Amendment to the Environmental Assessment of HMDC's 2D/3D/4D Seismic Projects, 2013-Life of Field

Prepared by

LGL LIMITED
environmental research associates

for

Hibernia

September 2015
LGL Project No. SA1207

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1.0 Introduction

This document serves as an Amendment to the Environmental Assessment (EA) prepared by LGL Limited (LGL) for Hibernia Management and Development Company Ltd.'s (HMDC) 2D/3D/4D Seismic Projects, 2013 - Life of Field in the Newfoundland offshore (LGL 2015; submitted to Canada-Newfoundland and Labrador Offshore Petroleum Board in February 2015). The revised EA (LGL 2015)[1] assessed the potential effects of 2D, 3D and 4D seismic survey activities within the defined Project/Study Area on the following Valued Environmental Components (VECs).

- Fish and fish habitat;
- Commercial fisheries;
- Seabirds;
- Marine mammals and sea turtles;
- Species at risk; and
- Potentially sensitive areas.

This Amendment assesses the potential effects of operating a sound velocity profiler on the VECs indicated above. A sound velocity sensor will be installed on a Remotely Operated Towed Vehicle (ROTV), which will be deployed from either the picket vessel or supply vessel that is supporting the seismic vessel. Further details on sound velocity profilers are provided in Section 2.2.

The Project/Study Area associated with this Project is shown in Figure 1.1.

1.1 The Operator

Headquartered in St. John's, Newfoundland and Labrador (NL), HMDC was the first company to be involved in offshore oil production on the Grand Banks. HMDC is the management and operating company under Production Licenses (PL) for 1001 and 1005. Most recent estimates of recoverable reserves for the Hibernia field are provided on the C-NLOPB website at http://www.cnlopb.nl.ca/pdfs/estrr_hib.pdf. Information on HMDC's commitment to Health, Safety and Environment (HSE) is provided on the company's website (http://www.hibernia.ca/she.html), some of which reads: "The principles of environmental responsibility and stewardship are integrated throughout the Hibernia organization and are reflected in every action and initiative. HMDC recognizes that environmental objectives, based on relevant scientific and socio-economic data, are best achieved by defining specific goals and developing appropriate standards through government consultation. Input from local communities is also essential in order to strike a balance between environmental needs and the technical and socio-economic demands of the project."

[1] The original EA dated May 2013 (LGL 2013a) had two addenda (LGL 2013b,c), changes to the Project Description dated July 2014 (LGL 2014), and associated HMDC responses to regulator comments. These documents are available on the C-NLOPB website (http://www.cnlopb.ca/assessments/).

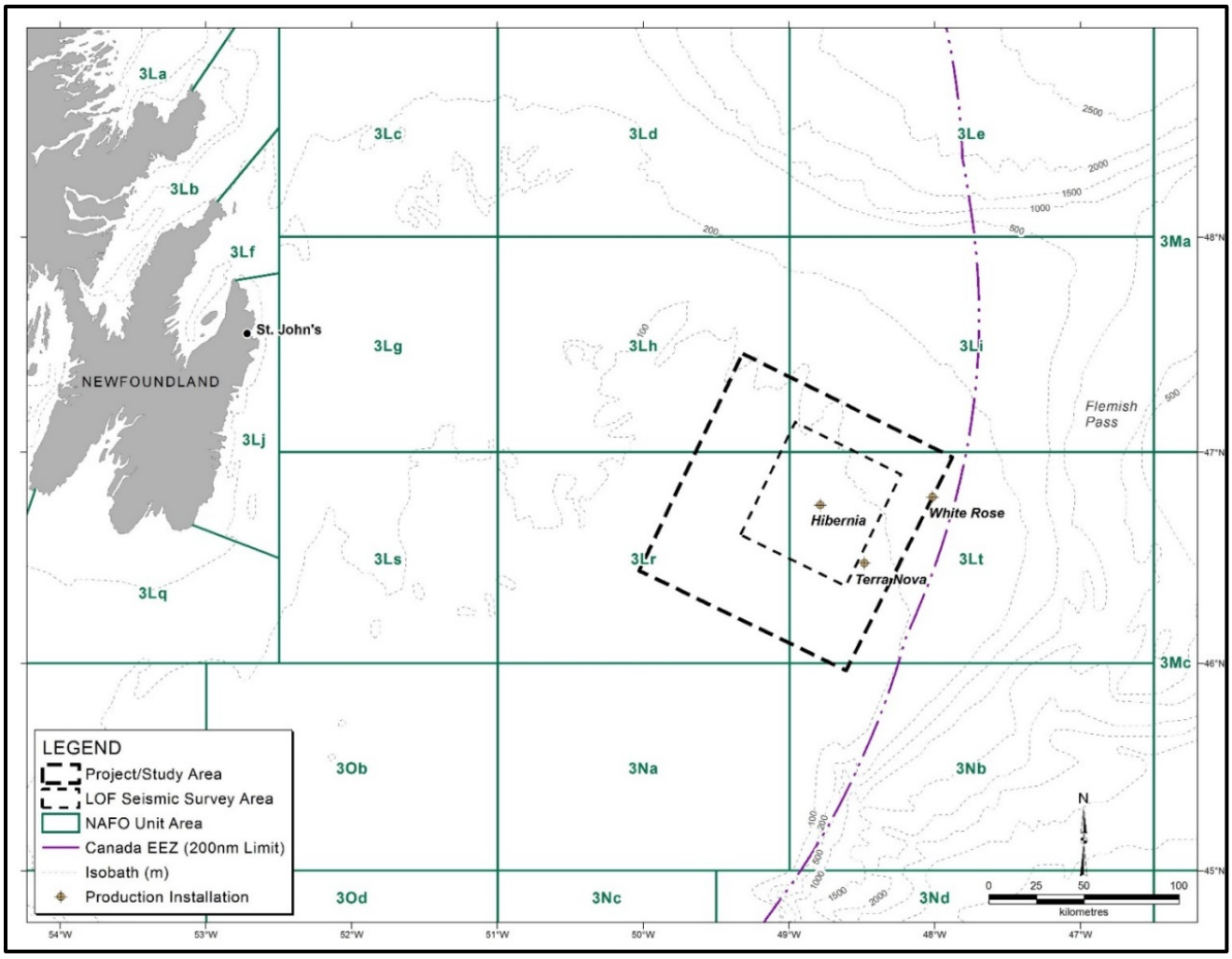

Figure 1.1 HMDC Project/Study Area and Life of Field (LOF) Seismic Survey Area (also shown are the NAFO Unit Areas).

In keeping with its commitment to community involvement, Hibernia continues to work closely with representatives of the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) and fishers and fish processors that represent Newfoundland and Labrador and Maritimes fishing interests on the Grand Banks.

1.2 Contacts

Relevant contacts at HMDC for this Amendment are provided below.

1.2.1 Executive Contact

Ms. Jennifer Walck
HMDC President
Jennifer.m.walck@exxonmobil.com
(709) 778-7000 (Telephone)

1.2.2 Health, Environment & Safety Contact

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1.2.3 Geophysical Operations Contact

Inquiries regarding geophysical operations should be directed to Ms. Jennifer Walck (as above).

2.0 Project Description

The official name of the Project is the 2D/3D/4D Seismic Projects, (2013-Remaining Life of Field) Newfoundland Offshore Area. The Project is located in an offshore area about 255 km east-southeast of St. John's, Newfoundland and Labrador (see Figure 1.1).

2.1 Spatial and Temporal Boundaries

The spatial boundaries of the Project/Study Area and the LOF Seismic Survey Area are shown in Figure 1.1.

Typically, the Project Area is defined as the area within which all routine project activities occur, including deployment and operation of the sound velocity profiler (see Figure 1.1). The Study Area is defined as the area within which any potential effects of the Project on the VECs, based on the scientific literature, could occur. The Study Area is the same as the "Affected Area" as originally defined by *CEAA*. Note that for this Project, the Study Area and the Project Area share the same boundary.

The LOF Seismic Survey Area within the Project/Study Area is defined as the area within which the seismic sound source arrays may be active (for data acquisition and survey).

The temporal boundaries include Life of Field wherein surveys may occur anytime between 1 May and 31 December.

2.2 Sound Velocity Profiling

Sound velocity profiling is routinely conducted during seismic surveying. The data collected during the profiles allow for more accurate interpretation of the seismic data. During the Project, sound velocity profiling will be conducted only within the Life of Field Seismic Survey Area (see Figure 1.1). A calibrated sound velocity sensor will be installed on a ROTV, which is typically about 0.90 m long, 0.26 m high and 1.80 m wide. The ROTV will be towed 60-70 m astern of either a picket vessel or a supply vessel, oscillating between surface and a 30 m depth during sound velocity profiling.

A typical sound velocity sensor operates at about 4 MHz, sending up to 25 sound pulses per second. The pulse is highly directional and the minimal amount of sound that does propagate beyond the sensor attenuates very quickly. The ROTV/sound velocity sensor will be deployed from either a picket vessel or a supply vessel when it is not performing primary duties and the weather is suitable. The sound velocity sensor will be deployed for long periods of time and will operate continuously when possible. The operation of the sound velocity sensor will be documented in the weekly reports submitted to the C-NLOPB.

3.0 Potential Effects of the Sound Velocity Sensor Acoustic Emissions and ROTV Presence on the Environment

The sound emitted by a sound velocity sensor will have a frequency of about 4 MHz and will therefore be undetectable by marine biota. The currently known maximum detectable frequencies for the marine biota groups in the Study Area that are most susceptible to the effects of exposure to underwater sound are 180 kHz (0.18 MHz) for fishes (see Section 5.6.1.1 of LGL 2015), 160 kHz (i.e., 0.16 MHz) for marine mammals (see Section 5.6.4.1 of LGL 2015), and 1.6 kHz (0.0016 MHz) for sea turtles (see Section 5.6.4.1 of LGL 2015). Recent studies of the behavioural responses of Atlantic herring (*Clupea harengus*) to sonar signals with frequencies ranging between 1 and 7 kHz indicate minimal responses to the sound (Doksaeter et al. 2009, 2012; Sivle et al. 2012). Atlantic herring and a limited number of other fish species appear to be able to detect higher frequencies than most other fishes. It is unlikely that biota with the capability of hearing higher frequency sound (e.g., toothed whales) will be affected by sound velocity sensor acoustic emissions with a frequency well beyond the known upper hearing limits of marine biota. Seabirds are less of an issue with respect to effects of exposure to underwater sound. However, birds as a group are most sensitive to sounds within the 1-4 kHz frequency range. Although they can hear sounds with frequencies outside of that range, no species of bird has yet exhibited sensitivity to ultrasonic frequencies (i.e., >20 kHz) (Beason 2004), well below the frequency of the sound that will be emitted by sound velocity sensor. Based on the sound detection capabilities of the various biota groups discussed above, the sound emitted by the sound velocity sensor will also be

outside of the detectable frequency ranges of species at risk. In addition to being characterized by frequencies well above those detectable by marine biota, the minimal amount of sensor sound that will propagate beyond the sensor will attenuate very quickly due to its ultrasonic frequency.

The physical presence of the ROTV will also have negligible effect on the VECs. A key role of a picket vessel, which would most likely tow the ROTV, is to minimize the potential for conflict between fishing gear and seismic operations. The presence of the ROTV will not interfere with the primary duties of either a picket vessel or a supply vessel. In addition, none of the fixed stations of the DFO-Industry Post-season Snow Crab Survey occur within the LOF Seismic Survey Area (see Figure 4.16 of LGL 2015). The closest station is located about 10 km from this area. Considering the EA predicted that the potential residual effects of the physical presence of the seismic vessels and equipment on the VECs will be *not significant* (see Section 5.6.2.2 of LGL 2015), it is justified to predict that the physical presence of the ROTV will not adversely affect the various VECs.

In summary, the residual effects of the sound velocity sensor pulse emissions and the physical presence of the ROTV are predicted to be *negligible* in magnitude for a duration of *<1* to *1-12 months* over an area of *<1 km*^{2}. Based on these criteria ratings, the *reversible* residual effects of the sound velocity sensor acoustic emissions and the presence of the ROTV on all VECs are predicted to be *not significant.* The level of confidence associated with this prediction is *high*.

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