

**PROJECT DESCRIPTION  
FOR THE PROPOSED CHEVRON CANADA RESOURCES  
WINTER 2001/2002 ELLICE AND MALLIK SEISMIC PROGRAM**



**Prepared for:**

**Chevron Canada Resources  
Calgary, Alberta**

**Prepared by:**



**Calgary, Alberta and Inuvik, Northwest Territories**

**August 2001  
Project #5063-01**

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PROJECT DESCRIPTION  
FOR THE PROPOSED CHEVRON CANADA RESOURCES  
ELLICE, MALLIK AND NORTH LANGLEY SEISMIC PROGRAM

Submitted by:

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## EXECUTIVE SUMMARY

Chevron Canada Resources (Chevron) is applying to conduct a winter 2001/2002 seismic program in the Mackenzie River Delta Region of the Northwest Territories. The projects are located on Crown land in the Inuvialuit Settlement Region (ISR). The Ellice 3D project occupies approximately 199 km<sup>2</sup> on Ellice Island. The Mallik 3D project entails the acquisition of 212 km<sup>2</sup> of seismic data on Richards Island, and the North Langley 3D program includes 21 km<sup>2</sup> on Langley Island. Pending regulatory approval, activities are scheduled to commence in December.

The proposed program is a cooperative effort involving three joint venture partners: Chevron, Burlington Resources Canada Energy Ltd. (Burlington) and BP Canada Energy Company (BP). These three companies have formed the Mackenzie Delta Joint Project Team. On behalf of the Project Team, Chevron will operate and manage the Seismic Program, located within Exploration Licences (EL) #394, #393, #384 and #404 on Crown land.

Inuvialuit Environmental & Geotechnical Inc. (IEG) has been commissioned by Chevron to prepare this project description for the Chevron Canada Resources Ellice and Mallik Seismic Program. The project description has been prepared to meet the requirements of Indian and Northern Affairs Canada (INAC) and fulfill the Operating Guidelines and Procedures of the Environmental Impact Screening Committee (EISC).

The proposed project is located primarily in the lowland delta environment of the Mackenzie Delta with isolated portions within the Mallik block located in the upland tundra. The topography in the project area is flat to gently rolling, with moderate to steep slopes adjacent to waterbodies. Vegetation is limited to dwarf shrubs and grasses and it is anticipated that minimal clearing will be required along seismic lines.

The winter seismic program has been developed with the consideration of minimizing impacts on the environment and land users. The technologies employed during the program mitigate potential impacts on fish habitat specifically. The potential exists for temporary alteration of mature vegetation and wildlife habitat; elevated noise, emissions and traffic levels resulting in short-term wildlife displacement; temporary disruptions to traditional land use in the vicinity of the project and disturbance to permafrost.

Protection measures designed to mitigate the potential environmental impacts are presented in this Project Description and are outlined in Table 13. No significant residual impacts are identified. Chevron and its contractors are committed to following these measures in order to minimize the risk of potential environmental impacts and disturbance of culturally and historically significant sites.

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## 1.0 CONTACT NAMES AND ADDRESSES

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## 2.0 REGULATORY APPROVALS

Chevron Canada Resources (Chevron) is applying to conduct a winter 2001/02 seismic program consisting of three seismic blocks in the northern Mackenzie River Delta region of the Northwest Territories. The projects are located on Crown land in the Inuvialuit Settlement Region (ISR). The program on Ellice Island occupies approximately 199 km<sup>2</sup>. The North Langlely program is immediately west of the mouth of the Middle Channel of the Mackenzie River and covers an area of 21 km<sup>2</sup>. The Mallik program, on Richards Island adjacent to the Kendall Island Bird Sanctuary, covers an area of approximately 212 km<sup>2</sup>. The primary agencies with jurisdiction over the project include Indian and Northern Affairs Canada (INAC) and the National Energy Board (NEB).

Other agencies with regulatory interest in the approval process include: Fisheries and Oceans Canada (DFO) with reference to potential effects on fish and fish habitat; the Government of the Northwest Territories (GNWT) Resources, Wildlife and Economic Development (RWED), regarding wildlife and associated habitat; the Prince of Wales Northern Heritage Centre (PWNHC) for an archaeological and historical resources review and Environment Canada (EC) in regard to pollution prevention. The Environmental Impact Screening Committee (EISC) is an advisory committee responsible for screening all proposed projects on Crown Land. When a screening occurs, the EISC's responsibilities are set out in clause 11(13) of the Inuvialuit Final Agreement (IFA), which reads:

*On receipt of a project description, the Screening Committee shall expeditiously determine if the proposed development could have a significant negative environmental impact and shall indicate in writing to the government authority competent to authorize the development that, in its view:*

- (a) the development will have no such significant negative impact and may proceed without environmental impact assessment and review under this Agreement;
- (b) the development could have significant negative impact and is subject to assessment and review under this Agreement; or
- (c) the development proposal has deficiencies of a nature that warrant a termination of its consideration and the submission of another project description.

Should the EISC determine that the project may have a significant negative impact, the Project Description will be referred to the Environmental Impact Review Board (EIRB) or other equivalent environmental review process for a public assessment and review pursuant to clause 11(24).

The NEB is the governmental authority competent to authorize the development within the meaning of the IFA. The NEB is also required to conduct an environmental screening of the project pursuant to the *Canadian Environmental Assessment Act* (CEAA), and to consider environmental impacts under its jurisdiction to approve the development under the *Canadian Oil and Gas Operation Act* (COGOA) and applicable regulations.

Approvals required for this project are summarized in Table 1. Chevron will contact the agencies listed as appropriate, and will satisfy any requirements they may have in their respective areas of jurisdiction.

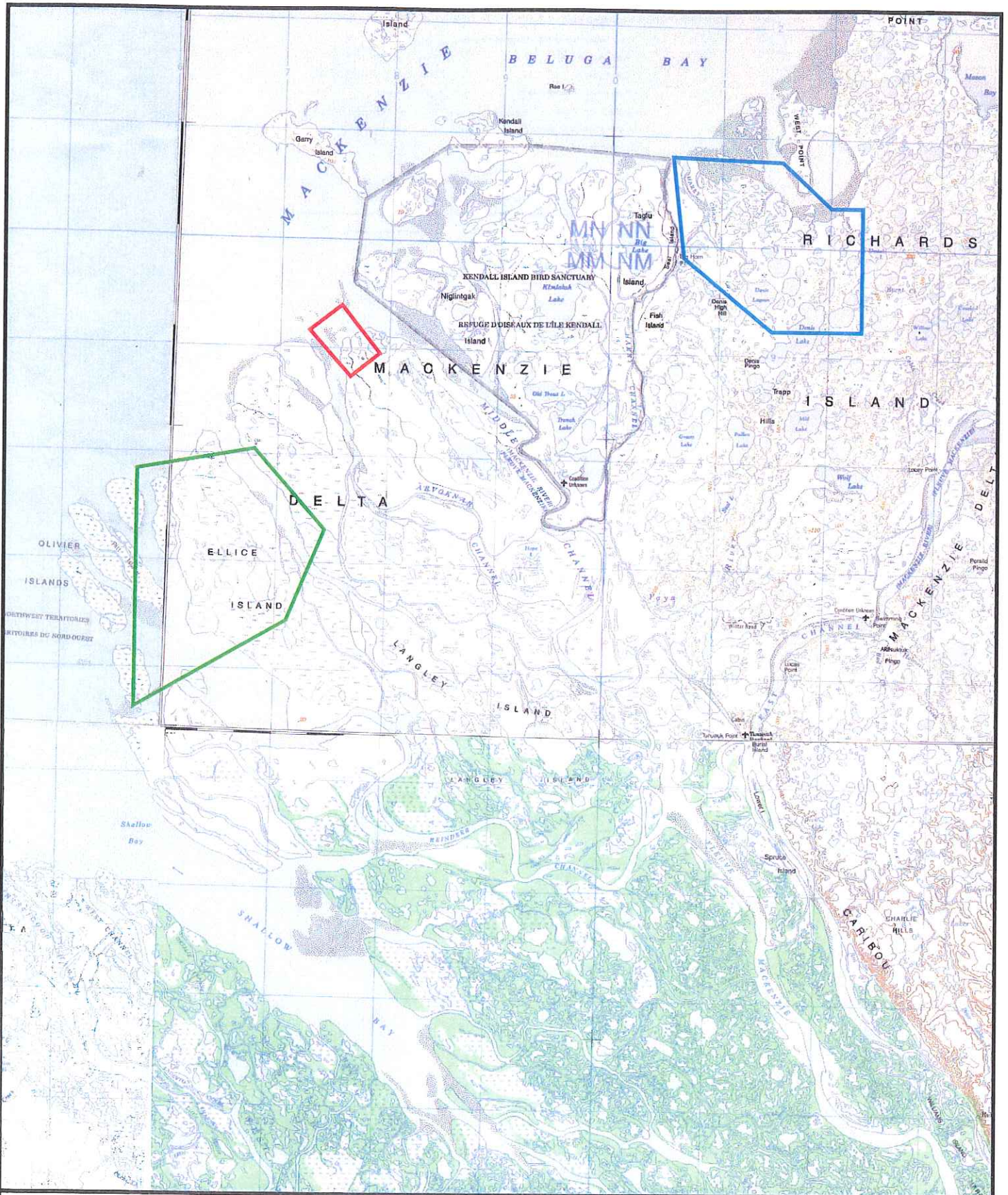
**TABLE 1**  
**APPROVALS REQUIRED**

Contact/Agency	Approval Required/Governing Legislation	Status
Rudy Cockney District Manager, North Mackenzie District P.O. Box 2100 Inuvik, NT X0E 0T0	Land Use Permit  <i>Territorial Lands Act</i> <i>Territorial Land Use Regulations</i>	Submitted by August 25, 2001
Linda Graf Secretary Environmental Impact Screening Committee P.O. Box 2120 Inuvik, NT X0E 0T0	Approval on Project Description  <i>Inuvialuit Final Agreement</i>	Submitted by August 25, 2001
John Korec Environmental Assessment Officer National Energy Board 444 - 7 <sup>th</sup> Avenue S.W. Calgary, Alberta T2P 0X8	Geophysical Operation Authorization  <i>Canadian Environmental Assessment Act</i> <i>Canadian Oil and Gas Operations Act</i>	Submitted by August 25, 2001
Gordon Wray NWT Water Board 2 <sup>nd</sup> Floor Goga Cho Building 4920-52 <sup>nd</sup> Street Yellowknife, NT X1A 2R3	Class B Water Licence  <i>NWT Waters Act</i> <i>NWT Waters Regulations</i>	Submitted by August 25, 2001

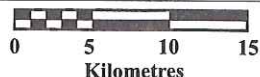
### 3.0 TITLE

Chevron Canada Resources Ellice, Mallik and North Langley Seismic Program





**Regional Location of Chevron Canada Resources Ltd. Winter 2001/2002 Ellice and Mallik Seismic Programs**



Scale

Sources: Topographic Map of Mackenzie Delta 107C and Herschel Island 117C

**LEGEND**

- ▭ General Location of Mallik Seismic Program
- ▭ General Location of N. Langley Seismic Program
- ▭ General Location of Ellice Seismic Program



5063-01

August 2001

Figure 1

## 4.0 DEVELOPMENT SUMMARY

### 4.1 Project Scope

The program proposed by Chevron Canada Resources (Chevron), on behalf of their joint venture partners: Burlington Resources Canada Energy Ltd. (Burlington) and BP Canada Energy Company (BP), entails the acquisition of 432 km<sup>2</sup> of 3D seismic data in three proposed 3D seismic blocks. An additional 59 km of 2D seismic that was previously approved during the Burlington 2000/2001 application, will also be conducted as a continuation of last season's program. The proposed seismic blocks are located on Crown land within EL #393, #394 and #404, with some extension onto EL #384. During winter 2001/2002, Chevron is proposing to acquire up to 2654 linear kilometres (approximately 1592 ha) of 3D seismic data within the three seismic blocks. The results of the seismic programs will be used to delineate potential exploratory drill site locations on the lands that the Mackenzie Joint Project Team currently holds.

Veri-Illuq has been contracted to conduct the seismic operations for Chevron. Veri-Illuq will provide the geophysical survey crews and equipment required to conduct the seismic program. The seismic crew will be housed in two sleigh mounted camps that will be situated at two locations within the proposed 3D blocks, including 69° 08' 22.39", 135° 37' 32.8" (Ellice/N. Langley) and 69° 22' 3.53", 134° 52' 46.71" (Mallik). The seismic program is scheduled to commence in December 2001, beginning with surveying and access route construction, and is anticipated to be complete by the end of April 2002.

#### 4.1.1 *Ellice 3D*

The Ellice project entails the acquisition of 199 km<sup>2</sup> of 3D seismic data on Ellice Island, within EL #404. The entire project lies on Crown lands in the ISR. The Ellice project area is approximately 122 km northwest of Inuvik, 119 km southwest of Tuktoyaktuk and 107 km northeast of Aklavik at its nearest point to each community. During winter 2001/2002, Chevron plans to acquire up to approximately 1242 linear kilometres (497 hectares) of 3D seismic line within this block.

The results of the seismic program will be used to fully evaluate lands held by the Joint Project Team and to delineate potential exploratory drill site locations on land within EL #404. The proposed seismic program extends into the offshore Zone 2 Beluga Management Zone and is located approximately 2.5 km from the Mackenzie Bay 1A Beluga Management Zone at its closest point.

#### 4.1.2 *Mallik 3D*

The Mallik project entails the acquisition of 212 km<sup>2</sup> of 3D seismic data on Richards Island, within EL #393, with the eastern portion of the program extending onto EL #384. The entire project lies on Crown lands. The Mallik project area is approximately 123 km northwest of Inuvik, 63 km southeast of Tuktoyaktuk and 133 km northeast of Aklavik at its nearest point to each community. During winter 2001/2002, Chevron plans to acquire up to approximately 1249 linear kilometres (500 hectares) of 3D seismic line within the proposed seismic block.

A portion of the Mallik Block overlaps a 3D seismic program proposed by AEC West Ltd. Chevron and AEC are currently in discussion to determine how best to coordinate their operations.

#### 4.1.3 North Langley 3D

The North Langley project entails the acquisition of 21 km<sup>2</sup> (65 hectares) of 3D seismic data on Langley Island, within EL #394. The entire project lies on Crown lands. The North Langley project area is approximately 124 km northwest of Inuvik, 100 km southeast of Tuktoyaktuk and 118 km northeast of Aklavik at its nearest point to each community. During winter 2001/2002, Chevron plans to acquire up to approximately 163 linear kilometres of 3D seismic line.

#### 4.1.4 Burlington 2D

In addition to the newly proposed 3D blocks, Chevron is proposing to conduct 59 km of 2D line that was screened and approved by the appropriate regulatory agencies in October 2000 under the Burlington Resources Canada Energy Ltd. Mackenzie Delta Winter 2000/2001 Seismic Program. The two 2D lines are 01-MCK-123 and 01-MCK-121, located on the north point of Richards Island, and extending from Richards Island to Hooper Island, respectively.

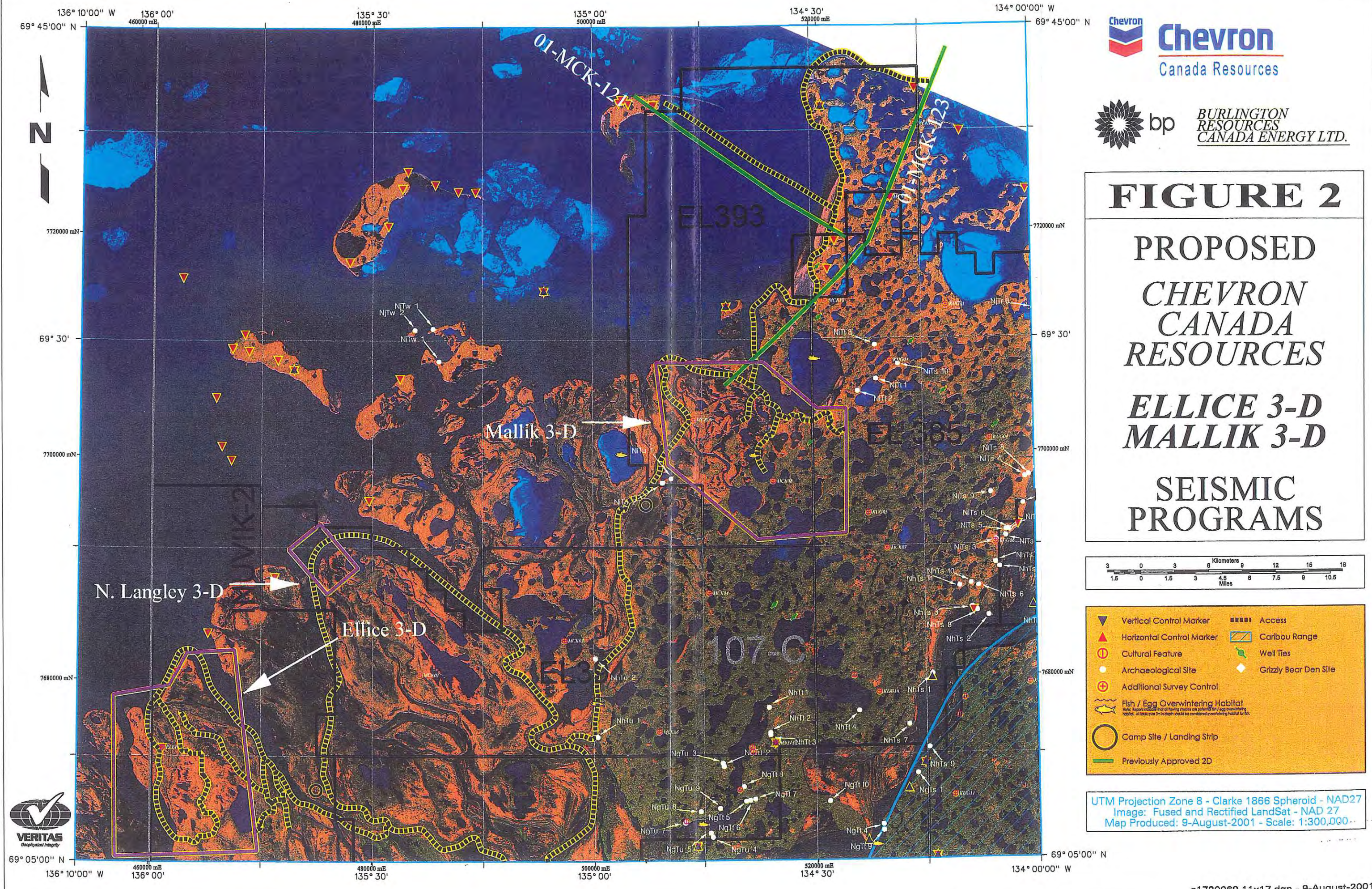
The proposed seismic line sets are outlined in Table 2 and illustrated in Figure 2.

**TABLE 2**

**SEISMIC LINE SET DETAILS\***

Source Line	Length (km)	Area (ha)	Receiver Line	Length (km)	Area (ha)
<b>ELLICE 3D</b>					
37 Lines in Total	569	341	62 Lines in Total	673	404
<b>MALLIK 3D</b>					
41 Lines in Total	629	377	65 Lines in Total	620	372
<b>NORTH LANGLEY 3D</b>					
17 Lines in Total	91	55	19 Lines in Total	72	43
<b>TOTALS</b>	<b>1289</b>	<b>773</b>		<b>1365</b>	<b>819</b>

\* All lines are on Crown Lands



**FIGURE 2**

**PROPOSED**

**CHEVRON**

**CANADA**

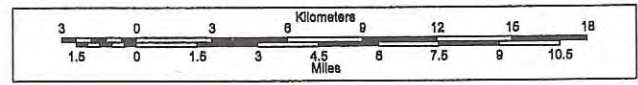
**RESOURCES**

**ELLICE 3-D**

**MALLIK 3-D**

**SEISMIC**

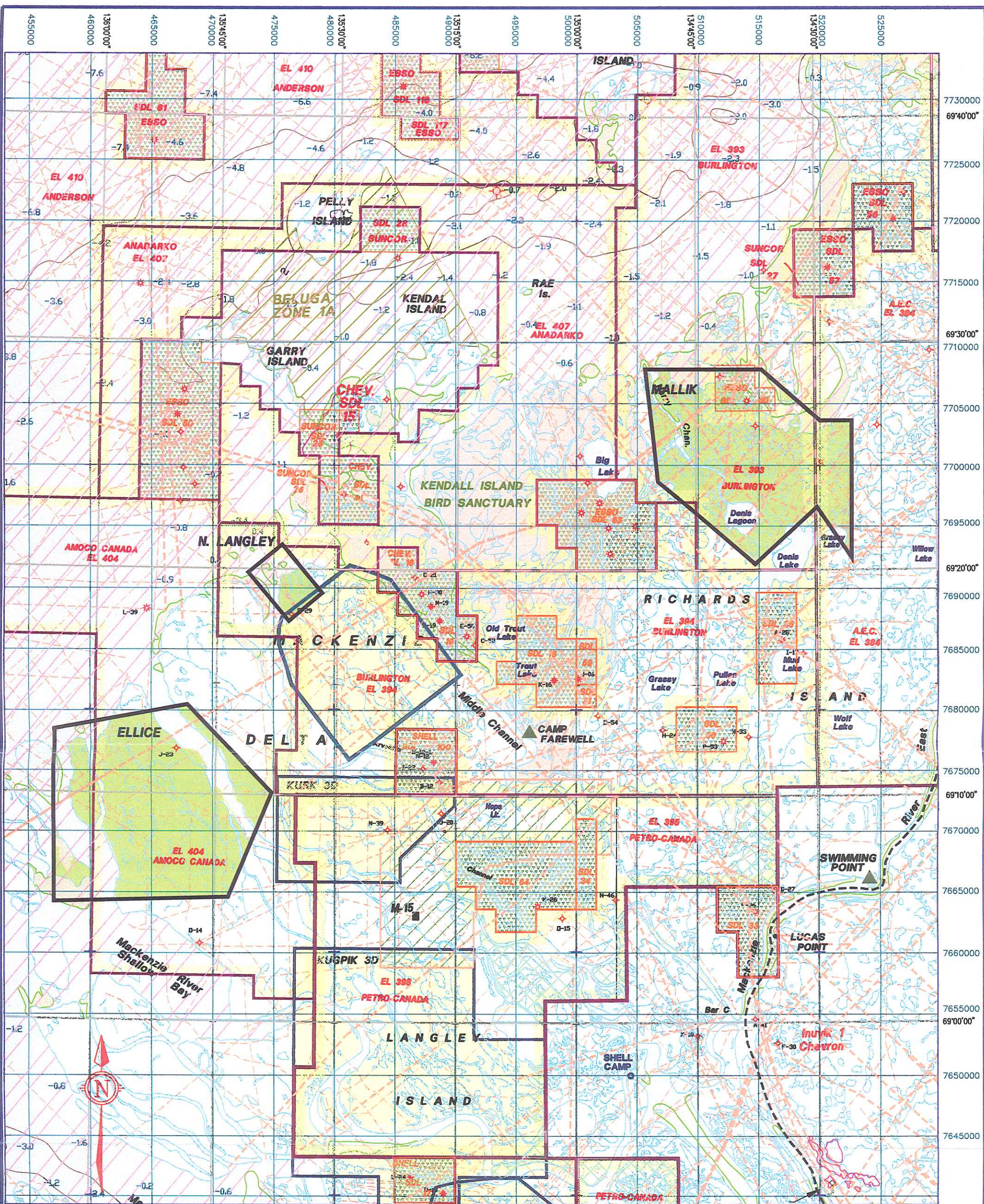
**PROGRAMS**



- Vertical Control Marker
- Horizontal Control Marker
- Cultural Feature
- Archaeological Site
- Additional Survey Control
- Fish / Egg Overwintering Habitat
- Camp Site / Landing Strip
- Previously Approved 2D
- Access
- Caribou Range
- Well Ties
- Grizzly Bear Den Site

UTM Projection Zone 8 - Clarke 1866 Spheroid - NAD27  
 Image: Fused and Rectified Landsat - NAD 27  
 Map Produced: 9-August-2001 - Scale: 1:300,000





**LEGEND**

- PROPOSED 3D SEISMIC PROGRAM
- PREVIOUS 3D PROGRAMS BY OTHER OPERATORS
- PREVIOUS 2D SEISMIC PROGRAMS BY OTHER OPERATORS
- PREVIOUS HISTORICAL 3D SEISMIC PROGRAMS BY OTHER OPERATORS
- PREVIOUS HISTORICAL SEISMIC FROM 1965 TO 1992
- BASE CAMP SHOWN THUS
- EXPLORATION LEASE (EL) BOUNDARY
- EXISTING WELLSITE SHOWN THUS
- IKHIL GAS PIPELINE

**CHEVRON CANADA RESOURCES**

FIGURE 3  
**CUMULATIVE EFFECTS OF OIL AND GAS ACTIVITIES IN THE VICINITY OF THE PROPOSED PROJECT**  
 MACKENZIE DELTA, N.W.T.

SCALE : 1 : 300 000



DRAWN : B.T.	JOB NO. : 00-12115-MAP CHEV2001-PROJECT1-FIG3
DATE :	REV NO: 1
AUG. 16/2001	

## 4.2 Seismic Acquisition

### 4.2.1 Access Route and Line Selection

The location of the proposed winter 2001/2002 program was based on the interpretation of existing seismic and subsurface well data in the Mackenzie Delta, and focuses in on portions of the 2D seismic program completed by Burlington during winter 2001. The intention is to further delineate potential hydrocarbon prospects identified during 2D geophysical data interpretation. In order to optimize the seismic data quality, source line orientation will be NE-SW and receiver line orientation will be SE-NW. Source and receiver line locations will avoid cabin locations, heritage sites identified during summer 2001, and other environmentally sensitive areas such as steep slopes or other areas identified during biophysical studies completed during summer 2001.

To the extent feasible, lines will be straight, with offsets or skidding used to avoid sensitive areas. Line surveying will be completed using global positioning system (GPS) navigation, thus allowing Chevron to pick the path of least disturbance along the line. Areas of sensitivity and paths of least disturbance will be identified through air-photo interpretation during program planning prior to line surveys. Setbacks to be incorporated into the program are summarized in Table 13.

Access to the 3D program will be primarily along lakes and river channels. These locations are identified on Figure 2. The criteria used for temporary winter access route selection includes:

- utilizing the Inuvik to Tuktoyaktuk winter road as primary access to the program;
- utilizing the Mackenzie River and its associated channels for ice access;
- minimizing disturbance by avoiding areas of steep slopes;
- minimizing disturbance by using in-and-out access on the lines so that minimal overland travel is required; and
- minimizing disturbance to sensitive wildlife habitat, soil, hydrological, archaeological and vegetation areas.

### 4.2.2 Access Route Construction

Ice roads will be constructed primarily on lakes and river channels in the vicinity of the project. Surface preparation will consist of clearing snow from the ice. Where lakes and river channels do not provide access to the project area, or where ice cover is insufficient to support the weight of equipment, overland access routes may be required. Construction of overland access routes will consist of snow compaction along the routes chosen. Ground depressions encountered along the access routes may be filled with snow to smooth the surface. Dozer blades will be equipped with mushroom shoes to elevate the blade, leaving a minimum of 15 cm snow cover on the access route to prevent disturbance to the organic layer.

If thickening of ice on access routes is required, water will be withdrawn from the Mackenzie River and used to flood the area. Water withdrawal methods will meet all regulatory guidelines (Section 4.3.4).

Access will be over ice and snow where ice thickness is sufficient to safely carry equipment loads, and overland sections will be kept to a minimum.

Both electronic and physical ice thickness profiling will be employed during the construction and use of access routes to evaluate ice conditions for safe travel. Access routes will be selected where slopes are minimal. Where slopes are unavoidable and high banks (>1 m) hamper access, snow and/or ice ramps made of clean snow and water will be constructed to prevent erosion and disturbance by equipment. Ice ramps will be constructed using water withdrawn from the Mackenzie River (Section 4.3.4).

### 4.2.3 *Line Construction*

#### 4.2.3.1 *Surveying*

Chevron will utilize air-photos provided by Tarin Resources Services Ltd. during the planning stages of line construction. Once lines have been accurately determined, survey crews will be deployed to the field in December, weather and snow depths permitting. The seismic lines will be surveyed using a combination of GPS and conventional survey systems. Survey crews will proceed down the lines using GPS receivers mounted on tracked vehicles, locating the line as determined by the geophysicists during line location planning. This will minimize environmental impacts by avoiding mature coniferous trees. As required, the lines will meander along the theoretical line locations to avoid environmentally sensitive areas identified by the Inuvialuit Environmental Monitor.

#### 4.2.3.2 *Line Clearing*

It is anticipated that line clearing will not be required on any of the three proposed seismic blocks as vegetation is restricted to mainly dwarf shrubs, grasses and Arctic lupin on Richards Island, and *Equisetum* and *Carex* species on Langley and Ellice Island. Primary access will be achieved with tracked units. Equipment will be driven over the snow and shrubby vegetation will be walked down. Impacts related to crushing vegetation will be restricted to above-ground woody material, leaving the root systems and organic mat intact. The number of passes made by equipment along the lines during clearing will be kept to a minimum.

Although minimal bulldozer use is anticipated, any cats contracted will be equipped with mushroom shoes, and operators will be instructed to keep cat blades a minimum of 15 cm off the ground to avoid topsoil scalping.

#### 4.2.3.3 *Line Parameters - Ellice*

Along the lines, source and receiver points will be marked with wooden lath to denote each point and line for that portion of the program. Energy source points and receiver locations will be positioned along the source lines at 60 m intervals. The interval between source lines is 360 m and the interval between receiver lines is 300 m.

#### 4.2.3.4 *Line Parameters - Mallik*

As in the proposed Ellice 3D block, source and receiver points will be marked with wooden lath to denote each point and line on the program. Energy source points will be located along the source lines at 70 m intervals. Receiver locations will be positioned along the receiver lines at 50 m intervals. The interval between source and receiver lines is 350 m.

#### 4.2.3.5 *Line Parameters - North Langley*

Energy source points will be located along the source lines at 50 m intervals. Receivers will be spaced at 40 m intervals along the receiver lines. The interval between source lines is 240 m and the interval between receiver lines is 300 m.

Source and receiver line widths on all programs will be 6 m. Additional line width may be required at turnarounds, or where vehicles must travel beside geophone strings. Turnarounds will be on ice wherever feasible. Receiver line widths may be decreased if the programs move to a heli-assist operation, daylight and weather conditions permitting.

#### 4.2.4 *Line Construction on Ice*

Ice profiling methods will be utilized throughout the program to evaluate the thickness of ice related to equipment support, and to establish whether or not waterbodies are frozen to bottom, thus determining potential fish-bearing waterbodies along the line. Where waterbodies are frozen to bottom, no year-round fisheries potential will be assumed and the line will continue over the ice and be completed as designed, utilizing the vibroseis technique proposed for land.

Where waterbodies are less than 400 m across and do not contain bottom-fast ice, potential year-round fisheries habitat may be present. Source points will be set back from either side of the waterbody along the planned seismic line to undershoot the area.

Where waterbodies are not frozen to bottom, overwintering habitat for fish will be assumed as stated in communications with DFO in December 2000. In this instance, the line will continue over the waterbody where ice thickness is sufficient to safely carry equipment loads, and seismic will be conducted below the bed of the waterbody using the dynamite technique. The techniques used to conduct seismic below waterbodies, while minimizing disturbance to fish and fish habitat, are outlined in Section 4.2.5.4 and in Appendix A. These procedures are designed to allow Chevron to achieve the maximum number of source points along the lines while minimizing environmental disturbance.

Where ice thickness is insufficient to safely carry equipment loads, lines will detour around lakes. Where source points are located on land, conservative fisheries setbacks of 30 m for vibroseis or dynamite, from waterbodies containing free water under ice will be maintained wherever feasible (Section 4.2.5.3).



## 4.2.5 Energy Source

### 4.2.5.1 Primary Energy Source – Vibroseis

The seismic program will be completed using vibroseis as the primary energy source. When using vibroseis, the signal is put into the ground at intervals along the line, and unlike the dynamite method, is completed without drilling or explosives. The vibroseis units themselves are diesel-fuelled, tracked vibrators. The tracked units minimize pressure on the tundra while maximizing mobility. The vibroseis technique utilizes low ground pressure vibrator units positioned at each source point along the source line. Each unit has a metal pad that is placed on the ground. Energy is transmitted into the ground by exerting variable pressure on the pads. The energy travels in the form of waves and is called the vibroseis signal. The vibroseis signal is input over a period of several seconds. The waves reflect off the various rock layers in the earth and return to the surface. Here they are detected by geophones laid out on the receiver lines, which are in turn connected by cables to a recording unit.

Vibroseis is Chevron's preferred energy source option for this program, on land and on waterbodies with bottom-fast ice. Vibroseis is felt to be the better method in this environment, where vegetation is low-lying and will not be impacted by the large vibrator units. Where waterbodies are frozen to bottom, the source line will continue over the ice and be completed as designed utilizing vibroseis. Potentially fish bearing waters (those containing water under ice) less than 400 m wide will be undershot by stacking source points on either side of the waterbody, following all DFO setback guidelines.

### 4.2.5.2 Secondary Energy Source – Dynamite

Dynamite will be used as secondary source where the vibroseis technique cannot provide high quality seismic data. Specifically, dynamite source points will be considered where waterbodies are not frozen to bottom, are too large to obtain data using the stacking method, where lines extend into non-frozen river channels, or where the vibroseis method provides poor geophysical data on land. Where the dynamite technique is used, source points will require drilling shot holes on land, and below lakebeds or channel beds. A comprehensive monitoring strategy to mitigate impacts to fish and fish habitat is outlined in Appendix A.

### 4.2.5.3 Drilling on Land

Setback distances from fish habitat while drilling on land, will be maintained wherever feasible. To determine the setback distance required for compliance with the peak pressure guideline of 100 kPa, the square root of the charge weight is multiplied by the appropriate K factor, as provided by DFO (Wright and Hopky 1998). The K factor used is the most conservative, provided for rock. The calculations to determine the required setback distance to meet these guidelines are as follows:

$$R = W^{.5} (K) \quad \text{where:}$$

R = setback distance  
W = charge size  
K = substrate type factor

$$\text{Using a charge size of 20 kg } R = 20^{.5}(5.03) = 22.5 \text{ m}$$

Chevron is proposing to provide a conservative setback buffer of 30 m wherever possible. Where unplanned detours are made for safety reasons, and distances between waterbodies are less than 60 m, the maximum setback distance allowed will be provided.

#### 4.2.5.4 Drilling below Waterbodies

The primary mitigative measure to protect aquatic resources is to avoid conducting shots below waterbodies less than 400 m wide. Shot hole drilling will only occur below waterbodies that are too large to undershoot by stacking source points along the edges of the lake.

All waterbodies will be drilled using a specialized cased drill technology utilized on the Langley 3D program during 2000/2001 seismic operations. This equipment is capable of achieving depths that are in accordance with DFO setback distance guidelines revised in December 2000. The cased rig is described in detail in Section 10.0 - New Technology.

During drilling below waterbodies, drillers will be instructed to attain a minimum depth of 7 metres as per DFO guidelines (for rock substrate using a 2 kg charge size) once they hit solid lake-bottom substrate (consolidated material) (see Table 3). Drillers will be asked to provide details on depths of layers encountered during drilling on drill logs (*ie.* ice, water, silt and clay thickness). Where drillers identify large amount of loose substrate on lake bottom, setback distances below lakes can be adjusted to more conservative levels to ensure continued compliance.

**TABLE 3**

**SETBACK DISTANCE (M) FROM CENTRE OF DETONATION OF AN EXPLOSIVE TO FISH HABITAT TO ACHIEVE  $\leq 100$  KPA OVERPRESSURE GUIDELINE (Wright and Hopky 1998)\***

Substrate Type	Weight of Explosive Charge (kg)							
	0.5	1	2	5	10	25	50	100
Rock	3.6	5.0	7.1	11.0	15.9	25.0	35.6	50.3
Frozen Soil	3.3	4.7	6.5	10.4	14.7	23.2	32.9	46.5
Ice	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Saturated Soil	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Unsaturated Soil	2.0	2.9	4.1	6.5	9.2	14.5	20.5	29.0

\* Setback distances were revised by DFO on December 6, 2000

To ensure charges stay at placement depth, the tip of each charge is outfitted with a "barbed point" and the top is outfitted with a "top loader" (a device that will grasp onto the sides of the hole) that will hold the charge in place. Drillers will be required to record lengths of cap leads in drill logs at each shot point both before and after casing removal. Consultation with DFO was initiated early in the planning process and will be ongoing during program operations. An Aquatic Resources Protection Plan has been approved in principle by DFO and is provided in Appendix A. Additional contingencies, should they be required, will be determined in consultation with DFO, prior to program commencement, and on an as-needed basis.

Additionally, no debris will be deposited on ice or below waterbodies and no alteration of stream banks or substrate will occur during the proposed program. Locations of source points below waterbodies will be recorded using GPS during operations.

#### **4.2.6 Recording**

The primary mode of cable layout and retrieval will be line crew personnel supported by tracked units. Once daylight conditions exist to the extent that heli-assist can be used, the lines may be laid out with the assistance of helicopters. Each of these two methods, or a combination of methods, may be used to deploy equipment. When helicopters are used, they will drop bags of recording equipment at pre-determined locations on the receiver lines, or the helicopter will move bins of equipment from a Nodwell in one location to a Nodwell in a forward location. Line crews on the ground will unpack the bags of equipment, lay-out the equipment and connect all the appropriate cables to form a continuous line of geophone strings. Cable and geophones will be laid out along the side of the tracked receiver lines. Receiver line widths will be maximum 6 m when using tracked vehicles.

The recording unit will be positioned on a Nodwell or similar vehicle, and will travel down the line, hooking up to the cable at the appropriate locations. If helicopter support is used to lay-out lines or position the recording unit, 30 m diameter helipads may be required at points located at approximately 1.5 km intervals along the receiver lines. Lakes will be used as much as possible for helipads. Helicopter support will be used once daylight permits, and depending on weather and availability. The advantage of heli-assist operations is that recording can be completed quicker than conventional methods, and is often used toward the end of a program to ensure timely completion.

### **4.3 Program Logistics**

#### **4.3.1 Sleigh Camp**

The seismic crew will be housed in two mobile sleigh mounted camps that will be situated at locations within the proposed 3D blocks, including 69° 08' 22.39", 135° 37' 32.8" (Ellice/N. Langley) and 69° 22' 3.53", 134° 52' 46.71" (Mallik). The camps will be on these locations for 8-10 weeks in total. No clearing of vegetation is required to accommodate the camps in their proposed locations.

The camp accommodation in total will consist of 36 sleigh-mounted units capable of housing 65+ persons. The camp will consist of six strings of sleigh-mounted units, with a maximum number of six units per string, in addition to an eight unit side-by-side complex containing common facilities and accommodation for approximately 45 people. A combination of loaders and D6 Caterpillars will pull the trailers to their locations in the program.

The camps proposed for use during the winter 2001/2002 season were used previously by the Joint Venture Partners on the Langley 3D and Burlington 3D programs during winter 2000/2001 operations. The camp is equipped with sleeping quarters measuring 10' x 12' each holding two people, in addition to cold storage facilities, a kitchen and dining room. The washroom facilities consists of 14 toilets, 18 showers, and 25 sinks for men, and 2 toilets, 4 showers, and 7 sinks for female personnel. Detergents used throughout the camp are phosphate-free. Diagrams of the proposed sleigh camp are found in Appendix C.

### 4.3.2 Personnel Required

#### Advance

1 Advance Party Manager  
 1 Cat Push  
 1 Drill Supervisor  
 1 Clerk/Supply  
 1 Expeditor  
 5 Surveyors\*  
 5 Survey Helpers\*  
 3 Dozer Operators\*  
 4 Drillers\*  
 4 Drill Helpers\*  
 2 Ice Checkers\*  
 2 Ice Profilers\*  
 1 Plow Driver\*  
 1 Flood Truck Driver\*  
 2 Environmental Monitors  
 2 Wildlife Monitors  
**TOTAL 36**

\* Subcontractors – accurate numbers unknown

#### Recording

1 Clerk  
 1 Recording Crew Manager  
 3 Senior Observers  
 1 Junior Observer  
 4 Vibrator Operators  
 1 Shooter  
 5 Line Truck Drivers  
 1 Vibrator Technician  
 2 Mechanics  
 1 Shooter Helper  
 27 Line Crew Helpers  
 4 Line Trouble Shooters  
 1 Expeditor  
 1 Fuel Driver  
 1 Helicopter Engineer  
 1 Medic  
**TOTAL 55**

#### Camp

1 Camp Manager  
 2 Cooks  
 2 Attendants  
 1 Maintenance Person  
 2 Water Truck Drivers  
 1 Helper  
**TOTAL 9**

### 4.3.3 Equipment Required

#### Advance

6 – 1 ton pick-up truck  
 4 Tracked Foremost 110 Nodwells (Vibrator Units)  
 4 Monitor Unit Snowmobiles  
 2 Ambulances  
 1 Fuel Transport Unit Caterpillar D6\*  
 2 Fuel Sloops\*  
 2 Snow Plows\*  
 1 Flood Truck\*  
 Ice Profilers\*  
 4 Drills  
 6 Cats  
 \* Subcontractors – accurate numbers unknown  
**Camp**  
 2 Water Trucks  
 2 Incinerators

#### Recording

1 – 1 ton pick-up truck for Recording Manager  
 1 Recording Vehicle  
 1 Tracked Personnel Carrier  
 1 Shooter Vehicles  
 5 110 Nodwell Line Vehicles  
 1 Mechanics Vehicle  
 1 Clerk Supply Vehicle  
 1 Battery Charging Vehicle  
 1 Equipment Transport Vehicles  
 2 Support Vehicles  
 1 Vibrator Technician Vehicle  
 1 Fuel Truck  
 1 Helicopter  
**TOTAL: 17**

#### 4.3.3.1 Fuel Storage

Fuel storage for the camp and equipment will consist of two secondary containment fuel sloops, each holding 2200 US gallons (8,327 litres) diesel fuel tanks. An additional sleigh will carry six (3 gas and 3 diesel), 500 US gallon (1,893 litres) fuel tanks and Jet B fuel in an amount based upon helicopter use. The total volume of fuel storage for the program is anticipated to be 7400 US gallons (28,009 litres). All tanks will be double walled enviro-tanks fitted with a spill proof fuelling mechanism. In addition, the sleighs are equipped with secondary containment that can contain the entire volume of fuel carried on the sloop. All tanks and fuelling procedures will adhere to safety standards outlined within the Veri-Illuq Fuel and Oil Spill Contingency Plan (Appendix B). A designated individual will be responsible for the management of fuel transfer. Spill recovery and fire-fighting equipment will be present at all times.

#### 4.3.3.2 Wastewater Treatment and Disposal

The sleigh camp is equipped with Incinolet toilets that eliminate sewage waste through incineration. The resulting ash is inert and will be disposed of in the Inuvik landfill. Grey water that includes only shower water, wash water and kitchen water will be steamed off using a grey water steamer, with any sludge hauled away for proper disposal at an approved landfill site. Overflow water will be trucked to Inuvik for treatment. No black water is generated from this camp.

The sleigh camp is additionally equipped with an incinerator. Solid refuse will be incinerated, and non-combustible material will be hauled out and disposed of at the Inuvik landfill. Veri-Illuq will track all waste produced during operations as part of regular safety reporting procedures.

#### 4.3.4 Water Use

Utility water for the sleigh camps will be withdrawn from the Mackenzie River. Approximately 15 m<sup>3</sup> of water will be withdrawn per day. Withdrawal volumes and locations will be recorded using GPS. Bottled water will be provided for human consumption.

Water that is required for ice access, and building snow ramps will be obtained from channels of the Mackenzie River. The water will be extracted at a point where a seismic line or access road intersects with the river, and intake hoses will be screened with 2.54 mm (0.10") wire mesh to avoid impingement of fish. Locations and volumes of withdrawal will be recorded using GPS. Water withdrawal volumes will not exceed 100 m<sup>3</sup> per day as per water license requirements.

## 5.0 ALTERNATIVES

The proposed 3D seismic blocks have been located to maximize the quality and location of the seismic data collected. The 3D blocks were positioned using existing data from the 2D programs conducted by Chevron and Burlington during 2000/2001, as well as past seismic programs and geological data from exploratory wells in the project area. Alternative locations will not fulfil the geophysical requirements of the program. However, the positioning of the seismic lines may be adjusted as necessary to mitigate any potential impact identified prior to or during the program operations.

Chevron has proposed to conduct the 3D seismic programs using vibroseis as the primary energy source. An alternative energy source is dynamite. However, vibroseis is felt to be the best option for acquisition of geophysical data in this location due to the lack of tall vegetation found in the area and accessibility for vibrator units. Heli-assist may be used as an alternative method of line-laying once daylight conditions allow, thus resulting in decreased line widths.

Alternative drill rig technologies for drilling below waterbodies have been investigated for use within the Delta environment. The cased rig technology presented in Section 10.0 was used successfully during Chevron's 2000/2001 operations on the Langley Island 3D. Should overpressure within waterbodies arise as an issue during seismic monitoring, alternative methods of setting charges will be discussed with DFO (see Appendix A).

## 6.0 CUMULATIVE EFFECTS

Cumulative effects refers to impacts that result from past, existing and imminent projects and activities. This broad interpretation of cumulative effects under the *Canadian Environmental Assessment Act* includes both environmental and socio-economic considerations. The socio-economic interactions are more fully discussed in Section 8.0 Traditional and Other Uses. The causal agents of cumulative effects may include several causes, multiple effects, effects of activities in more than one locale and recurring events. The bounding for the cumulative effects assessment has been adapted to address spatial and temporal overlap of the impacts of previous, current and future activities within, and in the vicinity of, the proposed program area.

As an initial assessment of the cumulative effects associated with the Chevron Ellice and Mallik Seismic Program, the study area was based upon the sub-regional footprint of effects of the proposed seismic program of 432 km<sup>2</sup> for the 3D blocks. This program is scheduled to occur between December 2001 and April 2002. The significance, extent, duration, magnitude, and residual effects criteria used in this section are defined in Section 12.0, Proposed Mitigation and Anticipated Environmental Impacts.

### 6.1 Past, Current and Imminent Activities

Since the 1960s, the most extensive, non-traditional land use that pre-dates current and future projects is seismic exploration. The Joint Secretariat obtained and mapped data from the NEB to depict historic seismic activity throughout the Mackenzie Delta, nearby islands and the Beaufort Sea for the period of 1965 through to 1992. Seismic activity between 1992 and 2000 has not been compiled and mapped. Updating and verifying the seismic data conducted up to 2000 will help eliminate data gaps and reduce uncertainty regarding the extent of past activities. Additionally, the biophysical and heritage inventories currently underway will provide better information to assess cumulative effects. Chevron's proposed program lies within a region of historically low intensity seismic exploration. Spatial and/or temporal overlap of past activities and current planned projects of known location are shown in Figure 3.

Approved activities occurring within the vicinity of Chevron's proposed program include: a biophysical inventory for the Producer's Group (Exxon Mobil, Imperial Oil Resources, Shell Canada Ltd., and Gulf Canada Resources Ltd. (now Conoco), a biophysical and heritage inventory for the Operator's Group

(AEC West Ltd., Anderson Resources Ltd, BP Canada Energy Company, Burlington Resources Canada Energy Ltd., Chevron Canada Resources, Gulf Canada Resources Limited, Petro-Canada, and Shell Canada Ltd), and a Cape Bathurst Caribou Study and a Grizzly Bear Denning Study that are being conducted by RWED. The field seasons for the biophysical and heritage studies will be completed before the proposed program is set to begin. The caribou and grizzly bear denning studies will be ongoing. Impacts from the sampling programs may coincide with the project due to a repeated visitation of the landscape by virtue of air travel to gain access to sites. On the ground, non-intrusive methods were used and are unlikely to have created an additive stress to the landscape although effects to individual caribou associated with collaring has been noted by local people. Additional oil and gas activities will take place on or in the vicinity during the winter 2001/2002. Japex Canada Corporation has already received approval for winter drilling operations. Proposed programs currently before the EISC or in planning stages include the seismic activities of AEC, Anadarko and Shell, the drilling activities of Petro-Canada and the research activities of RWED. Spatial and/or temporal overlap of the projects identified above is illustrated in Table 4 and Figure 3.

## **6.2 Valued Ecosystem Components**

The Valued Ecosystem Components (VECs) for this program are resources or environmental features determined to have specific legal, scientific, cultural or aesthetic value according to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the Inuvialuit as published in Community Conservation Plans or local people as identified during community consultation. VECs in the project area have been identified as grizzly and polar bears, migratory birds and traditional harvesting grounds for fish and goose.

## **6.3 Additive and Synergistic Effects**

Surface disturbance associated with seismic exploration and supporting camp facilities may disturb grizzlies denning within the project area. The dens are often on steep south and southwest slopes. Equipment travel is prohibited for crew safety reasons and to minimize erosion potential on steep slopes and therefore disturbances to denning are likely to be isolated events. RWED has initiated a grizzly bear denning survey program, which tracks collared animals and identifies den sites. This study is being conducted with financial and logistical support from the Joint Project Team.

Chevron will communicate with RWED representatives during program operations to ensure that an appropriate avoidance buffer is maintained between seismic activities and bear dens that are located during radio collaring. Wildlife Monitors will work with Chevron to ensure that operations avoid other identified den sites. In addition, RWED is currently planning to create artificial bear den within the Mallik block where data on noise and vibration will be collected during activity. Chevron will work with RWED to ensure that study objectives are met by testing potentially both vibroseis and dynamite sources in the vicinity of the test dens. Logistical co-ordination of this work is ongoing.

Due in part to the efforts of the Joint Project Team and RWED, cumulative effects of surface disturbance on grizzlies are considered subregional, low in magnitude, limited to short-term disturbance, isolated in frequency and not significant in creating enhanced disturbance to den sites.

**TABLE 4**  
**OTHER CURRENT AND IMMINENT LAND USE ACTIVITIES**  
**WITHIN THE PROJECT VICINITY**

Proponent	Activity	Distance from Project Area*	% Overlap of Chevron 3D	Temporal Overlap (Y/N)	Duration	Areal Extent	Magnitude of Cumulative Effect
<i>Current Projects</i>							
Operators Group	Biophysical Inventory	0	< 1%	N	Summer 2001 – Fall 2001 Short Term	Subregional	Low
Operators Group	Aquatics Study	0.5	< 1%	N	Summer 2001 – Fall 2001 Short Term	Subregional	Low
Producer's Group	Biophysical/Heritage Inventory	Unknown	Unknown	N	Summer 2001-Unknown	Subregional	Low
RWED	Grizzly Bear Denning Study	0	< 1%	Y	Summer 2001 Short Term	Subregional	Low
RWED	Cape Bathurst Caribou Herd Satellite Tagging Program	0	< 1%	Y	Multi-year Fall 2001 – Winter 2004 Medium Term	Subregional	Low
Japex	Drilling Program	Overlapping	< 1%	Y	Winter 2001/2002 Medium Term	Subregional	Low
<i>Imminent Projects</i>							
AEC	Burnt Lake 2D Seismic	Overlapping	Unknown+	Y	Winter 2001/2002 Short term	Subregional	Low
Anadarko	Immerk 2D Seismic	Unknown	Unknown+	Y	Winter 2001/2002 Short term	Subregional	Low
Shell	2D Seismic	0	< 1%	Y	Winter 2001/2002 Shortterm	Subregional	Low
Petro-Canada	Kurk/Kugpik Drilling	4	0%	Y	Winter 2001/2002 Short term	Subregional	Low-moderate
Petro-Canada	Napartok/Kurk Drilling	4	0%	Y	Winter 2001/2002 Short term	Subregional	Low-moderate

\* Distance from project area at nearest point.

+ Program details have not been confirmed.



Polar bears depend on ice floe edge for hunting. After freeze up in October, they disperse west and east to hunt along freshly forming ice prior to denning (Amstrup, Durner, Stirling, Lunn and Messier 2000). Polar bears have an acute sense of smell and inherent curiosity that may attract them to operational areas and camps. The proximity to the northern coastal region of Richards Island may increase disturbance to bear dens as well as human-bear interactions in association with seismic activities. However the timing of operations is likely to commence after polar bears have entered dens. Disturbance of on-land den sites, although a concern, is expected to be limited since dens are concentrated along the coast of the Yukon territory, outside the footprint of the proposed project (Amstrup and Gardner 1994).

Harvesting of polar bears is also noted along the northern extent of the project area. Aklavik has a quota of five bears that are harvested between January 1 and May 31 (AICCP 2000). Tuktoyaktuk has a quota of twenty-six polar bears that are harvested between December 1 and May 31 (TCCP 2000). Inuvik has a quota of three polar bears, but the timing of the harvest is not specified in their Community Conservation Plan (IICCP 2000). Polar bear harvests are limited and strictly controlled. Seasonal and annual variability in ice contributes to the mobility of the Southern Beaufort Sea population (Amstrup and Gardner 1994) such that hunting impacts show no measurable population effect. Cumulative effects of seismic activity and hunting are considered subregional, low in magnitude, limited to short-term disturbance, accidental in frequency and not significant in disturbing den sites.

Migratory birds arrive in the project area in the spring. Migratory birds fly north in the spring in search of abundant food supplies and to breed. Chevron's winter camps will be decommissioned in April before the birds arrive so the impact on migratory birds is limited to effects on habitat.

Willows, mostly in the Mallik block, are very small and sparse and with a low probability of being encountered. The willows are also expected to have adequate snow cover to minimize disturbance. The potential effects are considered subregional, low in magnitude, and accidental for bird species that depend on willows for habitat.

Discussions regarding Cumulative Effects Assessment have been initiated with the Joint Secretariat and industry representatives, on how to best quantify the cumulative impacts of development within the Mackenzie River Delta on a regional scale over a longer time frame. The EIRB and EISC are cooperating with Kavik Axys Ltd. to prepare guidelines for quantitatively assessing cumulative effects (Chernoff Pers. Comm.). Workshops to provide guidance on the application of the guidelines are expected before the end of August, prior to this winter's operating season. The workshops, coupled with the biophysical inventory, will help to build the capacity for quantitatively assessing ecosystem quality and the effects of oil and gas activities.

Residual cumulative effects from this project are predicted to be low in magnitude and local in extent. If seismic results are positive, future operations within the project vicinity may include more seismic exploration, exploratory well sites and eventually, development of oil resources. Future development will be planned with consideration of environmental impacts and appropriate mitigative measures.

## 7.0 LOCATION

The Ellice program entails the acquisition of approximately 199 km<sup>2</sup> of 3D seismic data on EL #404. The program area lies on the northern part of Ellice Island and will extend onto the near-shore coastal ice. The project area is approximately 119 km west of Tuktoyaktuk and 107 km northeast of Aklavik (Figure 1). The Ellice seismic block is located approximately 2.5 km away from the Mackenzie Bay 1A Beluga Management Zone at its closest point.

The Mallik program includes the acquisition of approximately 212 km<sup>2</sup> of 3D seismic data on EL #393, with a portion of the program extending onto EL #384. The program area is immediately east of the Kendall Island Bird Sanctuary on the northwest of Richards Island. The project area is on Crown land about 63 km west of Tuktoyaktuk and 123 km northwest of Inuvik (Figure 1).

The proposed North Langley program covers approximately 21 km<sup>2</sup> on Crown Land. The program area is in EL #394 on the western shore of the mouth of the Middle Channel of the Mackenzie River. The program area is primarily onshore but will extend onto the near-shore coastal ice. The project area is 100 km west of Tuktoyaktuk and 118 km northeast of Aklavik.

## 8.0 TRADITIONAL AND OTHER LAND USES

Chevron's proposed program falls within the Tuktoyaktuk, Inuvik and Aklavik Conservation Planning Areas as defined by the respective Community Conservation Plans (TCCP, IICCP and AICCP 2000). The community conservation plans identify management categories C, D and E that coincide with the proposed project area. These categories are:

Category C: Lands and waters where cultural or renewable resources are of particular significance and sensitivity during specific times of the year. These areas shall be managed so as to guarantee the conservation of the resources.

Category D: Lands and waters where cultural or renewable resources are of particular significance and sensitivity throughout the year. As with Category C areas, these lands and waters shall be managed so as to guarantee the conservation of resources.

Category E: Lands and waters where cultural or renewable resources are of extreme significance and sensitivity. There shall be no development on these areas. These lands and waters shall be managed to eliminate, to the greatest extent possible, potential damage and disruption. This category recommends the highest degree of protection in this document.

The proposed program is situated within or adjoins eleven Special Management Areas. The location of these areas is explained in Table 5, and their significance is discussed below. Mitigative measures are discussed in Section 12.0, Proposed Mitigation and Anticipated Environmental Impacts.

Chevron's proposed program area offers year-round and seasonal habitat for wildlife. The sites of interest within the proposed project area include Kendall Island Bird Sanctuary (Site No. 706D) and Key

Migratory Bird Habitat (Site No. 715C), Mackenzie Bay and Shallow Bay (716CE), and Central Mackenzie Estuary (Site No. 718D).

Kendall Island Bird Sanctuary provides vital bird habitat during the breeding season from May to August. Wetland habitat within the area is sensitive year round and a large number of shorebirds migrate through the delta area. The Shallow Bay area provides a staging area for Greater white-fronted geese. Tundra swans, Greater white-fronted geese, Sandhill cranes, Brant geese, ducks and shorebirds nest and moult throughout this area.

Mackenzie River Delta Key Migratory Bird Habitat is important nesting and breeding habitat for birds from May to September. Subsistence harvesting of waterfowl and beluga whales occurs during the summer months (IICCP 2000). Community concerns include the possibility that development may have a negative impact on the birds, beluga whales and traditional lifestyles (IICCP 2000).

Mackenzie Bay and Shallow Bay provides important seasonal habitat for beluga whales and various species of waterfowl and are important subsistence harvesting areas for the Inuvialuit (TCCP 2000). The region also coincides with traditional fishing area. The region offers overwintering area for anadromous coregonids and serves as a feeding and nursery area for young fish. The major part of the beluga population concentrates here late June to early August.

The denning areas for Grizzly Bear and Mainland Coastal Polar Bear (Site Nos. 322C and No. 323C, respectively) both occur within the proposed program area. Both of these sites include many critical sites for denning bears and can easily be disturbed by industrial activity (IICCP 2000). Grizzly bears den from October to May (site No. 322C) and polar bears will also den in the area from November to April (site No. 323C). The project straddles two grizzly bear management areas: C2-4G Tuktoyaktuk West and C2-3G Inuvik. The proposed project occurs in the South Beaufort Polar Bear Management Area (TCCP 2000). The eastern portion of Chevron's proposed project area is located within the Tuktoyaktuk Group Trapping Area (TCCP 2000).

Subsistence harvesting is an important activity in this area. The project area includes year round fish harvesting areas (Site Nos. 305C, 306C, 310C and 316C), and spring and fall goose harvesting areas (Site Nos. 304C and 312C).

Assessing the level and permanency of the impacts of the proposed project is made difficult by the lack of comprehensive analysis to show the intensity of traditional harvesting of various species, by season and by location. The Joint Secretariat has data for Harvest Studies conducted throughout the area and would like to analyze the available data to determine the intensity of traditional harvesting but the continued uncertainty regarding the future of the Harvest Study has delayed further analyses (Slack Pers. Comm.).

Increased wage earning jobs as a result of oil and gas exploration prompted settlement throughout the 1970s and 1980s. Seismic activity was particularly intense around Kendall Island Bird Sanctuary and contributed to economic change within nearby communities through the creation of wage earning lifestyles. This lifestyle change contracted hunting ranges as harvesting became limited to holidays and weekends, although the hunting range has been restored with the introduction of the snowmobile (TCCP 2000, MFRL 1976).

TABLE 5

## SPECIAL MANAGEMENT AREAS WITHIN OR NEAR THE PROJECT AREA\*

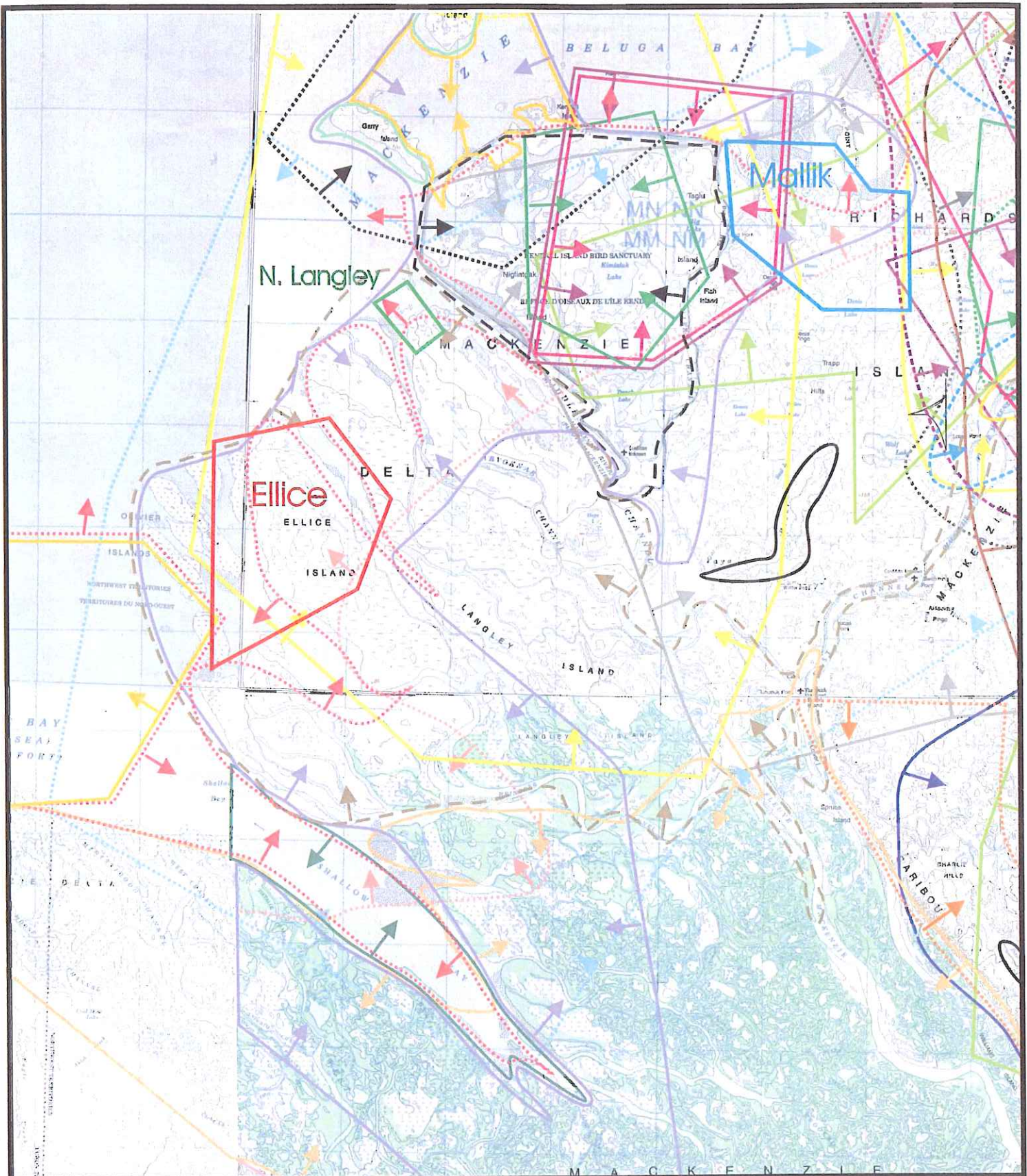
Site Number And Protective Status Category	Name	Location Description	Location In Relation To Project
304C	Spring Goose Harvest	Islands in the western portion of the Mackenzie River Estuary, from eastern Richards Island along the coast, including all of the Tuktoyaktuk Peninsula, to Mason River Estuary, and the Husky Lakes. Other areas include sections of the Miner River, Anderson River and Gossley Lakes.	Overlaps with program at Harry Channel and Ellice Island.
305C	Spring Fishing Areas	Various sites within the Tuktoyaktuk Planning Area.	Overlaps with eastern edge of program at Kendall Island Bird sanctuary.
307C	Summer Fish Harvesting	Kendall Island Bird Sanctuary, North Point of Richards Island and Northwestern Tuktoyaktuk Peninsula.	Overlaps with western boundary of Mallik program near Harry Channel.
310C	Fall Fish Harvesting	Kendall Island Bird Sanctuary, southern portion of Kugmallit Bay and Northwestern Tuktoyaktuk Peninsula.	Overlaps with western boundary of Mallik program near Harry Channel.
312C	Fall Goose Harvesting	All of the coastline from Yukon/Alaska border in the west, to the Mason River in the east, including sites on Anderson River and Crossley Lakes.	Surrounds entire program.
316C	Winter Fish Harvesting	Various sites within Tuktoyaktuk planning area including Liverpool Bay.	Overlaps with Mallik segment of program.
322C	Grizzly Bear Denning Areas	Coastal areas including Richards Island and Tuktoyaktuk Peninsula.	Surrounds entire program area.
323C	Mainland Coastal Polar Bear Dens	Northeast portion of the Tuktoyaktuk Peninsula, Kay Point to Summer Island, and northern portion of Cape Bathurst and Baillie Islands.	Overlaps with Kendall Island on the west end of Mallik.
706D	Kendall Island Bird Sanctuary	The Sanctuary is represented by an area of land and sea with Middle Channel of Harry Channels as boundaries and the northern boundary extending from the southern tip of Garry Island, extending northeastward, bisecting Kendall Island, as far as the mouth of Harry Channel.	Surrounds entire program area.
715C	Key Migratory Bird Habitat	Includes Shallow Bay, Olivier and Ellice Islands, Perry Island and part of Richards Island.	Surrounds entire program area.
716C	Mackenzie Bay and Shallow Bay	Management Category C: represents all of the site, with the exception of the Beluga Management Zone 1A in Mackenzie Bay, but includes a shoreline/water buffer around the Beluga Management Zone, extending southward into Shallow Bay.	Overlaps with Ellice near Olivier Islands.

\* AICCP, IICCP and TCCP, 2000

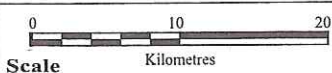
Chevron's project area accommodates a low level of consumptive (hunting and fishing) and adventure tourism (NWT Arctic Tourism 1998). There is sport hunting and wildlife viewing associated with the caribou herds in this area (AICCP, IICCP, and TCCP 2000). Table 6 provides information on the Northwest Territories Hunting Regulations for non-land claim beneficiaries (RWED 2001). These hunting areas extend beyond the boundaries of the proposed program and the occurrence of species such as moose is expected to be fairly limited in this area. Traditional harvesting and permitted hunting of the caribou, grizzly bear, polar bear and wolf may be impacted by the proposed program.

**TABLE 6**  
**SEASONS FOR PERMITTED HUNTING AND HARVESTING**

Species	Hunting Area	Season
Barren ground caribou	I/BC/06	Residents: August 15 – November 15 Non-Residents: August 15 – October 31 Non-resident Aliens: August 15 – October 31
Grizzly Bear	I/GB/03	Residents: August 31 – October 31, April 15 – May 31 Non-Residents: August 31 – October 31, April 15 – May 31 Non-resident Aliens: August 31 – October 31, April 15 – May 31
Moose	I	Residents: July 25 – April 30
Polar Bear	I/PB/03	Residents: December 1 – May 31 Non-Residents: December 1 – May 31 Non-resident Aliens: December 1 – May 31
Wolf	I/WF/05	Residents: August 15 – May 31 Non-Residents: August 15 – May 31 Non-resident Aliens: August 15 – May 31
Wolverine	G	Residents: July 25 – April 30



**Special Management Areas  
Surrounding or Adjacent to  
Proposed Project Area**



Sources: Maps of Mackenzie Delta  
107C and Herschel Island 117D

**Legend:**

322C	712C	714CDE
312C	715C	716CE
304C	704C	308C
305C	309C	717B
316C	706D	718D
711E	307C	323C
310C	315C	
719C	311C	



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Figure 4

## 9.0 DEVELOPMENT TIMETABLE

Planning for the Chevron winter 2001/2002 seismic program was initiated during May 2001. Chevron and their seismic contractor, Veri-Illuq are proposing to commence access construction in December 2001, pending regulatory approval. Table 7 provides the proposed schedule for the winter 2001/2002 seismic program.

**TABLE 7**

**DEVELOPMENT SCHEDULE\***

<b>Project Activity</b>	<b>Estimated Time Frame</b>
Planning	May 2001 and ongoing
Access Construction	December 2001 to January 2002
Set up Mobile Camp at Camp Location	January 2002
Surveying	January 2002
Drilling and Charge Placement	January/February 2002
Recording	February 2002 to completion (scheduled April 2002)
Winter Clean-up	During operations and upon program completion
Inspections	July/August 2002
Final Clean-up	July/August 2002

\* 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

### 10.1 Cased Drill Rig

The cased drill rigs will be used where source points are set below waterbodies (Section 4.2.5). These drills employ a cased rig technique that is somewhat different from a standard cased rig system used on land (Plate 1). The drill system utilizes a drill bit that is attached to the casing itself during drilling. There are two methods of casing: with and without a flushing medium (water). In certain conditions, as the hole is drilled, the cuttings are compacted onto the sides of the hole by the action of the bit and casing. In other conditions, such as where soft substrate is encountered, high pressure water is pumped down through the bit, in order to displace the cuttings at the bit onto the sides of the drilled hole. Using either method, no cuttings are brought to surface.

The entire depth of the hole is drilled with the bit and casing connected. Once target depth is attained, the drill bit is removed by withdrawing it back up the casing along with the drill stem. The charge is then loaded through the centre of the casing, and the casing is retracted, leaving the charge in the ground. Upon removal of the casing, ground material sloughs into the hole over the charge. The detonator leads have an attachment that is left in the pipe. Length of leads will be documented throughout the program as part of the drill log summaries to verify burial depth of charge (Appendix A).

The depths that can be achieved using the cased drill technology are in accordance with DFO setback distance guidelines revised in December 2000. This casing rig method does have flexibility allowing for increased depth of drilling during operations.



Plate 1: Photo of the cased drill in ice on the Langley 3D program conducted during 2000/2001.

## 11.0 ENVIRONMENTAL OVERVIEW

### 11.1 Methods

The baseline information provided in this report was synthesized from existing literature, field surveys conducted during summer 2001, a field reconnaissance conducted by the Joint Project Team and personal communications with local experts, regulatory agency representatives and knowledgeable professional biologists. This information was augmented by informal discussions with local residents regarding Traditional Ecological Knowledge. Literature was collected from community reports obtained from the Joint Secretariat in Inuvik, and from the Arctic Institute of North America library, located at the University of Calgary.

A summary of the physical and biological character of the region was then adapted specifically to the proposed program to fully assess design-related issues and suitable mitigation. The physical description includes the physiography and geology, hydrology and climate. Variables such as the levels of precipitation that could help to determine the extent of damage to habitat for terrestrial mammals, bird or fish, as well as specific plant species or communities were emphasized. The species descriptions provided highlight the life cycle and habitat requirements that could be vulnerable to specific interactions with the proposed program for only those species that are deemed important to local peoples based on Community Conservation Plans or community consultation, and COSEWIC listed species.