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2012 Environmental Assessment Review Hibernia Drill Centres Construction and Operations Review

Prepared for:

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Report

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1.0 INTRODUCTION

This is an updated project description for the drill centres and water injection wells program to be initiated in 2012 and contained within Jacques Whitford (2009). In addition to updating the project description and verifying that the scope and assessment predictions of the Hibernia Drill Centres Construction and Operations Program EA are still accurate and valid, the commercial fisheries and *Species at Risk Act* (*SARA*) species information that was provided has also been updated to reflect the most current information (as obtained on March 15, 2012).

2.0 PROJECT DESCRIPTION

Development of the southern fault blocks will be completed using a combination of five production wells, located on the existing Hibernia Platform, supported by five corresponding down-dip subsea water injection wells.

The five subsea wells will be located in an excavated drill center (EDC) approximately 6.5 km to the southeast of the Platform. The equipment will be configured in a cluster arrangement with the five subsea wells positioned around a centrally located manifold and a separate subsea controls distribution unit (SDU). Drilling of each subsea well will be completed by a mobile offshore drilling unit (MODU). The EDC will be excavated to sufficient depth to protect the wells from the potential of iceberg scour. Injection wells, manifold, SDU, flying leads, pipeline jumpers, and well jumpers will be located in the EDC.

A large-bore 11 inch ID flexible pipeline will transport the injection water to the central manifold structure. Water will be distributed from the manifold to each well slot through 4 inch flexible well jumpers. High-pressure water to stimulate the injection wells will be transported via the subsea umbilical. The manifold will also distribute the stimulation service to each well slot; however, the stimulation service is applied to only one well at a time.

A steel-tube control and stimulation umbilical will link the Platform control system to the manifold and trees via a subsea umbilical termination assembly (UTA). The subsea control system utilizes an electro-hydraulic, multiplexed control architecture linking the Platform-based control equipment with the SDU. Flying leads will be installed between the SDU and subsea control modules (SCMs) on each tree.

The umbilical will also transport methanol for the following chemical services:

1) Bulk methanol (for well-bore hydrate management)

2) Annulus methanol (for well annulus pressure monitoring and management)

Due to on-bottom stability requirements for long-term operations, both the pipeline and umbilical will be rock-dumped to prevent lateral movement.

As the pipeline is exposed to iceberg scour risk, in-line weak-link systems will be installed at both the Hibernia Gravity-Based Structure (GBS) and EDC end of the pipeline.

The pipeline will access the Hibernia Platform via a flexible riser pulled into a single pre-existing J-tube (Figure 2.1). The umbilical will be pulled into a second J-tube at the Platform and laid in a continuous length to the EDC site. A UTA will be positioned outside the EDC and flying leads will be installed between the UTA and the SDU located in the EDC. A weak-link will also be incorporated into each end of the umbilical, one near the base of the GBS and the other at the UTA.

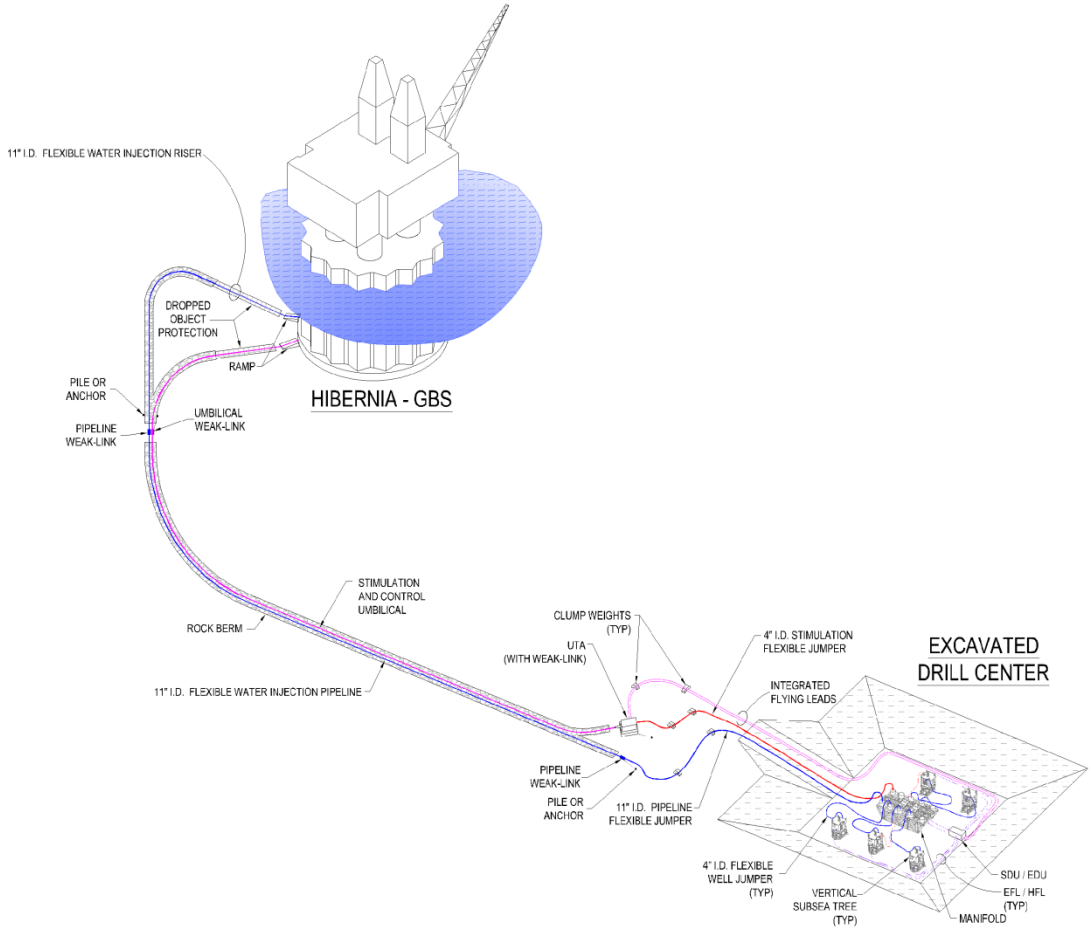


Figure 2.1 Hibernia Southern Extension Development

2.1 2012 Activity

The 2012 priority for HMDC is development of the HSE with an excavated drill center located just south of the Hibernia field in PL1005 (Figure 2.1). Drilling and subsea construction operations and tie-ins to the Hibernia GBS may then follow beginning in 2013.

The drill center will be excavated using proven construction methods for the Grand Banks. Subject to confirmation of soil conditions by a geotechnical survey, a trailing suction hopper dredge (TSHD) will be used to excavate the drill center. The contractor awarded this work scope will be Van Oord, and the TSHD vessel to be used will be the HAM 318. This type of dredge is a self-propelled ship that fills its hold or hopper during dredging while following a pre-set track. They are equipped with a single trailing suction pipes. Material is lifted through the trailing pipes

by one or more pumps as water-borne slurry and discharged into a hopper contained within the hull of the dredge. The HAM 318 lowers the suction pipe to within 10 m of the seabed. A heading parallel to the longest dimension of excavation is maintained, and at the start of the depression the suction head is lowered and the seabed excavated as the vessel moves forward. The suction head is lifted at the far end of the drill center. The number of passes required to excavate to any specific depth depends on the consistency of seabed material. Subsequent passes overlap to ensure layers are excavated correctly. Slopes at the edge of the depression are achieved by creating consecutive narrower cuts over the layer being removed. A graded feed-in ramp will be constructed to allow the pipelines and umbilical to enter the drill center. The solids settle into the hopper, and the clean surface water is gradually discharged over-board. When the hopper is full, the HAM 318 will travel to an approved soil relocation area and approach the center.

The primary method of application of dredge materials will be to place dredge spoils on the seabed by pumping through the discharge pipe on the port side of the vessel. The discharge pipe has a diameter of 1200 mm at a rate of 100-150 m^3/minutes. This method has the potential to significantly reduce the impact area of the soil relocation site as the sediment is discharged from a pipe 20 metres above the sea bottom. This method will allow the sediments to be directed and controlled to some degree compared to the traditional method of bottom dumping. The sidearm discharge pipe method for discharge requires 4-5 hours to discharge a hopper load of 27,293 m^3 of dredge spoils. If this method does not work due to sea states and/or mechanical or operational reasons, the dredged material will be deposited in the conventional way by opening the hold or “hopper” doors (bottom dumping) which would require 20 minutes to discharge the 27,293 m^3 of dredge spoils. The discharge pipe method should have an impact area smaller than the conventional methods.

The drill center will be excavated to a sufficient depth (approximately 10 m) to ensure protection of subsea equipment from iceberg impacts. Conceptually, the length and width are nominally 30 m and 30 m, respectively, but may be larger (up to a nominal size of 70 m x 70 m) if two manifolds are required. Estimated duration would be approximately 30 working days for 30 x 30 m, and 45 working days for 70 x 70 m drill center.

The estimated volume of material to be disposed at an approved disposal location from a single drill center (70 m x 70 m x 10 m), is 159,300 m^3. The dredging vessel hold is expected to be filled to capacity every second day. The initial drill center and disposal area locations are provided in Table 2.1 and illustrated in Figure 2.2.

Table 2.1 Drill Centre and Disposal Site Corner positions (UTM Zone 22, NAD 83 datum)

Location	Easting	Northing
Drill Center Centre	672020	5174100
SW corner – Disposal Site	674415	5178984
SE corner – Disposal Site	675415	5178984
NW corner – Disposal Site	674415	5179984
NE corner – Disposal Site	675415	5179984

As per Schedule 1, Part 1, Paragraph 3, Section 127 (1) of the *CEPA*, HMDC will submit an application for an Ocean Disposal Permit for the HSE EDC construction prior to commencement of work.

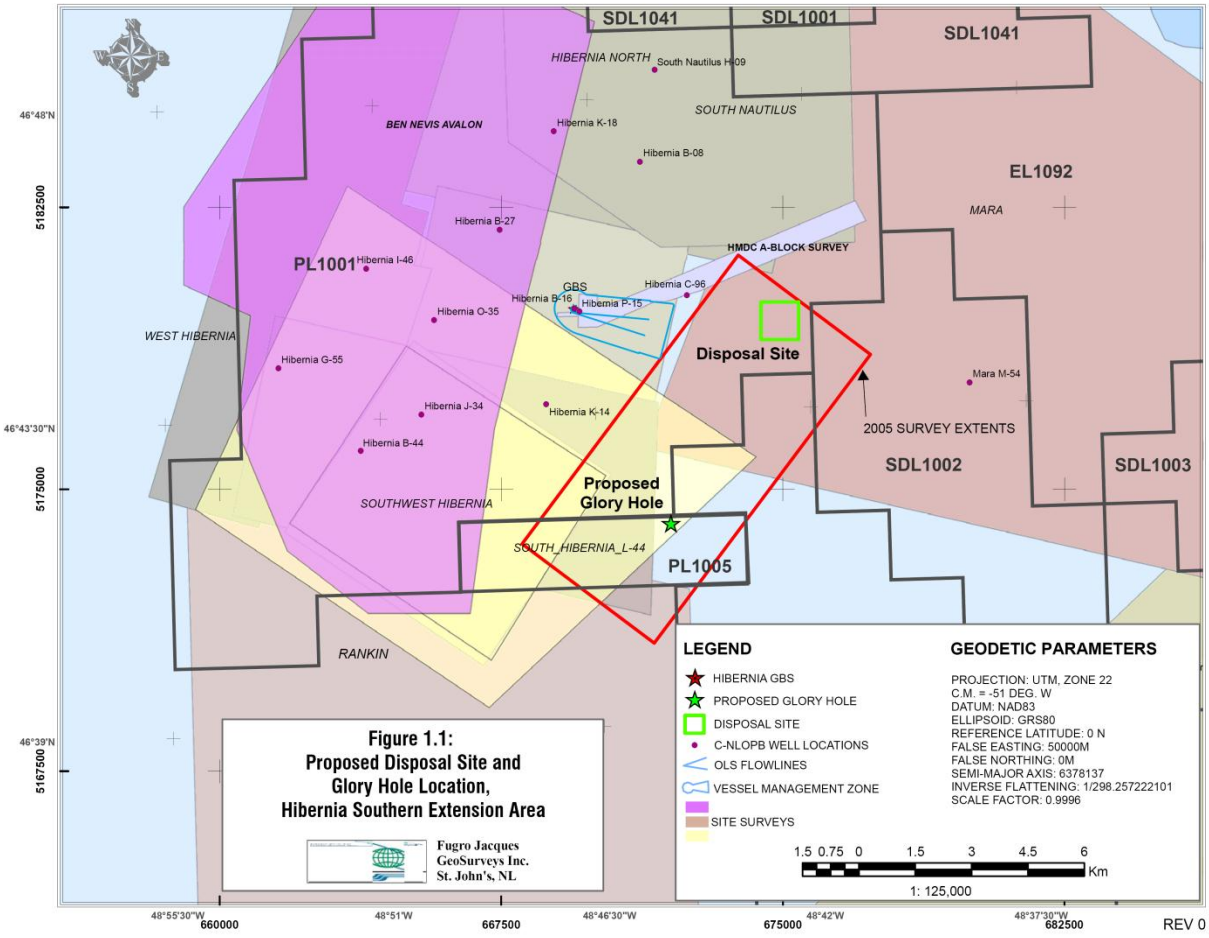


Figure 2.2 Ocean Disposal Location

2.2 Existing Habitat

The seabed within the area of the proposed HSE drill centre location consists of predominately gravel and cobble substrate with a discontinuous veneer of surficial sand (Figure 2.3). There are isolated seabed boulders possible.

The sediment of the proposed dredge spoil disposal location is comprised of predominantly sand substrates (66 percent) and areas that are predominantly gravel/cobbles/boulders with minor sand (34 percent of the disposal area) (E. Cumming, pers. comm.). Occasional iceberg scours and pits are evident in places approximately 1 m deep and 25 m to 50 m wide (Figure 2.4).

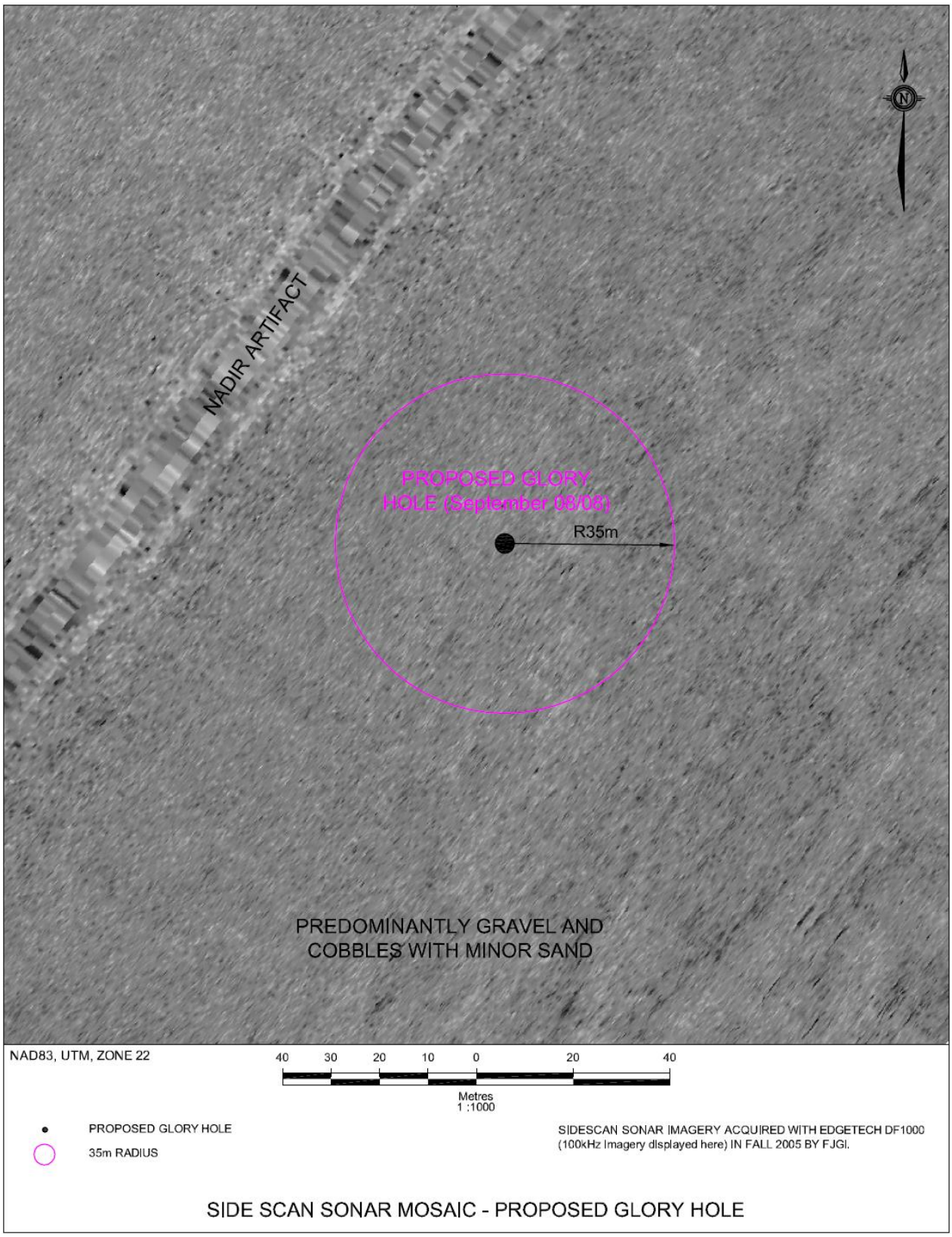


Figure 2.3 Excavated Drill Center Plan

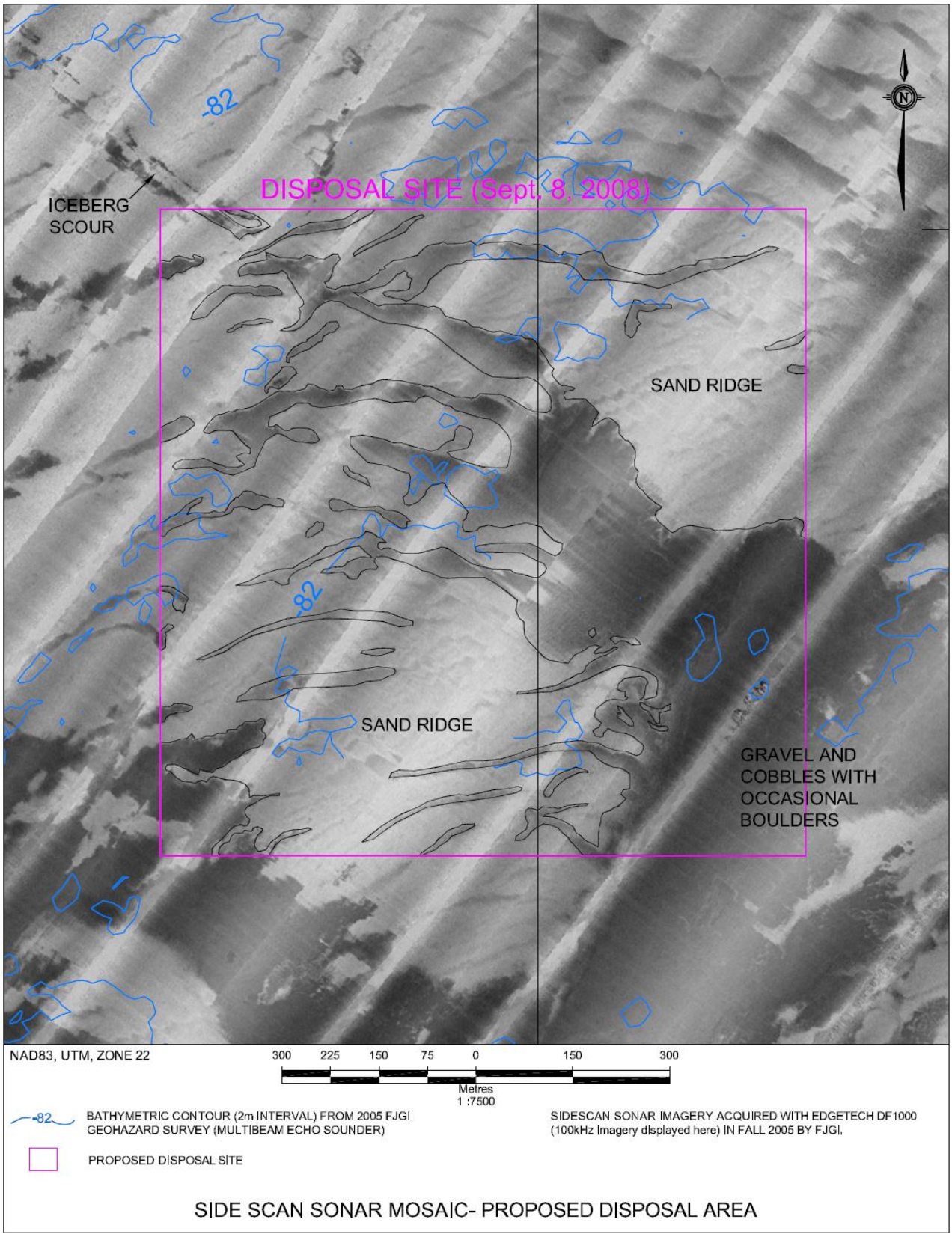


Figure 2.4 Disposal Site

2.3 Mitigations

The primary effect of this undertaking on the environment would relate to the relocation of materials to a newly established dredge disposal area and the excavation of the HSE centre. The release of the dredge materials and the excavation of the HSE drill centre have been determined by the Department of Fisheries and Oceans (DFO) to result in the harmful alteration, disruption or destruction (HADD) to fish habitat and as such will require a Section 35 (2) *Fisheries Act* Authorization. The release of the dredge material will be done in such a manner as to minimize the dredge disposal area. The dredge disposal area designated for the HSE excavated drill centre will be considered for re-use for disposal of any future excavated drill centre dredge spoils.

3.0 BIOLOGICAL ENVIRONMENT UPDATES

As noted in Section 1.0, in addition to updates to Section 2.1.3 of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009), the commercial fisheries and SARA species information has been updated to reflect the most current information (as of March 15, 2012). These updates are contained within Appendices A and B, respectively.

3.1 Commercial Fisheries

Fisheries activities within the Study Area remain very similar to that reported in the original EA. The key fishery for the Northwest Atlantic Fisheries Organization (NAFO) Unit area 3Lt is still snow crab (*Chioocetes opilio*). However, it should be noted that for 2008, 2009 and 2010, there were no snow crab catches (or any other species) from within the identified Study Area. Updates to section 4.2 (Commercial Fisheries) of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009) are provided in Appendix A. Commercial fisheries data for 2011 is currently not available for release. Based on DFO's response to a 2011 commercial data request, the 2011 commercial data will not be available for release until August-September 2012.

3.2 Species at Risk Updates

Since the 2009 Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009) and the 2011 EA Update (Stantec 2011), there have been three changes or additions to the list of species included under the *Species at Risk Act* (SARA) or the listings by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The white shark (*Carcharodon carcharias*) was assessed as endangered and included under Schedule 1 of SARA, Sowerby's beaked whale (*Mesoplodon bidens*) was upgraded from Schedule 3 to Schedule 1 of SARA and listed as a species of special concern, and the spiny dogfish (*Squalus acanthias*) was assessed as a species of special concern by COSEWIC.

None of the SARA/COSEWIC species updates have final recovery strategies, actions plans or associated critical habitat identified. None of the recovery or action plans that are available for the SARA species affect the mitigation measures committed to by HMDC in Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009).

Updates to section 4.5 of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009, Stantec 2011) are provided in Appendix B.

4.0 ENVIRONMENTAL EFFECTS ASSESSMENT

A review of the environmental effects assessment (Section 6.0) predictions and mitigations that were assessed as part of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009, Stantec 2011) was conducted as a result of updated commercial fisheries data and new SARA/COSEWIC species information. The proposed activities fall within the scope of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009) and the environmental effects predictions and significance determinations cited remain valid. The mitigations for the activities planned to be carried out under the scope assessed in the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009) are still appropriate and HMDC reaffirms its commitment to the mitigation measures cited in this assessment and the Screening Report (C-NLOPB 2009).

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APPENDIX A

Commercial Fisheries

A Commercial Fisheries

The following information is provided as an update to Section 4.2 (Commercial Fisheries) of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009). Updates are provided for Tables 4.1 and 4.3, as well as Figures 4.6 and 4.7. Data for 2011 have been requested but we have been advised that this data will not be available for release until August-September 2012.

Table A.1 Study Area Harvest (2005, 2006, 2007, 2008, 2009, and 2010)

Species	Weight In Tonnes						Total Weight	% of Total Weight
	2005	2006	2007	2008	2009	2010		
Snow/Queen Crab	4,311.70	4,218.60	3,514.95	12,535.03	11,060.54	11,707.26	47,348.08	30.55
Clams (sp)	2,711.82	4,813.70	159.17	136.51	39.57	289.02	8,149.79	5.26
Cockles	4,394.89	9,864.11	726.93	0.00	1,006.45	687.45	16,679.83	10.76
American Plaice	1,008.28	5.51	189.10	610.71	704.64	625.01	3,143.25	2.03
Yellowtail	10,666.16	176.09	2,053.03	7,961.92	3,149.79	4,537.60	28,544.59	18.42
Turbot	540.26	290.44	477.02	485.84	968.47	932.46	3,694.49	2.38
Grenadier	39.57	18.87	5.42	0.16	4.60	7.41	76.03	0.05
Northern Shrimp	1,723.66	4,667.12	4,013.77	10,821.10	14,546.48	9,097.49	44,869.62	28.95
Other Ground Fish	220.52	3.60	68.38	726.92	764.15	145.17	1,928.74	1.24
Tuna (sp)	7.05	0.00	0.00	0.00	3.33	0.0	10.38	0.01
Swordfish	9.08	0.00	0.00	0.00	0.00	0.0	9.08	0.01
Shark/Skate (sp)	2.44	2.60	0.88	12.68	25.58	1.55	45.73	0.03
Iceland Scallop	123.22	346.08	0.00	0.00	0.00	0.0	469.3	0.30
Total Harvest in Study Area							154,968.9	**100.00**

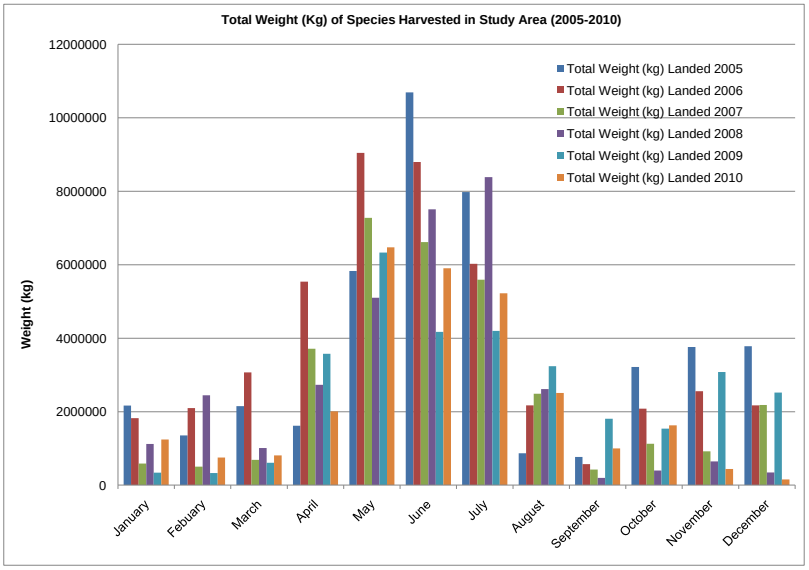
Update to Table 4.1 (Jacques Whitford 2009)

Table A.2 3Lt and Project Area Harvest Summary (2005 to 2010)

Area	Species	Weight In Tonnes						Total	Percent of Total
		2005	2006	2007	2008	2009	2010		
3Lt Excluding Project Area	Snow/Queen Crab	2,503.19	2,868.84	2,826.33	1,771.7	1,783.9	1,895.5	13,649.45	99.1
	Stimpson's Surf Clams	0.00	84.73	0.00	0.00	0.00	0.0	84.73	0.7
	Cockles	0.00	18.21	0.00	0.00	0.00	0.0	18.21	0.1
	Total Harvest in 3Lt Excluding Project Area							**13,752.39**	
Project Area	Snow/Queen Crab	9.16	6.02	0.00	0.00	0.00	0.0	15.18	0.1
	Total Harvest in Project Area							**15.18**	
3Lt + Project Area	Total Harvest in Project Area and 3Lt							**13,767.57**	100.00

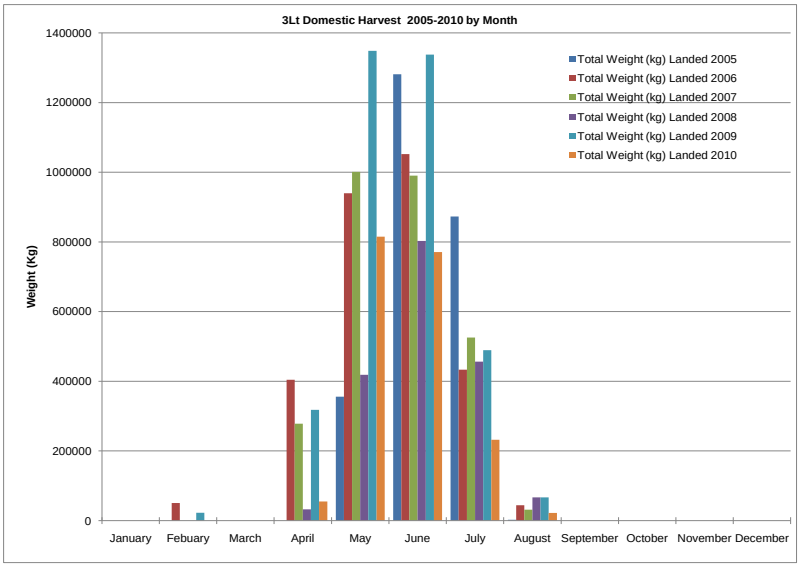
Update to Table 4.3 (Jacques Whitford 2009)

Figure A.1 Temporal Distribution of All Species Harvesting within the Study Area



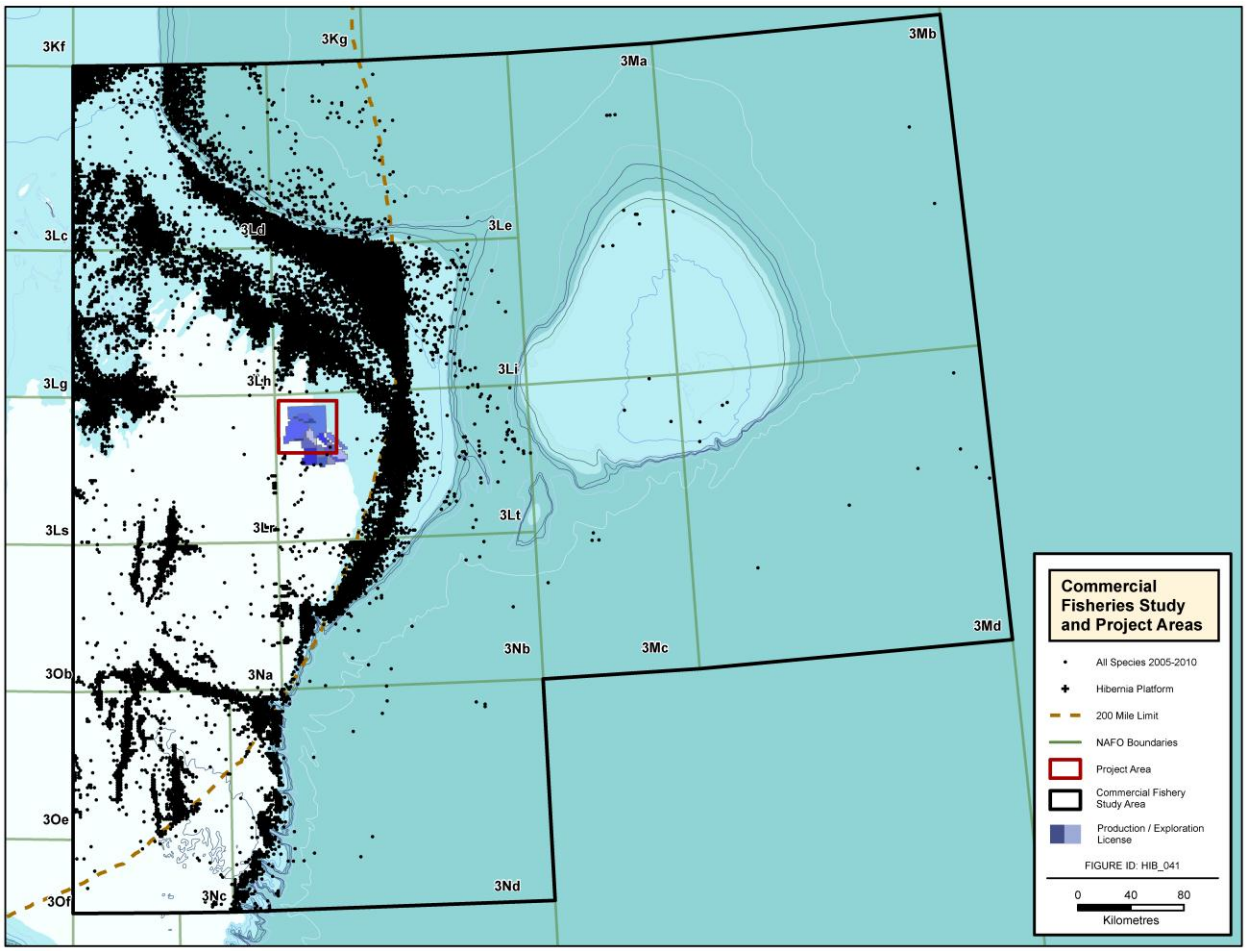
Update to Figure 4.6 (Jacques Whitford 2009)

Figure A.2 Temporal Distribution of All Species Harvesting within 3Lt



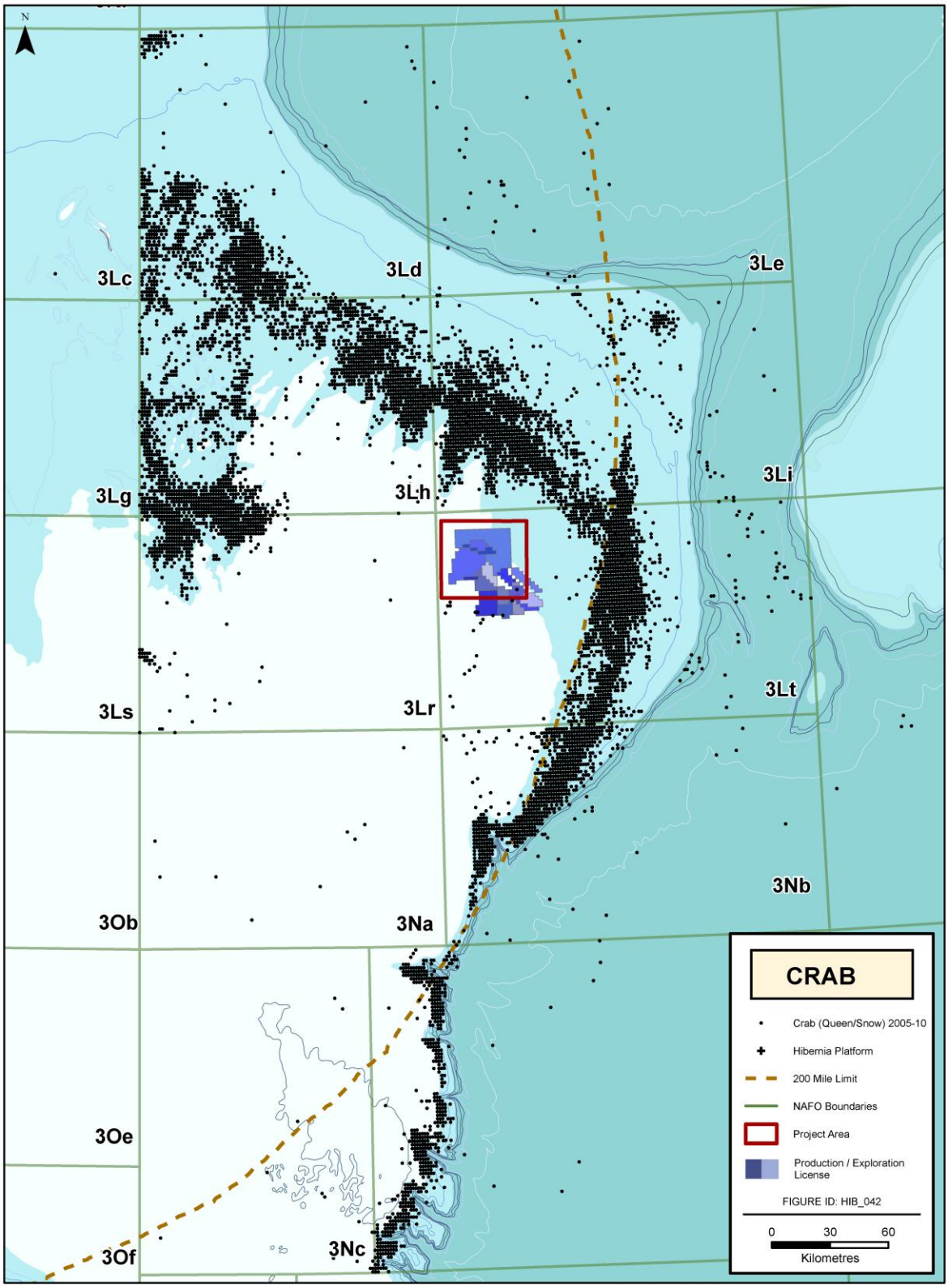
Update to Figure 4.7 (Jacques Whitford 2009)

Figure A.3 Study Area Commercial Fisheries all Species (2005 to 2010)



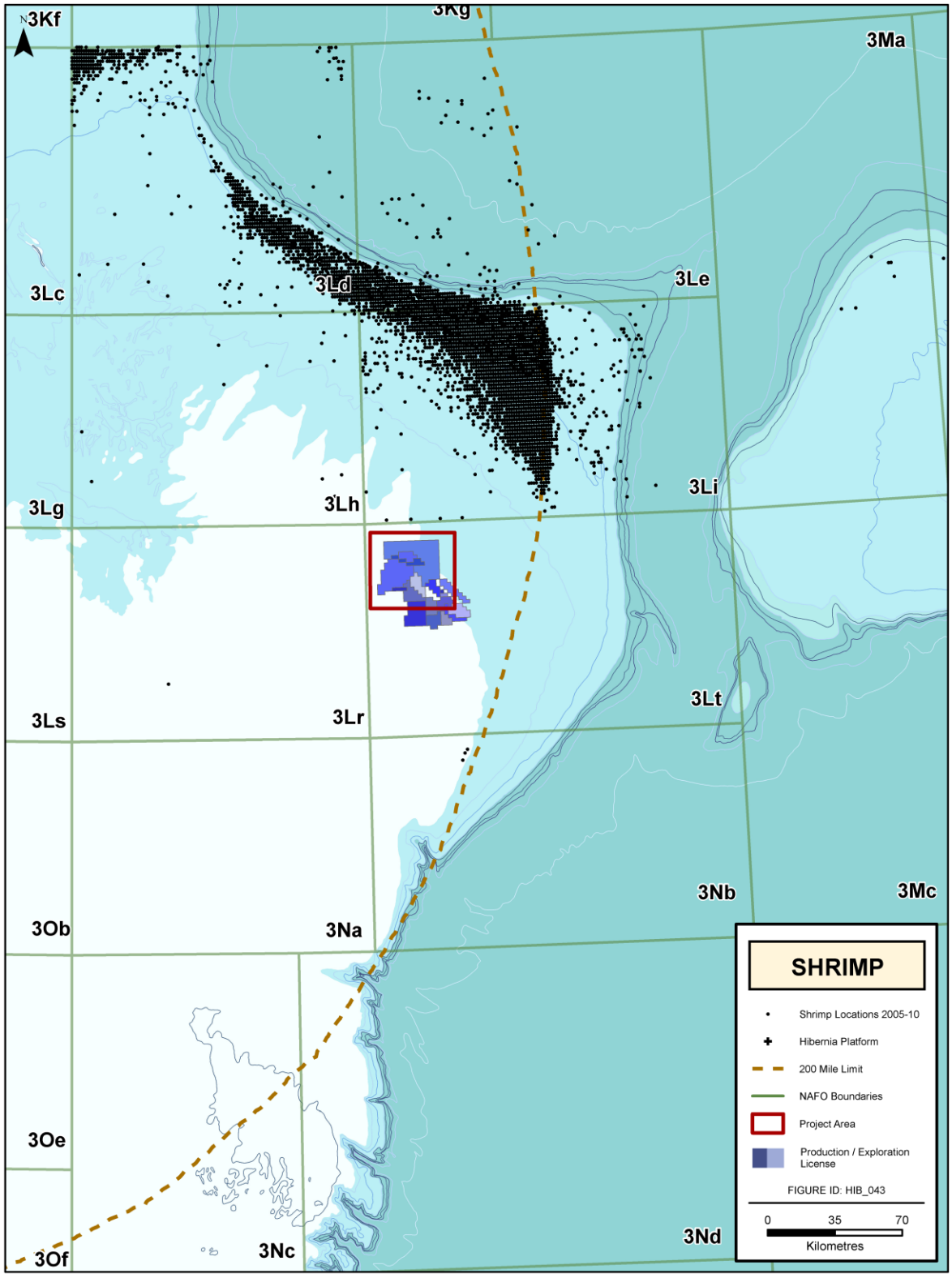
Update to Figure 4.8 (Jacques Whitford 2009)

Figure A.4 Snow Crab Harvesting Locations (2005 to 2010)



Update to Figure 4.9 (Jacques Whitford 2009)

Figure A.5 Northern Shrimp Harvesting Locations (2005 to 2010)



Update to Figure 4.10 (Jacques Whitford 2009)

APPENDIX B

SARA Species

B Species at Risk

The following information (Table B.1) is provided as an update to Section 4.5 of the Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009). The information contained within this section is current as of March 14, 2012. Table B.1 is an updated Table 4.10 (Jacques Whitford 2009) and has an additional three species that have either had a change to their *SARA* status or COSEWIC designation. Sowerby's beaked whale was designated of special concern under Schedule 1 (previously listed under Schedule 3), the white shark was added to *SARA* and designated as endangered under Schedule 1, and the spiny dogfish was listed by COSEWIC as a species of special concern. A brief description of each of the added species is provided below Table B.1.

Table B.1 Occurrence of Species at Risk within the Study Area

SPECIES		SARA Status	COSEWIC Status	Occurrence in the Study Area
Common Name	**Scientific Name**			
Birds				
Ivory Gull	*Pagophila eburnea*	Schedule 1 – Special Concern	Endangered	May occur but area is not known to be critical habitat for the species. Most likely to occur at edge of pack ice in winter
Marine Mammals				
Blue Whale (Atlantic population)	*Balenoptera musculus*	Schedule 1 - Endangered	Endangered	Occurs but area is not known to be critical habitat for the species. May migrate through area while foraging for krill during spring, summer, and fall.
North Atlantic Right Whale	*Eubalaena glacialis*	Schedule 1 - Endangered	Endangered	Occurs but area is not known to be critical habitat for the species. Rare species, occurs very occasionally.
Fin Whale	*Balenoptera physalus*	Schedule 1 – Special Concern	Special Concern	Occurs but area is not known to be critical habitat for the species. Concentrates in the Northwest Atlantic region during summer months feeding along oceanic fronts
Sowerby's Beaked Whale	*Mesoplodon bidens*	Schedule 1– Special Concern	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species. The distribution of this species is not well understood.
Harbour Porpoise	*Phocoena phocoena*	Schedule 2 – Threatened	Special Concern	Occurs but area is not known to be critical habitat for the species. More common in coastal areas; able to move rapidly to follow prey.

SPECIES		SARA Status	COSEWIC Status	Occurrence in the Study Area
Common Name	**Scientific Name**			
Killer Whale	*Orcinus orca*	No Schedule – No Status	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species
Northern Bottlenose Whale (Davis Strait-Baffin Bay-Labrador Sea	*Hyperoodon ampullatus*	No Schedule – No Status	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species. Deep water species, little is known about the distribution of this beaked whale.
Fish				
White Shark	*Carcharodon carcharias*	Schedule 1– Endangered	Endangered	Not likely to occur. Rare in Canadian waters (32 records in 132 years). Most records are located within the Bay of Fundy. Extremely rare as far north as Grand Banks.
Northern Wolffish	*Anarhichas denticulatus*	Schedule 1 - Threatened	Threatened	Occurs but area is not known to be critical habitat for the species. Most commonly found over the continental shelf at depths of 500 to 1,000 m. Only common in northeastern Newfoundland and Labrador and Flemish Cap, occurs occasionally on the Grand Banks
Spotted Wolffish	*Anarhichas minor*	Schedule 1 - Threatened	Threatened	Occurs but area is not known to be critical habitat for the species. Most commonly found in water depths of 200 to 750 m. Distribution is most concentrated in the deep shelf area off northeastern Newfoundland and Labrador
Atlantic Wolffish	*Anarhichas lupus*	Schedule 1 – Special Concern	Special Concern	Occurs but area is not known to be critical habitat for the species. Most commonly found inhabiting the seafloor in water depths from shallow to 500 m, but appears to prefer 100 to 150 m depth. Widely distributed in Atlantic Canada. Most abundant in northeastern Newfoundland Labrador, Flemish Cap and southern Grand Bank

SPECIES		SARA Status	COSEWIC Status	Occurrence in the Study Area
Common Name	**Scientific Name**			
Atlantic Cod (NL Pop)	*Gadus morhua*	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species. Atlantic cod from this population inhabit waters from the northern tip of Labrador to the Southern Grand Banks
Roundnose Grenadier	*Coryphaenoides rupestris*	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Porbeagle Shark	*Lamna nasus*	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Atlantic Bluefin Tuna	*Thunnus thynnus*	No Schedule – No Status	Endangered	May occur in small numbers but area is not known to be critical habitat for the species. May migrate through the Grand Banks following food stocks in July through December.
American Plaice (NL Pop)	*Hippoglossoides platessoides*	No Schedule – No Status	Threatened	Occurs but area is not known to be critical habitat for the species. Associated with seafloor, and commonly at depths of 100 to 200 m in soft sediment habitat.
Shortfin Mako	*Isurus oxyrinchus*	No Schedule – No Status	Threatened	Occurs rarely, pelagic species that migrates following food stocks (mackerel, herring, tuna).
Cusk	*Brosme brosme*	No Schedule – No Status	Threatened	Not likely to occur. Rare along the continental shelf off Newfoundland and Labrador
Deepwater Redfish (northern population)	*Sebastes mentella*	No Status	Threatened	Occurs but area is not known to be critical habitat for the species. Closely associated with the seafloor, commonly found inhabiting waters 350 to 500 m in depth from the Grand Banks to northern Labrador
Acadian Redfish (Atlantic population)	*Sebastes fasciatus*	No Status	Threatened	May occur in small numbers but area is not known to be critical habitat for the species. Benthic, occurs at 150 to 300 m. Most common in area from May to September; spawns in fall.
Atlantic Salmon (South NL pop)	*Salmo salar*	No Schedule – No Status	Threatened	May occur in small numbers. Juvenile Atlantic salmon may migrate from freshwaters streams to the North Atlantic and occur on Grand Banks

SPECIES		SARA Status	COSEWIC Status	Occurrence in the Study Area
Common Name	**Scientific Name**			
Roughhead Grenadier	*Macrourus berglax*	No Schedule – No Status	Special Concern	Occurs but area is not known to be critical habitat for the species
Basking Shark	*Cetorhinus maximus*	No Schedule – No Status	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species. Found in offshore waters and coastal waters of Newfoundland, concentrated between Port aux Basques and Hermitage. May be present feeding on plankton from May to September
Spiny Dogfish (Atlantic population)	*Squalus acanthias*	No Schedule – No Status	Special Concern	Occurs but area is not known to be critical habitat for the species. Commonly found from the intertidal zone to the continental slope in water depths up to 730 m. Most abundant between Nova Scotia and Cape Hattaras, North Carolina
Reptiles				
Leatherback Turtle	*Dermochelys coriacea*	Schedule 1 - Endangered	Endangered	Occurs but area is not known to be critical habitat for the species. Forages in Northwest Atlantic during summer months
Loggerhead Sea Turtle	*Caretta caretta*	No Status	Endangered	Occurs but area is not known to be critical habitat for the species. Low potential for occurrence but may be observed in summer months.

Update to Table 4.10 (Jacques Whitford 2009)

B.1 Fish

The following fish have been added to Section 4.5.1 of Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009).

White shark

The white shark (*Carcharodon carcharias*), Atlantic population, was recently listed as endangered under Schedule 1 of *SARA* (SARA Registry 2011). This species is a large, apex predator that is globally distributed and occurs in both temperate and sub-tropical waters. It occurs from the nearshore to as deep as 1,280 m, and is most common over the continental shelf (COSEWIC 2006). White sharks are highly mobile and undertake extensive migrations that have only recently been fully realized by using satellite tagging technologies (Bonfil et al. 2005, Weng et al. 2007). This species is considered rare throughout its range, and has been rarely sighted in Atlantic Canada (32 records over 132 years). Many of these sightings occur in summer, including in the Bay of Fundy, coastal Nova Scotia, northeastern Newfoundland Shelf,

Strait of Belle Isle, St. Pierre Bank and Laurentian Channel, suggesting Newfoundland and the Gulf of St. Lawrence are on the northern fringe of its range (COSEWIC 2006).

As the species is rare and data limited, there is little known about trends in abundance over time. However, in other areas of the Northwest Atlantic, the species is estimated to have declined by 59 to 89 percent between 1986 and 2000 (less than one generation). This species is long-lived and has low reproductive rates, and consequently it is unable to withstand increases in mortality rates. Bycatch in pelagic longline fisheries (particularly the southern US) is considered to be primary threat to the Atlantic population (average of more than 400 captures annually between 1986 and 2000) (DFO 2006).

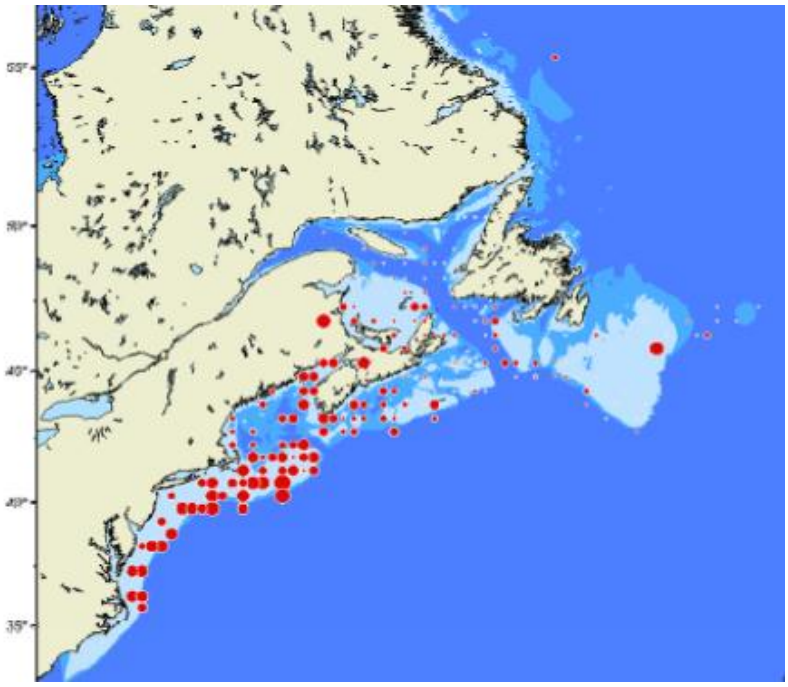
The white shark is extremely rare as far north as the Grand Banks and has a low likelihood of occurring in Project Area.

Spiny Dogfish

The spiny dogfish (*Squalus acanthias*), Atlantic population, was recently assessed as special concern by COSEWIC (2010), but is not yet listed under *SARA*. This small shark is widely distributed over the continental shelf of temperate and boreal regions, preferring waters 5 ^{o}C to 15^{o}C. The Atlantic population extends from Labrador to Cape Hatteras. The population remains relatively abundant in Canadian waters, and is most abundant in southwest Nova Scotia (COSEWIC 2010) with areas of concentration around Newfoundland and Labrador as well (Figure B.1).

Like other elasmobranchs, dogfish are vulnerable to increased rates of mortality as it has an extremely long gestation period (18 to 24 months), long generation time (23 years), and low fecundity (average of six pups every two years), and is vulnerable to exploitation. Additionally, there is uncertainty about long-term trends in abundance, and particularly the abundance of mature females. This population is known to be broken into several well-defined ‘groups’, with concentrations in the southern Gulf of St. Lawrence, around Newfoundland, on the eastern and central Scotian Shelf, the Bay of Fundy, an southwest Nova Scotia, as well as in Massachusetts and North Carolina. These groups undertake seasonal migrations and it is not well understood how much mixing of these groups occurs. The distribution of spiny dogfish distributions is patchy. Dogfish can form dense aggregations, causing high variability in survey indices. The absence of young juveniles, as well as high variability in abundance estimates from surveys suggests that the early life history stages (pupping and juveniles) occur elsewhere.

Spiny dogfish are threatened by overfishing, as well as high discard rates. Large, sexually mature females are often targeted in commercial fisheries (COSEWIC 2010). Historically, the species has been caught for varied purposes including for its meat, for use as fertilizer, vitamins, fishmeal, and in the shark fin trade, as well as killed for being a ‘pest’ in commercial fisheries.



Source: Brown et al. 1996

Figure B.1 Distribution of Spiny Dogfish in the Northwest Atlantic based on Canadian and US Research Surveys from 1975 to 1994

B.2 Marine Mammals

The following marine mammals have been added to Section 4.5.2 of Hibernia Drill Centres Construction and Operations Program EA (Jacques Whitford 2009).

Sowerby's beaked whale

Sowerby's beaked whale (*Mesoplodon bidens*) was previously included in the assessment (Stantec 2011) but it should be noted it was recently upgraded from Schedule 3 of SARA to Schedule 1 and is listed as Special Concern. This means the species is now officially protected by the federal government and that a Recovery Strategy is required. The Sowerby's beaked whale was previously described in the 2011 assessment review.