



Deep Panuke

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<p>2009 Wellhead Protection Structures Installation Environmental Protection Plan / Environmental Effects Monitoring Plan</p>							
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ABBREVIATIONS

CEAA	Canadian Environmental Assessment Act
CNSOPB	Canada Nova Scotia Offshore Petroleum Board
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
DFO	Fisheries and Oceans Canada
DND	Department of National Defense
EA	Environmental Assessment
EEMP	Environmental Effects Monitoring Plan
EHSMS	Environment, Health and Safety Management System
EPP	Environmental Protection Plan
IMO	International Maritime Organization
MARLANT	Maritime Forces Atlantic
MPA	Marine Protected Area
ROV	Remotely-Operated Vehicle
UXO	Unexploded Ordnance
WHPS	Wellhead Protection Structures

1 BACKGROUND

1.1 Regulatory and Management System Context

The proposed Deep Panuke Project has been assessed in the Deep Panuke Environmental Assessment (EA) Report (Volume 4, 2006) under a *Canadian Environmental Assessment Act* (CEAA) Comprehensive Study process. The proposed wellhead protection structures installation program is part of the overall Deep Panuke scope of work.

As part of its environmental management system (see Figure 1.1, EnCana's Environmental Management Framework), regulatory commitments (2006 EA Report), and conditions of approval (specifically Condition 25 and Condition 26 from the CNSOPB Decision Report), EnCana is obliged to implement environmental protection and monitoring measures to mitigate potential environmental effects from its activities. This Environmental Protection Plan / Environmental Effects Monitoring Plan (EPP/EEMP) focuses on EnCana's proposed 2009 wellhead protection structures installation program.

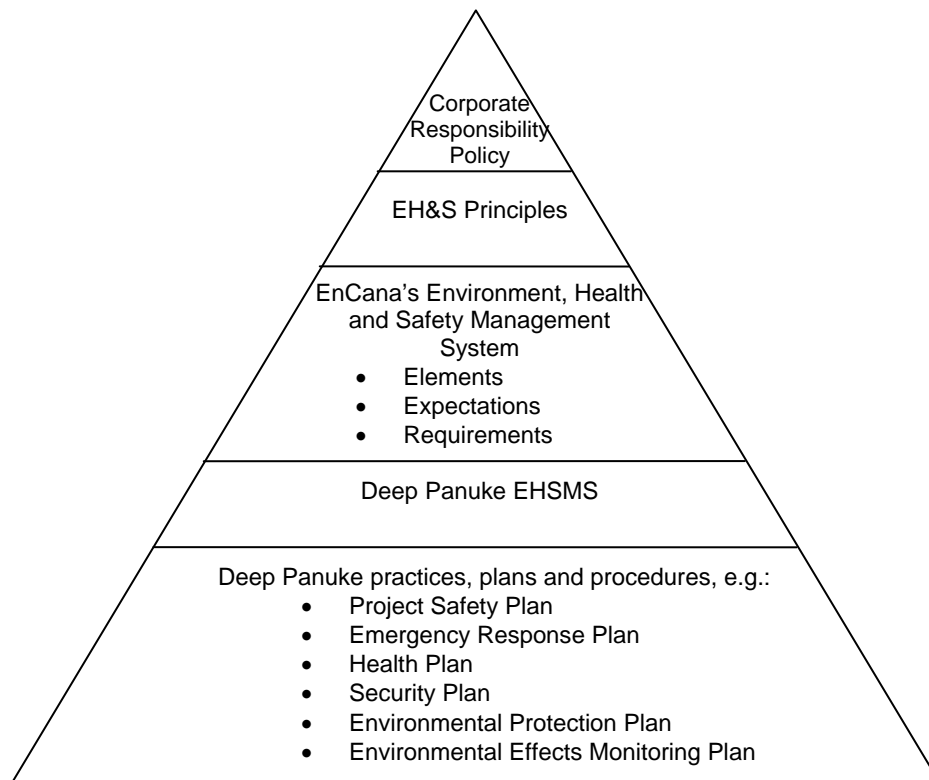


Figure 1.1 EnCana Environmental Management Framework

1.2 Program Overview

The wellhead protection structures (WHPS) installation will be conducted by Aker Marine Contractors with the vessel M/V Boa SubC. A total of five WHPS will be installed, one for each of the four production wells (H-08, M-79A, F-70 and D-41), and one for the acid gas injection well (see Figure 1.3, Location Map). WHPS are open faced, steel tubular frames with a base of approximately 8m x 8m and a maximum height of approximately 10 m (see Figure 1.2).

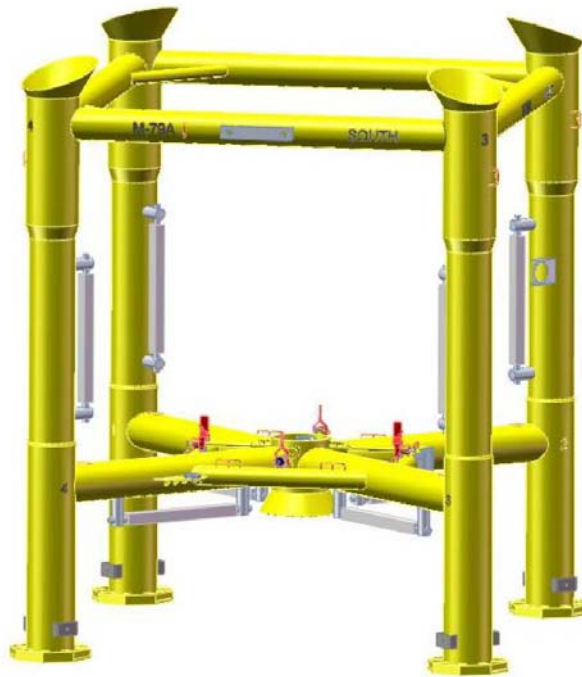


Figure 1.2 WHPS AutoCAD Image Courtesy of Aker Marine

The program includes the following tasks:

- The site will be surveyed with an ROV and prepared for lowering of the WHPS to the sea floor;
- Once the WHPS is lowered on the wellhead location, pile installation will begin (four piles for each WHPS, one in each corner);
- Piles will be lowered through the WHPS and pile hammered into place; and
- Once all piles have been installed for one WHPS, levelness will be checked and if acceptable the next installation will commence.

This work program is scheduled to commence or on about June 15, 2009, and will take approximately two weeks to complete offshore. However, depending on vessel's availability, the program could be delayed and extend into July or August 2009.

This wellhead protection structures installation program is very unlikely to have significant effects on the marine environment because of the non-intrusive aspects of the proposed activities and the environmental protection measures described in the following sections.

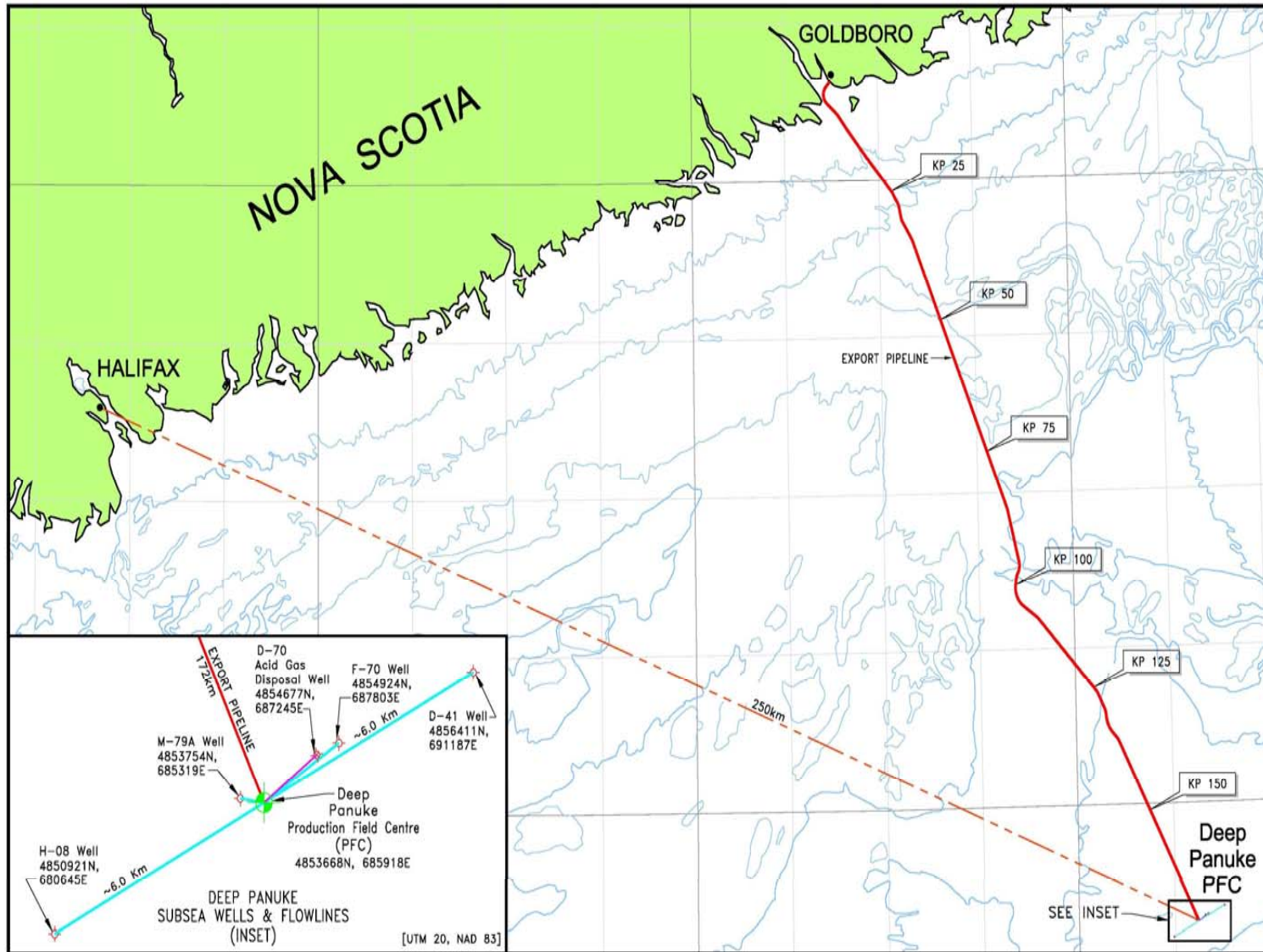


Figure 1.3 WHPS Installation Program Location Map

2 SPECIAL AREAS

The wellhead protection structures installation program will follow EnCana's Codes of Practice for Sable Island and the Gully Marine Protected Area (MPA), which include the following measures (see Appendix 1):

- No activities and no vessels and aircraft within 2 km (1 nautical mile) of Sable Island except in emergency situations, under an approved Environmental Monitoring Program or for special trips approved by the Canadian Coast Guard.
- No activities inside the Gully MPA, no vessels permitted within the Gully MPA, and aircraft flying at a height of at least 500 m above the Gully MPA; except for the purpose of safety or under an approved environmental monitoring program.

3 INTERACTION WITH FISHING ACTIVITY

No interactions with fishing vessels are anticipated since the program only involves a single vessel operating within the Deep Panuke Safety Zone, and minimal fishing activity is expected in the Deep Panuke field centre area.

Extensive consultation with the fishing industry was conducted as part of the Deep Panuke Environmental Assessment process and identified that the Deep Panuke field centre area was an area of very low fishing activity, with no catches reported in this area between 2002 and 2005 (refer to the commercial fisheries catch and effort maps provided in Appendix J of the 2006 Deep Panuke EA Report (Volume 4)). In addition, as mentioned above, the program will take place within the Deep Panuke Safety Zone (see Figure 3.1), which has now been added to hydrographic charts.

A Notice to Shipping will be issued with regard to this short-term activity (two weeks).

In the unlikely event of an incident with a non-project vessel such as a fishing vessel or a spill, EnCana will adhere to the CNSOPB *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity* and compensate and indemnify licensed participants in the fishing industry to the extent that the Deep Panuke Project may cause them damage or loss, including consequential damages during normal fishing operations.

In addition, as per EnCana’s commitment to place fisheries observers strategically on key construction vessels and as noted in the Fisheries Liaison Program, DMEN-X00-RP-EH-00-0011-02U, EnCana will be placing a Fisheries Observer on the M/V Boa SubC for the duration of this work program.

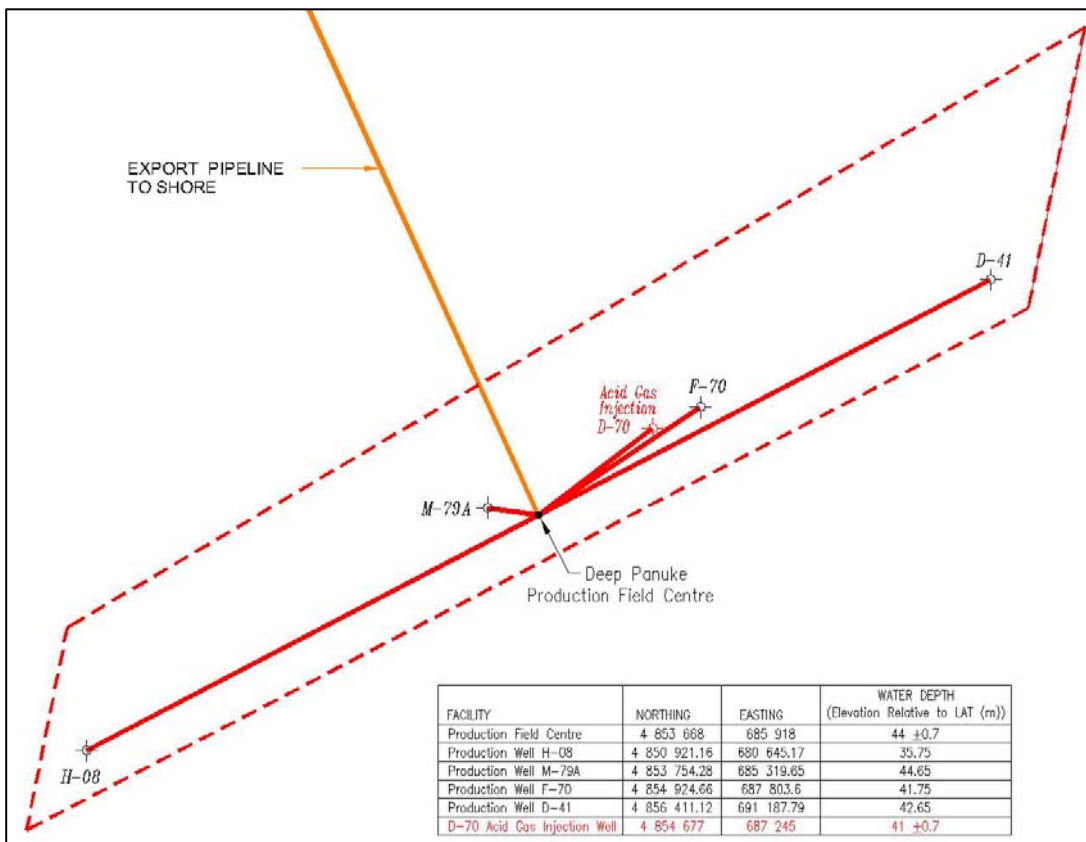


Figure 3.1 Deep Panuke Safety Zone

4 INTERACTION WITH MILITARY OPERATIONS

EnCana has received confirmation from DND in March 2009 that there are no UXO (Unexploded Ordnance), chemical, biological, or radioactive material or operational issues or conflicts from the MARLANT perspective with the Deep Panuke Project, including this WHPS installation program.

5 NOISE FROM PILE DRIVING OPERATIONS

5.1 WHPS Pile Driving Activities

A total of 20 steel piles (four piles for each of the five WHPS) will be installed. Piles will be lowered through each corner of the WHPS and hammered into place with a Hydrohammer S-150 (see Appendix 2).

The piles that will be used for the Deep Panuke WHPS are significantly smaller and their installation will generate significantly lower sound pressure levels than conventional platform piles. The table below provides a comparison between the Deep Panuke WHPS piles and typical platform piles such as those used for the initial 2002 Deep Panuke Project Basis Design (Table 2.3 of the 2006 Deep Panuke EA Report, Volume 4).

	Deep Panuke WHPS Piles	Conventional Platform Piles
Diameter	76 cm	210 cm
Penetration	18 m	68 m
Actual driving duration per pile	0.5-1 hour	4-6 hours

Figure 5.1 Pile Driving Characteristics

5.2 Safety Zone Monitoring

The following procedure will be implemented during pile driving operations:

- Visual monitoring of a 500-m safety zone around the pile driving source for 30 min before source start-up;
- Delay of start-up if a sea turtle or cetacean (i.e. a whale, dolphin or porpoise) is seen within the safety zone during the 30-min observation period, until the sea turtle or cetacean has not been observed within the safety zone for at least 30 min;
- Gradual ramp-up of sound source each time the source is started after an interruption of more than 30 min; and
- Immediate shut down of sound source if a designated endangered or threatened cetacean or sea turtle (i.e. Blue whale, Northern Bottlenose whale, Atlantic Right whale, or Leatherback turtle) is observed within the 500-m safety zone during activities.

The onboard Fisheries Observer will be trained for marine mammal observations and will conduct the safety zone monitoring during pile driving activities.

This proposed procedure is consistent with the DFO 2008 *Statement of Canadian Practice, Mitigation of Seismic Noise in the Marine Environment*. The safety zone radius of 500 m is also consistent with mitigation measures used for other pile driving programs, which involved more conventional piles of deeper penetration generating higher sound pressure levels than the Deep Panuke WHPS piles.

The program will take place early in the migration season for baleen whales and sea turtles (between mid-June and early July) when endangered species such as the Leatherback turtle, the Blue whale and the Northern Right whale are not expected to be in the Project area. Similarly, the endangered Northern Bottlenose whale, a toothed whale, inhabits much deeper water than the program area. If the program is delayed into July-August because of vessel's availability, there will

be more likelihood for migrating species (such as baleen whales and sea turtles) to be present in the area. However, the proposed safety zone mitigation measures will ensure no significant impact on these species, and endangered species of whales would still not expected to be present in the program area (the Blue whale is expected to be found in areas mostly to the west of the Scotian Shelf as well as in deeper waters along the shelf break; the Northern Right whale is expected to be found farther to the west of the shelf; and as mentioned above, the Northern Bottlenose whale inhabits much deeper water than the program area).

6 WASTE HANDLING AND DISPOSAL

No hazardous wastes are expected to be generated during the program. In the event of an onboard spill, any used absorbent materials and any other oily wastes will be placed in sealed containers and returned to shore for treatment and disposal at an approved waste management facility.

The CNSOPB *Offshore Water Treatment Guidelines* will be followed with respect to routine discharges (e.g., sanitary and food wastes, oily bilge/ballast water). The M/V Boa SubC has an onboard water sewage plant in accordance with MARPOL regulations.

Further, the M/V Boa SubC will comply with the *Ballast Water Control Land Management Regulations (2006)* under the *Canada Shipping Act*, including provisions to replace its ballast water before entering Canadian waters.

A built-for-purpose incinerator onboard the M/V Boa SubC will be used to treat wastes that are non-recyclable and non-hazardous. Operation of the shipboard incinerator will conform with MARPOL 73/78/97 ANNEX VI Regulation 16 which provides specific guidance on personnel training and incinerator operations, notably the prohibition of shipboard incineration of waste materials containing PCBs, heavy metals, or similar contaminants. In addition, no waste containing chlorinated compounds will be incinerated. EnCana will notify Environment Canada when the project starts and finishes for purposes of the Sable Island Air Monitoring Program.

Any other wastes will be sorted and brought to shore for disposal according to the local regulatory regime of the shore base, including the Nova Scotia *Solid Waste - Resource Management Regulations*, and municipal requirements at the offloading location.

7 STRANDED BIRD PROTOCOL

The Fisheries Observer onboard the M/V Boa SubC will be responsible for implementing the protocol developed by Williams and Chardine (1999) for storm petrels (Appendix 3) for any stranded bird species on the vessel. A camera will be available onboard to assist with bird identification and recording.

A Seabird Salvage Permit has been obtained from Canadian Wildlife Service (CWS) (covering all Deep Panuke 2009 offshore activities) and a report of birds “salvaged” onboard the vessel (and other offshore vessels/platforms used for Deep Panuke 2009 activities) will be submitted to CWS and to the CNSOPB within 30 days of the permit’s expiry date (January 2010).

EnCana will immediately notify the Canadian Coast Guard Operations Center if a dead bird is found during the program to confirm the course of action. In case of a mass stranding (more than five birds in a 24-hr episode), or a stranded oiled bird (see section 8.5.3 for oiled birds), the CNSOPB will also be contacted. In addition, Andrew Boyne at CWS can be contacted for seabird-related advice. Dead birds will be identified, recorded and disposed of at sea unless they are oiled (see section 8.5.3 for oiled birds). Figure 8.1 provides a summary flowchart of bird handling procedures for the program.

8 SPILL RESPONSE

8.1 Spill Risk

The likelihood of an accidental spill into the marine environment during the program is extremely low because the vessel will comply with IMO standards and will have no specific spill sources, including:

- No transfer of fuel to vessels at sea;
- No large container/tank of oil or fuel onboard the vessels other than their own internal fuel tanks; and
- Minimal risk of vessel collision, since there will only be one vessel involved in field activities at any one time.

In fact, the vessel will not present more risk of spill than any other standard offshore vessel (e.g. shipping, fishing, etc). Furthermore, a spill response plan will be in place to minimize the possible consequences of a malfunction or accident (refer to Sections 8.2 to 8.5 below).

The WHPS installation program will include the deployment of an ROV to assist with the pre-installation survey, frame guidance during lowering and set-down, pre-piling positioning survey, monitoring of piling activities, post-piling as-installed survey, etc. However, the risk of potential impact from hydraulic fuel spills from ROV cables is expected to be minimal due to the small duration of the program (approximately two weeks) and the fact that the ROV will use a hydraulic fluid (MOBIL DTE 22) that is non-toxic to aquatic organisms and likely intrinsically biodegradable.

8.2 Spill Response Logistics and Equipment

The only vessel available for spill monitoring and response will be the installation vessel, the M/V Boa SubC. There will be no regular vessel or helicopter trips between the project site and Halifax during the program.

The M/V Boa SubC has a standard spill response kit capable of containing and cleaning up a small spill onboard the vessel.

8.3 Spill Monitoring

As per EnCana's Spill Response Plan approved by and on file with the CNSOPB, the Canadian Coast Guard and DFO, in the unlikely event of a spill, EnCana will conduct the following monitoring until the slick dissipates:

- Estimate spill volume;
- Estimate oil type; and
- Visually assess the slick until it has disappeared by natural dispersion and evaporation.

8.4 Enhance Natural Dispersion

Spill modeling can be used to investigate the fate of a 'worst case' spill event – a diesel spill from a simultaneous rupture of the vessel hull and fuel tank, a highly unlikely event for this program. Furthermore, diesel is a light oil which is highly evaporative and dispersive in the marine environment.

Spill dispersion modeling carried out for the 2006 Deep Panuke EA (Volume 4) gave the following results for 10-barrel and 100-barrel diesel spill scenarios at the Deep Panuke PFC location. A 10-

barrel batch spill will persist as a slick for about 13 hours and travel about 12 km prior to the complete loss of the surface oil. The maximum dispersed oil concentration for this spill will be about 2 ppmw and this will drop to 0.1 ppmw within about 16 hours. A 100-barrel batch spill of diesel will persist as a slick for about 19 hours and travel about 18 km prior to the complete loss of the surface oil. The maximum dispersed oil concentration for this spill will be about 4 ppmw and this will drop to 0.1 ppmw within about 43 hours. The dispersed oil cloud will travel about 54 km and have a maximum width of about 4 km. Prevailing water currents would take the dispersed condensate cloud in a southwest direction away from Sable Island (located approximately 48 km from Deep Panuke). Therefore, no diesel is predicted to reach the nearest landfall which is Sable Island (critical habitat for endangered Roseate terns). Any diesel spill will also not likely reach the Haddock Box since most spill scenarios result in a dispersed oil cloud traveling significantly less than the 49 km distance from the production field to the Haddock Box (for further details refer to EnCana's Reply Evidence for the Deep Panuke Project dated February 26, 2007).

Based on the limited persistence of diesel on the sea surface, it is unlikely that a containment and/or recovery effort at sea or the use of chemical dispersants would be warranted. The most appropriate response would be to enhance natural dispersion processes by running vessels through the slick.

8.5 Spill EPP for Marine Birds

Figure 8.2 provides a summary flowchart of the proposed environmental protection plan (EPP) for the program in the event of a spill.

8.5.1 Bird Monitoring

In the unlikely event of a spill, any observations of spill and marine bird interactions will be reported immediately to the Allseas offshore project manager who will notify EnCana immediately.

Marine bird species-at-risk are not expected to occur in the program area. The only marine bird species listed by COSEWIC as endangered or threatened offshore Nova Scotia is the endangered Roseate tern nesting on Sable Island between May and July, approximately 40 km away from the closest location of the project site.

8.5.2 Bird Dispersal

In the unlikely event of a spill, EnCana will attempt to keep birds away from the slick area by hazing from the vessel, if logistical conditions permit. This effort will focus on dispersing congregations of birds. Potential hazing means include the vessel itself, and the use of sound makers (e.g. vessel horns). No specific permit is required from Environment Canada for bird hazing.

8.5.3 Oiled Birds Handling

It is very unlikely that an oiled bird will be found at sea during the program because of the very low risk of oil spill during the program (see section 8.1) and the difficulty to identify oiled birds in the water (small dark spot on dark water). In the very unlikely event that an oiled bird were found at sea during the program, EnCana would not attempt to recover it because of safety concerns associated with an overboard recovery operation and the unlikelihood to save a live oiled bird if it can be recovered (onshore rehabilitation can cause distress to marine birds with no guarantee of successful re-entry into the breeding population, especially in Canada where waters are generally cold and the species generally affected do not respond well to cleaning).

It is also very unlikely that an oiled bird will be found onboard the vessel during the program because of the absence of specific spill sources on deck and of good housekeeping procedures. If a live oiled bird were found onboard the vessel during the program, the protocol developed by Williams and Chardine (1999) for storm petrels (Appendix 3) would be implemented. If the bird

died or if any dead oiled birds were found onboard the vessel, the bird would be frozen and shipped to the CWS office in Dartmouth for confirmation of origin of the oil contamination at the end of the program, if logistics permits (CWS will be contacted beforehand). If shipping to shore were not possible, the bird would be disposed at sea.

EnCana will immediately notify the CNSOPB and the Canadian Coast Guard Operations Center if an oiled bird (dead or live) is identified during the program and will confirm the course of action with them. In addition, Andrew Boyne at CWS can be contacted for seabird-related advice.

Beached bird surveys on Sable Island would only be implemented in the event of a catastrophic spill in which a large number of birds were expected to be oiled and oiled birds were expected to arrive on the island. As indicated in Section 8.4, such an occurrence is deemed to be highly unlikely based on spill dispersion modeling.

Figure 8.1 provides a summary flowchart of oiled bird handling procedures for the program.

8.6 Spill EPP for Marine Mammals

Marine mammals have body coverings, unlike those of birds, that are relatively unaffected by oiling. Hair seals for example are often observed with apparently untroublesome patches of heavy oil; light oils such as diesel are likely to evaporate and wash off more readily. Spills of light oil are likely to impair breathing in ways that would tend to repel animals from the area before they are adversely affected.

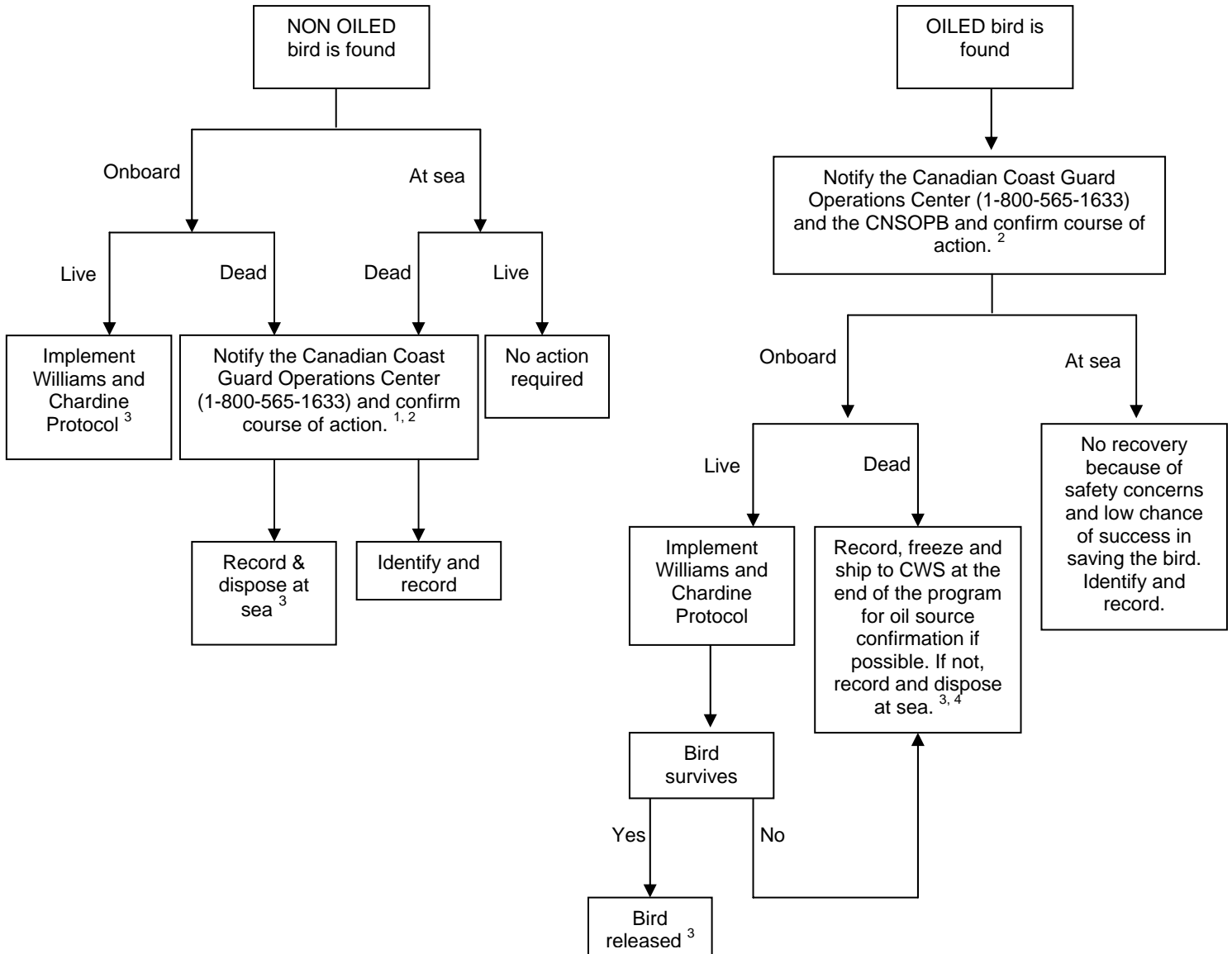
In the unlikely event of a spill, any observations of spill and marine mammal interactions will be reported immediately to Allseas offshore project manager who will notify EnCana immediately. Wildlife observations and any related action will be included in the spill incident report submitted to CNSOPB (see Figure 8.2).

8.7 Spill EPP for Sable Island

Dispersion modeling carried out for the Deep Panuke EA (Volume 4) shows that 10-barrel and 100-barrel spills of diesel are unlikely to occur during program activities or reach Sable Island due to prevailing currents away from the island - even with winds blowing directly towards the island (see Section 8.4).

While highly unlikely, EnCana will conduct beached bird surveys on Sable Island should a spill approach or reach Sable Island, to assist in determining the impact of the spill.

Figure 8.1 Bird Handling Flowchart



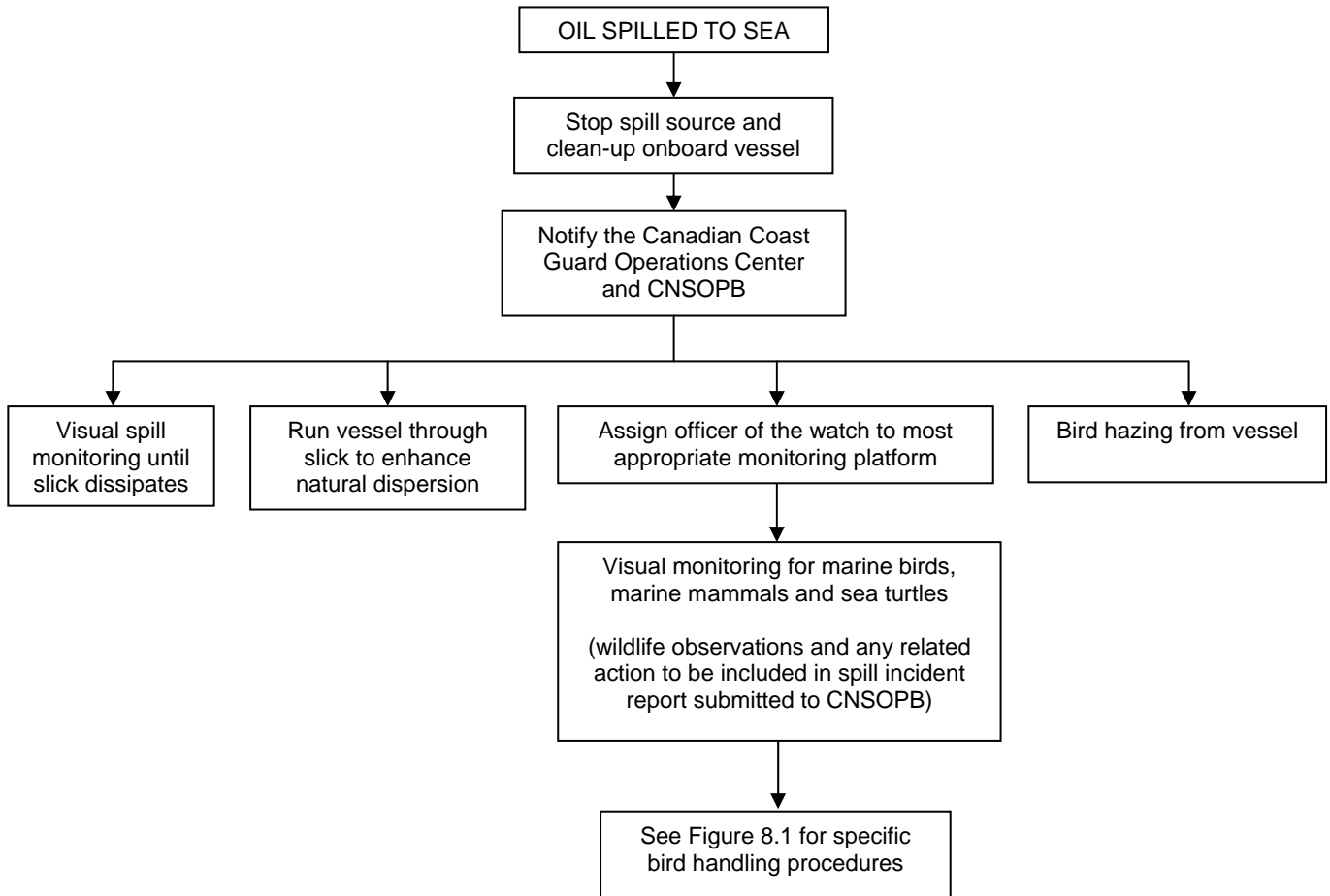
¹ Also notify the CNSOPB in case of mass stranding (more than five birds in a 24-hr episode)

² In addition, Andrew Boyne at CWS can be contacted for seabird-related advice

³ Birds handled during the program will be included in EnCana’s yearly Seabirds Salvage Permit report submitted to Environment Canada under the Migratory Bird Act and to the CNSOPB before the end of January 2010.

⁴ Oiled birds will be shipped to Canadian Wildlife Service, Environment Canada, 45 Alderney Drive, 16th Floor, Dartmouth, N.S. B2Y 2N6. CWS will be contacted beforehand.

Figure 8.2 Spill EPP Flowchart



APPENDIX 1 CODES OF PRACTICE FOR SABLE ISLAND AND THE GULLY MPA

ENCANA CODE OF PRACTICE FOR SABLE ISLAND**A. OVERVIEW**

EnCana has developed, as part of its environmental protection planning, a Code of Practice to protect the uniqueness and integrity of Sable Island (see attached map). This Code of Practice is intended to protect the sensitive environment of Sable Island and its Valued Environmental Components. This Code is not a regulatory requirement and is indicative of EnCana's environmental stewardship philosophy and corporate policies. This Code of Practice applies to all EnCana activities.

Sable Island is approximately 41km in length and is located 290km southeast of Halifax. The Island is composed of sand and is the only emergent portion of the Sable Island Bank. It supports a fragile ecosystem consisting of diverse flora and fauna; the best known components being the feral horses, seal populations, the rare Ipswich (Savannah) sparrow (*Passerculus sandwichensis princeps*), and the endangered Roseate tern (*Sterna dougallii*).

Sable Island access and activities are administered by the Canadian Coast Guard on behalf of the Government of Canada, pursuant to the Sable Island Regulations of the Canada Shipping Act. It is also protected under Environment Canada regulations, specifically the Migratory Birds Convention Act. EnCana is represented on the Sable Island Stakeholder Advisory Committee chaired by DFO. The Sable Island Green Horse Society website (<http://www.greenhorsesociety.com>) contains additional information on Sable Island.

B. DETAILS

As part of its environmental stewardship with respect to Sable Island:

EnCana will not conduct activities within 2 km (1 nautical mile) of Sable Island. All EnCana activities on Sable Island must receive approval from EnCana senior management and the Canadian Coast Guard, and will comply with all applicable guidelines, including the 2005 Sable Island Visitors Manual.

EnCana vessels and aircraft are not permitted within 2 km (1 nautical mile) of the Island. However, this restriction does not apply in the case of an emergency situation, for access required as part of an approved Environmental Monitoring Program or for special trips approved by the Canadian Coast Guard.

EnCana will include discussion of this Code of Practice in its environmental awareness training program for its personnel and provide orientation for its visitors to the Island. EnCana intends that this Code is a 'living document' and will review and update it as required. The Code of Practice will also be publicly available on the EnCana Corporation web site (www.encana.com).

EnCana Corporation

David L. Kopperson
Vice President
Offshore East Coast of Canada

ENCANA CODE OF PRACTICE FOR THE GULLY MPA**A. OVERVIEW**

EnCana has developed, as part of its environmental protection planning, a Code of Practice to protect the uniqueness and integrity of the Gully Marine Protected Area (MPA) (see attached map). This Code is not a regulatory requirement and is indicative of EnCana's environmental stewardship philosophy and corporate policies. This Code of Practice applies to all EnCana activities.

The Gully is a large submarine canyon approximately 40 km east of Sable Island on the edge of the Scotian Shelf. It is unique among canyons of the Eastern Canadian margin because of its depth, steep slopes and extension back into the continental shelf. It is thought to be an area of high productivity and important marine mammal habitat. Fifteen species of whales and dolphins have been identified in the area and eight of them are commonly found there. The deepest part of the Gully supports a resident population of approximately 163 endangered Northern Bottlenose whales (*Hyperoodon ampullatus*). The Gully also contains the highest known density of corals in Atlantic Canada with a dozen species identified to date.

The Gully has been designated by the Federal Department of Fisheries and Oceans as a MPA under the Oceans Act in 2004, and comprises an area of 2,364 km². EnCana is represented on the Gully Advisory Committee chaired by DFO.

B. DETAILS

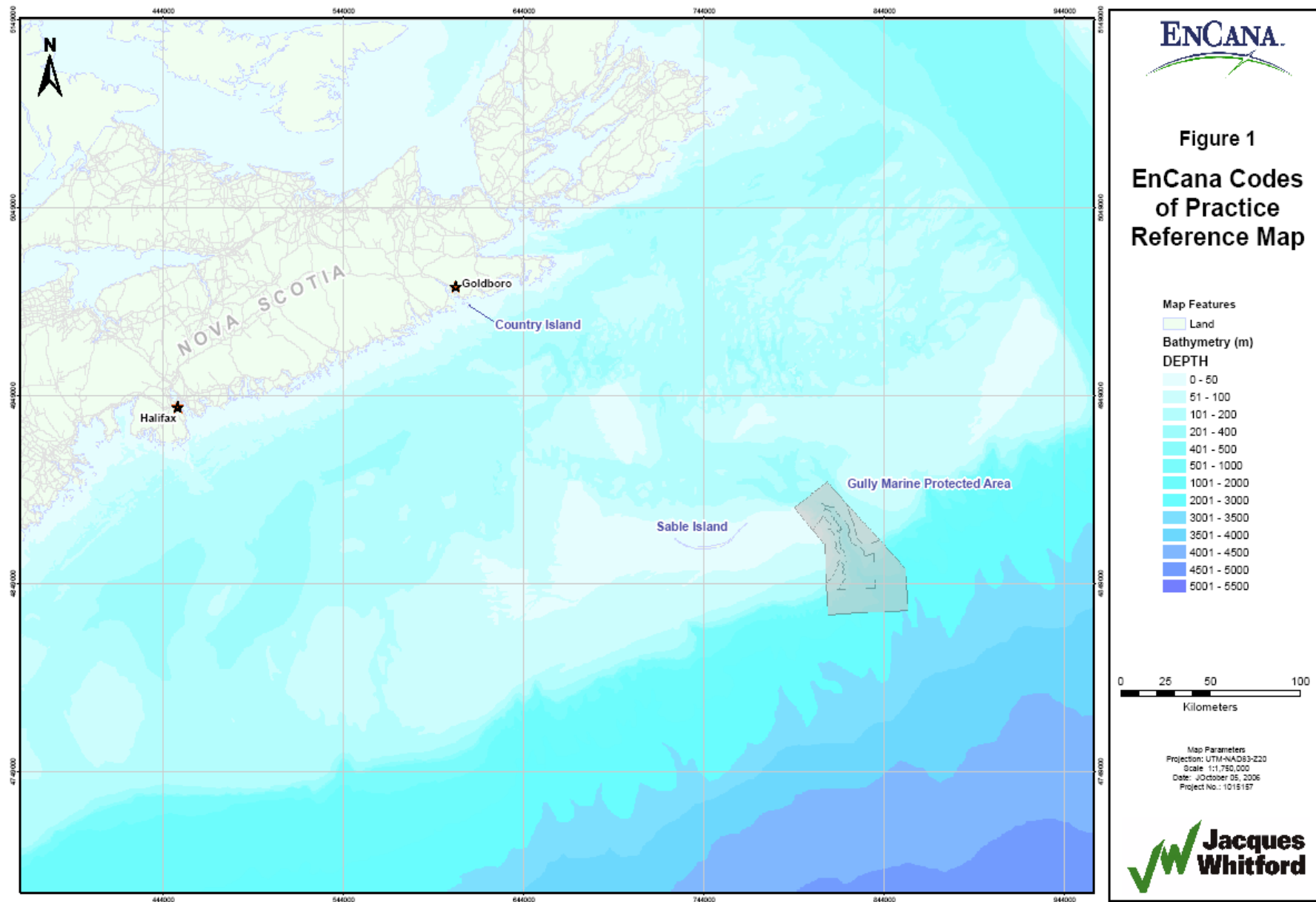
As part of its environmental stewardship with respect to the Gully MPA:

EnCana will not conduct activities inside the Gully MPA. In addition, no vessels are permitted within the Gully MPA and aircraft in regular transit to and from any vessels, drilling units, or facilities are restricted to flying at a height of at least 500 m. These restrictions apply unless it is required for purposes of safety or safe operation of a vessel/aircraft or as part of an approved Environmental Monitoring Program.

EnCana will include discussion of this Code of Practice in its environmental awareness training program for employees and contractors. EnCana intends that this Code is a 'living document' and will review and update it as required. The Code of Practice will also be publicly available on the EnCana Corporation web site (www.encana.com).

EnCana Corporation

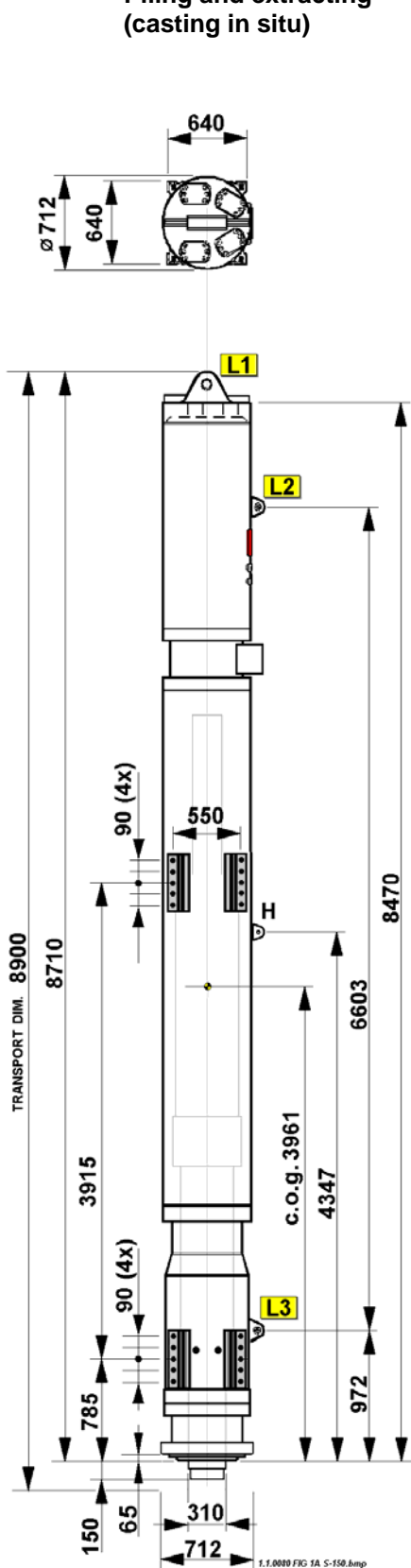
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APPENDIX 2 PILE DRIVING HYDROHAMMER S-150

APPLICATION: Hydrohammer® for steel piles.
Piling and extracting
(casting in situ)

Code no. 85 19 00 01



Main dimensions

Operating data

Max. net energy/blow	150	kNm
Min. net energy/blow	6	kNm
Blow rate (max energy)	44	Blows/min

Weight

Ram	7,5	tons
Hammer (incl. ram, in air)	16,2	tons
Hammer (incl. ram, in salt water)	12,6	tons
(Only if fully submerged)		

Hydraulic data

Operating pressure	280	bar
Max. pressure	350	bar
Max. oil flow	460	l/min

Gas filling pressure

Vertical pile driving only! Values will vary for:
- pile driving under different angles with the vertical,
- pile driving underwater depending on water depth.

Supply accumulator (Nitrogen)	150 - 170	bar
Return accumulator (Nitrogen)	4 - 5	bar
Cap (Nitrogen or Air)	12 - 16	bar

Safety setting

Cap	40	bar
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Hose connections

Oil supply 1½" hose (P)	M52x2	male
Oil return 1½" hose (R)	M52x2	male
Nitrogen to cap (CA)	R ¾"	male

Lifting eyes

	WLL	hole diam.	thick ness
	Working Load Limit		
L1	55 tons	Ø 75mm	80mm
L2 / L3	17 tons	Ø 45mm	55mm

APPENDIX 3 WILLIAMS AND CHARDINE PROTOCOL

The Leach's Storm-Petrel:
General information and handling instructions

Urban Williams (Petro-Canada)
&
John Chardine (Canadian Wildlife Service)

The Grand Banks is an area that is frequented by large numbers of seabirds, representing a variety of species. Large populations are found in this area in both summer and winter, and come from the Arctic, northern Europe, and the south Atlantic, as well as from colonies along the Newfoundland Coast. One of the species found in the area of the Terra Nova Field is the Leach's Storm-Petrel (*Oceanodroma leucorhoa*).

The Bird:

Leach's Storm-Petrels are small seabirds, not much bigger than a Robin. They have relatively long wings and are excellent fliers. Leach's Storm-Petrels are dark brown in colour and show a conspicuous white patch at the base of the tail. In the hand, you can easily notice a small tube at the top of their bill, and you will also notice that the birds have a peculiar, not unpleasant smell (although some Newfoundlanders call these birds "Stink Birds"). Storm-Petrels are easy prey for gulls and other predators, and so to protect themselves from predation, Leach's Storm-Petrels are only active at night when on land at the breeding colonies.



Photo : Gilles Chapdelaine

Nesting Habitat:

Leach's Storm-Petrels are distributed widely in the northern hemisphere, however, their major centres of distribution are Alaska and Newfoundland. The bird breeds on offshore islands, often in colonies numbering tens or hundreds of thousands of pairs, even millions at one colony in Newfoundland. The nest is a chamber, sometimes lined with a some grass, located at the end of a narrow tunnel dug in the topsoil. Depending on the colony, burrows may be under conifer or raspberry thickets or open grassland.

Reproduction:

In Newfoundland, Leach's Storm-Petrels lay their single egg in May and June. The egg is incubated by both parents alternately, sometimes for stretches exceeding 48 hours. The egg is incubated for 41-42 days, which is a long time for such a small egg. The peak hatching period is in the last half of July. The young petrel remains in the tunnel for about 63-70 days. Once breeding is over in late-August or early September, the birds disperse from the colonies and migrate to their wintering

grounds in the Atlantic. September is the most important period for migration of Storm-Petrels to the offshore areas such as near the Terra Nova field.

Populations:

Canada alone supports more than 5 million pairs of Leach's Storm-Petrels. Most of them are found in Newfoundland. The Leach's Storm-Petrel colony located on Baccalieu Island is the largest known colony of this species.

Nesting sites for Leach's Storm-Petrels are found along the southeast coast of Newfoundland. These are - i) Witless Bay Islands (780,00 nesting pairs), ii) Iron Island (10,000 nesting pairs), iii) Corbin Island (100,000 nesting pairs), iv) Middle Lawn Island (26,000 nesting pairs), v) Baccalieu Island (3,336,000 nesting pairs), vi) Green Island (72,000 nesting pairs), and vii) St. Pierre Grand Columbier (100,000 nesting pairs).

Feeding Habits:

Leach's Storm-Petrels feed at the sea surface, seizing prey in flight. Prey usually consists of myctophid fish and amphipods. The chick is fed planktonic crustaceans, drops of stomach oil from the adult bird, and small fish taken far out at sea. Storm-Petrels feed far out from the colony and it would be reasonable to assume that birds nesting in eastern Newfoundland can be found feeding around the Terra Nova site.

The Problem:

As identified in the C-NOPB Decision 97-02, seabirds such as Leach's Storm-Petrels are attracted to lights on offshore platforms and vessels. Experience has shown that Storm-Petrels may be confused by lights from ships and oil rigs, particularly on foggy nights, and will crash into lighted areas such as decks and portholes. Fortunately, this type of accident does not often result in mortality, however, once on deck the bird will sometimes seek a dark corner in which to hide, and can become fouled with oil or other contaminants on deck.

Period of Concern:

Leach's Storm-Petrels are in the Terra Nova area from about May until October and birds could be attracted to lights at any time throughout this period. The period of greatest risk of attraction to lights on vessels appears to be at the end of the breeding season when adults and newly fledged chicks are dispersing from the colonies and migrating to their offshore wintering grounds. September is the most important period for migration of storm-petrels to the offshore areas. Past experience suggests that any foggy night in September could be problematic and may result in hundreds or even thousands of birds colliding with the vessel.

The Mitigation:

On nights when storm-petrels are colliding with the vessel, the following steps should be taken to ensure that as many birds as possible are safely returned to their natural habitat:

- All decks of the vessel should be patrolled as often as is needed to ensure that birds are picked up and boxed (see below) as soon as possible after they have collided with the vessel. After collision, birds will often "freeze" below lights on deck or seek dark areas underneath machinery and the like.
- Birds should be collected by hand and gently placed in small cardboard boxes. Care should be taken not to overcrowd the birds and a maximum of 10-15 birds should be placed in each box, depending upon its size. The birds are very easy to pick up as they are poor walkers and will not

fly up off the deck so long as the area is well-lit. They will make a squealing sound as they are picked up- this is of no concern and is a natural reaction to be handled (the birds probably think they have been captured to be eaten!).

- When the birds are placed in the box the cover should be put in place and the birds left to recover in a dark, cool, quiet place for about 5-10 minutes. The birds initially will be quite active in the box but will soon settle down.
- Following the recovery period, the box containing the birds should be brought to the bow of the boat or to some other area of the vessel that has minimal (if any) lighting. The cover should be opened and each bird individually removed by hand. The release is usually accomplished by letting the bird drop over the side of the vessel. There is no need to throw the bird up in the air at release time. If the birds are released at a well-lit part of the vessel they usually fly back towards the vessel and collide again.
- If any of the birds are wet when they are captured (i.e. they drop into water on the deck) then they should be placed in a cardboard box and let dry. Once the bird is dry it can be released as per the previous instruction. Also, temporarily injured birds should be left for longer to recover in the cardboard box before release.
- Any birds contaminated with oil should be kept in a separate box and not mixed with clean birds. Contact Canadian Wildlife Service at (709) 772-5585 for instructions on how to deal with contaminated birds.
- In the event that some birds are captured near dawn and are not fully recovered before daylight, they should be kept until the next night for release. Storm-Petrels should not be released in daylight as at this time they are very vulnerable to predation by gulls. Birds should be kept in the cardboard box in a cool, quiet place for the day, and do not need to be fed.
- Someone should be given the responsibility of maintaining a tally of birds that have been captured and released, and those that were found dead on deck. These notes should be kept with other information about the conditions on the night of the incident (moonlight, fog, weather), date, time, etc). **THIS IS A VERY IMPORTANT PART OF THE EXERCISE AS IT IS THE ONLY WAY WE CAN LEARN MORE ABOUT THESE EVENTS.**

Handling Instructions:

- Leach's Storm-Petrels are small, gentle birds and should be handled with care at all times.
- It is recommended that the person handling the birds should wear thin rubber gloves or clean, cotton work gloves. The purpose of the gloves is to protect both the Storm-Petrel and the worker.
- As mentioned Storm-Petrel's have a strong odour that will stick to the handler's hands. Washing with soap and water will remove most of the smell.
- Handling Leach's Storm-Petrels does not pose a health hazard to the worker, however some birds may have parasites on their feathers, such as feather lice. These parasites do not present any risk to humans, however, as a precaution we recommend wearing cotton work gloves or thin rubber gloves while handling birds and washing of hands afterwards.

Wilson's Storm Petrels:

A relative of the Leach's Storm-Petrel is the Wilson's Storm-Petrel. They breed in the south Atlantic and Antarctica and migrate north in our spring to spend the summer in Newfoundland waters. This species is very numerous on the Grand Banks in the summer, and shares the same nocturnal habits as the Leach's Storm-Petrel. Thus it is possible that Wilson's Storm-Petrels may also be attracted to the lights of a vessel at night. The two species are very similar and should be handled in the same way as described above for our Leach's Storm-Petrel.

Permits:

A permit to handle storm-petrels issued by the Canadian Wildlife Service will be held on board the vessel to cover personnel involved in bird collision incidents.