10 COMMUNITY CONSULTATION

EnCana initiated public consultation with regional organizations and government agencies potentially affected by the proposed program in April 2003. Stakeholders were informed of the proposed project, schedule, and technical details.

EnCana held public meetings from 29 April to 1 May, 2003 in the communities of Inuvik, Tuktoyaktuk and Aklavik to discuss the details for the proposed project and to address any issues of concern. Updates on the program were also provided to the Hunters and Trappers Committees and Community Corporations in Tuktoyaktuk, Inuvik and Aklavik between 25 August and 11 September. A schedule of meetings is provided in Table 7. Notes from the community meetings are provided in Table 8. Discussions with regulators and management bodies have been ongoing.

TABLE 7 COMMUNITY CONSULTATION MEETINGS

Consultation Group	Date
Inuvik Public Meeting	29 April
Inuvik Community Corporation, Hunters and Trappers Committee and Elders Committee	30 April
Aklavik Community Corporation, Hunters and Trappers Committee and Elders Committee	30 April
Aklavik Public Meeting	30 April
Tuktoyaktuk Hunters and Trappers Committee	1 May
Tuktoyaktuk Community Corporation and Elders Committee	1 May
Tuktoyaktuk Public Meeting	1 May
Tuktoyaktuk HTC Meeting	25 August
Inuvik HTC Meeting	28 August
Tuktoyaktuk Community Corporation Meeting	8 September
Inuvik Community Corporation Meeting	9 September
Aklavik Hunters and Trappers Committee and Community Corporation Meeting	10 September

TABLE 8 COMMUNITY CONSULTATION ISSUES AND RESPONSES

Community	Proponent
Inuvik	
Operations/Technical/Contracting	
When will you know if you are doing one or two wells?	The final decision on the number of wells will be made in June or July, and we will be submitting our applications in late August or September. (Note: at subsequent meetings with the IHTC and ICC, EnCana confirmed that only one well would be drilled this winter)
Will you be doing any additional seismic this winter?	We don't intend to be submitting any new applications for seismic. Under the Atigi 3D program we have another 100 km2 permitted, which was not completed last year. There is a small chance that we could choose to complete that program, but it is unlikely. On Richards Island, there is also a very small chance that we would be interested in another 2D, but generally we feel that we have enough seismic data and now we need to take the time to interpret it.

Community	Proponent
Environmental/Regulatory	
Which route will you be using to access the area?	If another operator opens up Harry Channel, we could consider accessing the drill location from the north through Mallik Bay. However, we currently don't know of any other activities for that area. We intend use the main Tuk-Inuvik ice road, then go overland from the East Channel. The overland portion will follow seismic trails and access routes that were used last year, wherever feasible.
Aklavik	
Operations/Technica/Contracting	
Burnt Lake is the priority for you to drill?	Yes. We are still evaluating the Atigi lead, but it is unlikely that we will do anything with it this year.
What is the long-term plan for tying into the pipeline if you find gas? How would you tie in?	There is a pipeline proposed that runs from Taglu to Parsons and that would be very close to our location.
What do you need to do in order to tie in to the pipeline?	We may need a compressor station at the location, but we wouldn't need a big gas plant like they are proposing at Taglu. The gas we are looking for won't require additional compression considering what they are talking about for a pipeline.
For all of the contracts that are going out and the hiring that is being done, we would ask you to keep the Community Corporation informed, so we can make sure the people in the community know what is going on.	Noted.
Environmental/Regulatory	
What is the advantage of going overland from Swimming Point? That is a long route. Overland is expensive and it has more impacts.	The advantage to going overland from Swimming Point is that we can probably get an early start with construction, without having to wait for the ice road to open. It is a long route overland and in all likelihood we won't have to use it. (Note: EnCana will not be using Swimming Point as a base for construction operations. EnCana has chosen to use the Arctic Star barge camp, staged near Lousy Point, as a basis for construction operations. This allows EnCana to get an early start to construction, and avoid the potential for any surface disturbance associated with a long overland route from Swimming Point)
When you are finished the program we would like to get a report back to the community and we would like to have an opportunity to go and look at the site in the summer time so we can see what the sump and other things look like. If you can show us pictures of the area afterward, that would be good too.	We will visit all of the communities before the June IRC meetings next year to give a report on how our season went. We also travel out in the summer to monitor the site and clean up any debris that may have been left behind. We invite community representatives to come with us on those trips.
Will you have monitors on the program? The IGC supports us in saying that the work here should benefit all the communities.	We will be hiring monitors for both our day and night shifts. The environmental monitor is designated for us by ILA.

Community	Proponent
What will you be doing with your wastewater? If you are going to use vacuum trucks as a contingency then you should put that contract out on an as and when needed basis and pay a fee to those companies to keep the trucks on stand-by.	We will have a wastewater treatment system in both the rig camp and the barge camp. If the treatment systems are working properly and we can meet the discharge criteria established by the NWT Water Board, then we will discharge the water to an area near those camp locations. We have to test the water regularly for the NWT Water Board and they won't let us start discharging the water until we have had several successful tests. In the past however, these systems have not worked as well as we had expected. Akita is putting a brand new system in the Rig 62 camp this year and we hope it will be much better and allow us to discharge. We will also have to have a contingency plan in place, in case the system isn't working. In the past we have hauled the wastewater back to town for disposal in the municipal treatment system.
Even though this application is going in before the drilling waste workshop that is being held in Inuvik at the end of September, you should try to incorporate the recommendations that come from that workshop.	We will be attending the workshop and we will try to incorporate any of the recommendations from it that we can. We have talked to many of the representatives on the technical advisory group and have already tried to implement some of the things that they have been talking about.
Tuktoyaktuk	
Operations/Technical/Contracting	
Will you be staging the rig out of Swimming Point?	If we use the Devon rig, which is at Swimming Point, we will stage out of there. Otherwise, if we use Rig 62, we expect to truck it directly to the site. (Note: Given that Rig 62 was available to mobilize earlier than expected, it will be barged to, and staged at, Tuktoyaktuk in September.
We are concerned about southern companies coming in to move the rig. You should be using northern companies first.	Noted.
Do you have any plans to do more seismic?	It isn't likely. We may finish the north end of the Atigi program. That is already permitted, but again, it is unlikely we will do that this year.
Some of our businesses here have been including a training component in their bid packages. This makes the cost a bit higher, but there are obvious benefits. Do you look at that at all?	We look favourably on that. However, the problem we have is when we are charged full rates for people that are in training.
Environmental/Regulatory	
When you are doing seismic every year, do you notice that the active layer in the permafrost has been getting deeper?	This is too difficult for us to see with seismic.
When they draw water out of lakes, they don't always use the screens that they are supposed to on the hoses.	On the seismic program, we tried to monitor this and go regularly to check screens. We will do the same on the drilling program. The trucks themselves have to have the right screens or they don't get to work on the job.

Community	Proponent
With all the subcontractors, who is monitoring them all. We are concerned that the monitors aren't monitoring what they are supposed to.	Both the environmental and wildlife monitors report directly to the project manager. We have been able to hire good people in the past to monitor, but we can't have a monitor on every single sub-contractor 24 hours/day. Instead we try to hire good subcontractors, that have been proven in the past, and their activities are checked regularly to ensure they are working according to the requirements.
With the sumps that we have seen, we were quite surprised at how big and deep they are. We have heard some concern about sumps melting.	We need to have them relatively large and deep so the drilling material can be spread over the bottom of the sump and be fairly thin, so it can get a good freeze-back. The waste material is also well below the active layer in the permafrost when they are built this way. A group with industry, government and community members is working to establish best practice guidelines for building sumps in the Delta. If sumps are built properly, in the right areas, it minimizes concerns of melting.
You will be operating in the Tuk group trapping area. We prefer you to use people from Tuk as monitors. When you are on our land you have to use our people.	Noted.
Generally our springs have been getting later. The summer is slow to begin. It is like the seasons are behind.	Noted.

11 ENVIRONMENTAL OVERVIEW

This section provides a general overview of environmental components that could potentially be affected by the proposed Burnt Lake Drilling Program.

Well sites for the proposed program are located in the Tuktoyaktuk Coastal Plain Ecoregion of the Southern Arctic Ecozone (ESWG 1995). The landscape surrounding the proposed drilling program sites consists of broadly rolling uplands, generally 30 m above sea level (Todd and Dallimore 1998). Pingos, some very large, also form unique features in the regional 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).

Tundra upland soils support tundra vegetation communities providing 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).

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

11.1 Hydrology

Richards Island is characterized by a surficial hydrology that is fundamentally different to Mackenzie Delta islands further west. The area is generally 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).

Lakes on the Tuktoyaktuk Coastal Plain tend to remain ice covered for around 250 days/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).

The project area lies within the Burnt Creek watershed which drains westward into Mallik Bay. The project area includes five principal lakes, all of which are linked to Burnt Creek via small connecting lakes and streams. Most of these connecting streams are probably intermittent although some may flow throughout the open water season in wet years. The lakes range in size from 20 to 328 ha, and in depth from 4.4 to 10.9 m.

11.2 Permafrost

Permafrost, defined as sediments that remain below 0oC for two or more years (National Research Council of Canada [NRCC] 1988), underlies all terrestrial and many subaqueous areas of the Tuktoyaktuk coastlands and the Mackenzie Delta (Todd and Dalimore 1998). The thickness of the permafrost varies substantially from greater than 600 m in the coastlands to less than 100 m in the delta itself (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).

11.3 Vegetation

Using general knowledge of the region as described in available literature (ESWG 1995; Porsild and Cody 1980; F.F Slaney and Company Ltd. 1973) past personal observations and a recent satellite-based vegetation classification (Inuvialuit Environmental & Geotechnical Inc. [IEG], 2002) an overview of vegetation community composition and distribution was developed (Figure 4). Although accuracy of satellite-based mapping can vary considerably, this information was considered adequate for preliminary assessment purposes and is likely the best available data.

11.3.1 Vegetation Communities of Richards Island

The majority of Richards Island, is characterized by older glacial and late glacial deposits. Vegetation communities consist of a continuous cover of shrubby tundra vegetation, including dwarf birch, willows, alder, northern Labrador tea, red and alpine bear berry, crowberry and bog bilberry. There are also low wet sites with a sphagnum moss cover, as well as sedges and cotton-grasses, which often develop a distinctive polygon pattern created by ice wedge formation; and, in warmer sites, dwarf birch, willow and alder. The flora of the communities is diverse including both southern species that are more characteristic of the upper Mackenzie Basin, and truly arctic or maritime species (Porsild and Cody 1980).

11.3.2 Vegetation Communities Potentially Impacted

To evaluate the potential impacts of the project, the vegetation communities within a 2 km radius of the centre of the three potential locations for the proposed well pad and the access road were assessed (Local Study Area) (Table 9).

TABLE 9 AREA OF VEGETATION COMMUNITIES WITHIN THE LOCAL STUDY

Landcover Class	Total Area(ha)	% of Total Surface Area(%)
Aquatic Vegetation	18	1.4
Graminoid	185	13.9
Low Birch	153	11.5
Low Willow/Alder	411	30.9
Mud/Silt	24	1.8
Tall Willow/Alder	2	0.2
Tussock Tundra	126	9.4
Water	410	30.8
Total	1329	100

The most common vegetation communities within the local study area are the low willow/alder, graminoid, low birch and tussock tundra classes (Figure 4). The 'low willow alder' class consists of shrubs with heights of approximately 1 m. Willow and alder are characteristic species but dwarf birch is also an equal component that has grown to an equivalent size in these wetter and/or warmer sites associated with riparian areas or the south side of hill slopes. A sparse cover of dwarf shrub or herbaceous vegetation may also be present.

The graminoid community is the next most abundant, with 185 ha, and is composed of sedges and grass species. This community is typically found at the edges of lakes, pond or dominating other surface water areas and consists of water sedge, other sedge species, cotton-grass, horsetails and a smaller component of water loving herbaceous species. In these types of areas where the vegetation cover is sparser or the aquatic plants are actually floating in the water bodies they are typically classed as 'aquatic vegetation'.

The 'Low Birch/Dwarf Shrub', the third most abundant type, is representative of the dwarf shrub heath tundra community, which may or may not have developed hummocks, and is dominated by Betula species of about 20 to 30 cm in height and by other dwarf species in that height range, including northern Labrador tea, bog bilberry, red and alpine bearberry and crowberry. In addition to these dominant species, the 'Low Birch / Dwarf Shrub' sometimes includes a sparse cover of herbaceous plants.

The classic definition of tussock tundra is cotton-grass tussocks with a small component of the predominant shrubs including dwarf birch and northern Labrador tea. In the satellite classification this vegetation class can also represent dwarf shrub heath tundra that may or may not have

The information below is based on secondary sources of information including review of the available scientific literature for the region, knowledge of the region, and personal communications with regional resource managers. Community consultation meetings conducted in April/May and August/September 2003 confirmed the information presented and allowed issues of concern to be raised.

A substantial body of information on some species of wildlife is available for the ISR. Much of this scientific information comes from studies undertaken during the 1970s and 1980s to establish baseline conditions for impact assessments of oil and natural gas production facilities. Although useful as background documentation, much of this information may be dated, specifically:

- some wildlife populations may have changed markedly in the intervening 25-30 years (e.g., pintail populations have declined);
- some studies are highly site-specific and would not be applicable to the proposed project; and,
- little or no information is available for some species of high concern to present-day resource managers (e.g., grizzly bear, certain furbearers, and some species of waterbirds).

Additionally, human activities including development in the Mackenzie Delta and Inuvik area may have affected wildlife distributions. Scientific survey methods, standards, and analytical tools (e.g., habitat modeling, home range analyses) have improved considerably over the past 25-30 years and there appears to be a greater understanding of how oil and gas activities can impact wildlife. Traditional ecological knowledge (TEK) is being utilized in conjunction with, or to supplement, scientific studies.

Notwithstanding the above, this information was used as the best available in support of the assessment, which is primarily qualitative. For example, the Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development (RWED) conducted a local knowledge study on grizzly bear that provides important information on wildlife population trends, habitat use, seasonal distributions, movements, and animal health. Local knowledge projects on grizzly bears have been conducted by RWED in cooperation with the Tuktoyaktuk, Aklavik, Inuvik, and Paulatuk Hunters and Trappers Committees (HTCs) and draft reports have been distributed to HTCs for comment and feedback (Branigan 2003, pers. comm.). Recent scientific research and monitoring programs in the Mackenzie Delta region include a long-term satellite telemetry study of barren-ground caribou east of the delta proper (Nagy et al. in preparation; Nagy et al. 1999), and a current grizzly bear study in the Mackenzie Delta-Tuktoyaktuk region, both being conducted by RWED (Nagy 2003, pers. comm.). Additional information on wildlife (e.g., hunting mortality) is available from the Inuvialuit Harvest Study and RWED's harvest databases. Further use of available information on certain species is provided in the selection of wildlife VCs is outlined below.

Species at Risk

The legal responsibility under the Species at Risk Act (SARA) for assessing and identifying species at risk rests with the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Polar bears are listed as a species of 'Special Concern', with denning sites and/or denning bears potentially occurring in the project area. There is currently no terrestrial wildlife species listed as either 'Endangered' or 'Threatened' that could be overwintering in the Burnt Lake program project area.

11.5 Selection of Valued Components

A preliminary list of wildlife species as candidate Valued Components (VCs) was prepared based on literature reviews; knowledge of wildlife use of the lease areas; understanding of the concerns of resource and regulatory agencies, local people and other stakeholders; and consideration of VC selection criteria listed below. If the species appeared in any of the criteria below, it was considered a preliminary candidate for VC selection.

- Is the status (e.g., secure, threatened, at risk of extinction) of the species listed by one of the assessment agencies? Those considered included the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) species lists, NWT Species 2000 list, and the Convention on International Trade of Endangered Species (CITES).
- Is the species vulnerable to effects of the project?
- Life history - Does the species depend on the region affected by the project for some aspect of its life history requirements? (e.g., breeding habitat, seasonal migration, etc.)
- Restricted range - Is there likelihood of abandonment by the species, of critical range or increased mortality risk from project developments?
- What is the socio-economic importance of the species? For example, is there:
  - Subsistence value
  - Recreational value
  - Commercial value
- Do we have enough information on the species to effectively assess project related effects? Do we have:
  - knowledge of species biology at various scales.
  - ability to monitor project-related effects, if necessary.

The species' priorities to Inuvialuit communities as set out in the respective CCPs, and whether the species could actually be affected by the project due to known or potential spatial and/or temporal overlap of project components with habitat use were considered and qualitatively evaluated.

With the consideration of the above selection criteria, the following seven species or species groups constitute the candidate wildlife VCs:

- barren-ground caribou
- grizzly bear
- polar bear
- arctic fox
- muskrat
- waterfowl

From this candidate list, final VCs for assessment were selected (below) after further critical review and assessment of the selection criteria.

Barren-ground caribou

The proposed drilling program area overlaps with the range of the Cape Bathurst herd, and to a lesser extent, the Bluenose West herd. The combined population of these herds was estimated at 88,000-106,000 individuals in 1992 (Nagy et al. draft 2001) and, according to recent community interviews, the herds are perceived to be increasing in numbers (IEG 2002).

The spring migratory movement to calving grounds north of the tree line is a marked, directional movement, while fall migration is less clear (Bergerud 2000). The spring migration tends to follow frozen lakes and rivers and snow free uplands and eskers (CWS 2000), with barren ground caribou demonstrating fidelity to traditional calving grounds (Gunn and Miller 1986, Case et al. 1996, Ferguson and Messier 2000). In fall the herd crosses central Husky Lakes and generally occupies areas to the west of Husky Lakes and north of Parsons Lake. During this time caribou have been observed to range as far west as the Caribou Hills. During the post rut period (November) and winter period (defined by RWED's study as December 1 to March 31), movements have been tracked in the broad area surrounding Parsons Lake, extending north to Kugmallit Bay, west to the Caribou Hills, south past Sitidgi Lake, and east beyond Husky Lakes. In the spring (April 1) the herd is generally located north of Parsons Lake prior to beginning the migration east across the central Husky Lakes area (RWED 1999).

Based on the above, barren-ground caribou was selected as a final VC.