Project Description:

Multiklient Invest Newfoundland Offshore Seismic and Environmental Data Collection Program, 2025–2029

Prepared by

Prepared for

Multiklient Invest AS

September 2024
LGL Project No. FA0310

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Multiklient Invest Newfoundland Offshore Seismic and Environmental Data Collection Program, 2025–2029

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1.0 Introduction

Multiklient Invest AS (MKI) is proposing to conduct two-dimensional (2D), three-dimensional (3D), and/or four-dimensional (4D) seismic surveys offshore Newfoundland. In addition, MKI is proposing to collect environmental data (meteorological, oceanographic) via moored instrumentation. MKI is proposing to conduct seismic surveys and collect environmental data during one or more years within the 2025–2029 timeframe. This document is the Project Description (PD), the first step in the Canada-Newfoundland and Labrador Offshore Petroleum Board's (C-NLOPB) environmental assessment (EA) process. This PD, combined with the technical and scoping advice received from the C-NLOPB, other federal agencies, and stakeholders consulted by MKI, will guide the preparation of an EA. The Project Area is identified in Figure 1.1.

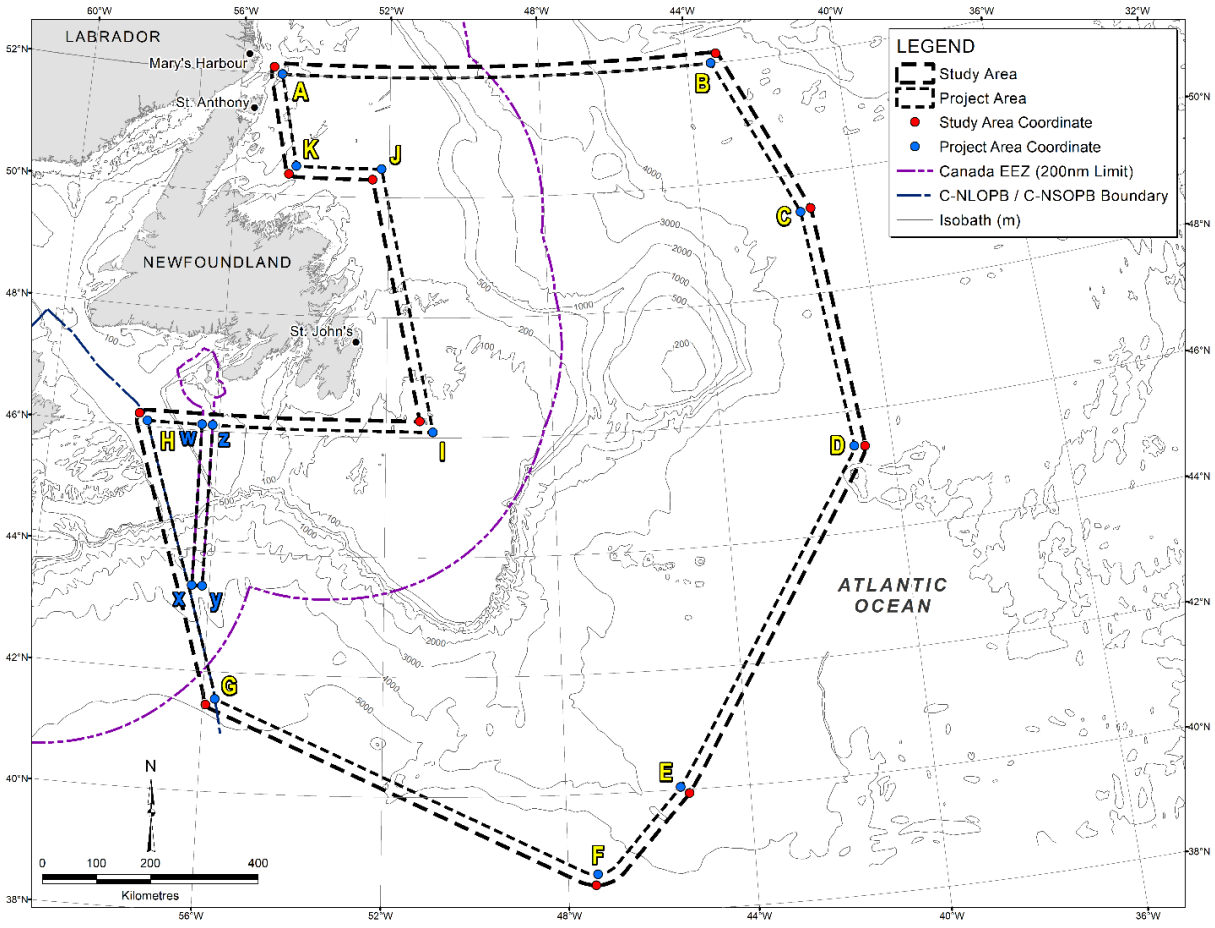

Figure 1.1. Locations of Project Area and Study Area for MKI's proposed offshore Newfoundland seismic and environmental data collection program, 2025–2029.

1.1 Relevant Legislation and Regulatory Approvals

An Authorization to Conduct a Geophysical Program will be required from the C-NLOPB. The C-NLOPB is mandated in this matter by the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* (Section 138(1)(b)) and the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act* (Section 134(1)(b)).

Other legislation that is relevant to the environmental aspects of this Project is as follows:

- *Species at Risk Act* (SARA)
- *Oceans Act*
- *Fisheries Act*
- *Navigable Waters Protection Act*
- *Canada Shipping Act*
- *Migratory Birds Convention Act*

One of the specific guidelines issued by the C-NLOPB, the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2019), is directly relevant to the proposed undertaking.

1.2 The Operator

The Operator, MKI, is a wholly owned subsidiary of TGS. TGS and PGS officially merged on 1 July 2024 and the combined company has retained the TGS name.

1.3 Canada-Newfoundland and Labrador Benefits

In full appreciation of the requirements of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland Labrador Act* and the *Canada-Newfoundland Atlantic Accord Implementation Act*, MKI are committed to providing maximum benefits associated with East Coast operations to Canadians, and in particular, to Newfoundland and Labrador individuals and companies where they are commercially competitive in accordance with MKI's requirements.

MKI will manage the seismic and environmental data collection operations from St. John's, Newfoundland and Labrador. MKI agrees that first consideration will be given to personnel, support and other services that can be provided from within Newfoundland and Labrador, and to goods manufactured in Newfoundland and Labrador as long as the goods and services can be delivered at a high standard of Health, Safety and Environmental competency, are of high quality, and are competitive in terms of fair market price. All contractors and subcontractors working for MKI in Newfoundland and Labrador must also apply these principles in their operations.

1.4 Contacts

Contact information for MKI personnel overseeing the Project is provided below (Table 1.1).

Table 1.1. MKI contact information.

Name	Position	Address	Company	Phone	Email
Executive Contact					
Mr. Jason Norman	Project Manager	10451 Clay Road Houston, Texas 77041	TGS	1-709-749-6046	Jason.Norman@tgs.com
Mr. Steve Whidden	Project Development Manager, Offshore North America Arctic	2100, 250-5th Street S.W. Calgary, Alberta T2P 0R4	TGS	1-403-852-6115	Steve.Whidden@tgs.com
Environment Contact					
Mr. Chris Wilkes	Senior Director, HSE	10451 Clay Road Houston, Texas 77041	TGS	1-832-217-8875	Chris.Wilkes@tgs.com

2.0 Project Description

The official name of the Project is Multiklient Invest Newfoundland Offshore Seismic and Environmental Data Collection Program, 2025–2029. MKI is proposing to conduct 2D, 3D and/or 4D seismic surveys within its proposed Project Area (see Figure 1.1) between 2025 and 2029, starting as early as May 2025. The EA will consider a maximum of four simultaneous seismic surveys within a given year: three 3D/4D surveys and one 2D survey. However, in most survey years, there would typically be no more than two simultaneous seismic surveys. The timing of the seismic surveys is subject to MKI priorities and circumstances, weather conditions, contractor availability, and regulatory approvals.

MKI is proposing to deploy one or more Floating Lidar Systems (FLS) buoys to acquire meteorological and oceanographic data. The FLS have instrumentation on the ocean surface and are moored to the seafloor. A FLS would typically be deployed for one to three years and require maintenance typically every 3–6 months.

2.1 Spatial and Temporal Boundaries

The Study Area includes the Project Area plus a 20 km buffer around the Project Area to account for the propagation of seismic survey sound that could potentially affect marine biota (see Figure 1.1; Table 2.1). The proposed Project Area includes space to account for ship turning and streamer

Table 2.1. Geographic coordinates (decimal degrees, WGS84 Datum) delineating the Project and Study areas.

Coordinate Point [a]	Project Area		Study Area	
	Latitude	Longitude	Latitude	Longitude
A	52	-54.913	52.114	-55.138
B	52	-43.348	52.151	-43.189
C	49.374	-41.468	49.415	-41.201
D	45.417	-40.887	45.395	-40.636
E	40.042	-45.501	39.934	-45.315
F	38.658	-47.365	38.478	-47.41
G	41.546	-55.727	41.445	-55.925
H	46.093	-57.716	46.205	-57.917
w	46.099	-56.404	-----	-----
x	43.418	-56.398	-----	-----
y	43.416	-56.157	-----	-----
z	46.1	-56.151	-----	-----
I	46.091	-50.869	46.274	-51.184
J	50.473	-52.199	50.294	-52.427
K	50.481	-54.424	50.345	-54.608

[a] See Figure 1.1 for location of coordinate points.

deployment. The areal extents of the Project Area and the Study Area are 1,244,143 km² and 1,354,951 km², respectively. Larger proportions of the Project Area and Study Area lie outside of Canada's Exclusive Economic Zone (EEZ) (~68%) than inside the EEZ (~32%; see Figure 1.1). Water depths within the Project Area range from approximately 100 m to 4000 m.

The temporal boundaries of the Project are 1 May to 30 November during 2025–2029. The duration of individual seismic surveys will vary from year to year but will typically occur within a May to November timeframe. The approximate durations of proposed 3D/4D and 2D seismic surveying in any given year are 90–150 days and 150 days, respectively. The FLS would be deployed year-round with maintenance occurring approximately every 3-6 months.

2.2 Project Overview

The proposed Project includes a ship-borne geophysical program and the collection of environmental data via the use of moored FLS buoys.

The ship-borne geophysical program may include as much as 20,000 km² of 3D seismic survey and 20,000 km of 2D seismic survey lines in a given year. Specific data acquisition plans for 2D, 3D and/or 4D surveys during 2025–2029 are not yet determined. The specific seismic survey vessel(s) and supporting vessels to be used during 2D/3D/4D surveys are currently unknown but will be approved for operation in Canadian waters and will be typical of the worldwide fleet. Information on representative seismic and support vessels are provided in Sections 2.2.5 and 2.2.9.1, respectively. It is possible that MKI will use Ocean Bottom Nodes (OBNs; Section 2.2.7) and as an option may utilize the Gemini sound source (Section 2.2.6). MKI will adhere to required and established mitigation measures and monitoring for marine mammals, sea turtles, and seabirds required for seismic surveys (see Section 2.3 for further details). A Fisheries Liaison Officer (FLO) will be on board the seismic

vessel(s) to ensure implementation of communication procedures intended to minimize conflict with the commercial fishery.

MKI will typically deploy 1-3 FLSs (up to a maximum of 10) in a given year. Information on the FLS is provided in Section 2.2.8.

2.2.1 Objectives and Rationale

The primary objective of a seismic survey is to determine the presence and likely locations of geological structures that might contain hydrocarbon deposits. Existing seismic data in the area do not provide sufficient detail or coverage to serve the needs of the energy companies in their exploration, development and production activities. Availability of such modern seismic data has triggered recent exploration interest, particularly in Orphan Basin and Flemish Pass. Furthermore, MKI's advanced OBN systems (detailed below) provide much deeper, and more precisely defined features, identifying source rocks, migration pathways, and play types. These data will enhance the understanding of the Newfoundland's offshore hydrocarbon potential, and aid future exploration and development activities, delivering – for instance – better information for those deciding on future exploration drilling locations, reducing the need for additional drill sites. Employed near existing production operations, the data will allow better reservoir delineation, better decision-making for the placement of satellite or tie-back wells and other development decisions, as well as reservoir optimization and conservation.

The primary objective of collecting environmental data via FLS is to assess the wind resource in offshore Newfoundland. The FLS will collect high-quality wind speed and direction data from the ocean surface to various heights above sea level. Data on waves, currents, water salinity, water temperature, and weather (air temperature, relative humidity, air pressure, and rainfall) will also be collected. Acquisition of these data is anticipated to assist with the potential development of offshore wind turbines to electrify (power) oil and gas facilities.

2.2.2 Project Scheduling

As indicated in Section 2.1, the seismic surveys will be conducted between 1 May and 30 November of any given year from 2025–2029. In 2025, it is anticipated that seismic surveys would occur from mid-May through September.

The FLS may be deployed year-round of any given year from 2025–2029. As soon as 2025, it is anticipated that 1-3 FLS would be deployed with servicing occurring approximately every 3-6 months.

2.2.3 Site Plans

In any given year from 2025–2029, it is possible that there will be ~20,000 km^2 of 3D and 4D seismic survey lines and 20,000 km of 2D seismic survey lines. The specific location, orientation, length, and spacing of seismic survey lines will be determined prior to each survey year. For 3D and 4D seismic surveys a racetrack survey design is used and for 2D seismic surveys, lines can be separated by

approximately 5–50 km with variable lengths. In 2025, it is anticipated that MKI will acquire approximately 5000–10,000 km^2 of seismic data in the Orphan Basin.

In any given year from 2025–2029, it is possible that up to 10 FLS will be deployed and operational; however, in most years, including 2025, 1-3 FLS would be deployed. FLS will typically be deployed in areas where water depths are less than 2000 m and FLS will be separated by a minimum distance of 30 km. The specific locations of the FLS are not yet determined.

2.2.4 Personnel

A typical seismic vessel can accommodate ~55–75 personnel. Personnel on a seismic vessel include ship's officers and marine crew as well as technical and scientific personnel. The seismic vessel will also have Marine Mammal Observers (MMOs), Passive Acoustic Monitoring (PAM) Operators, and a FLO on board.

A typical vessel that will be used to deploy a FLS can accommodate 15–25 personnel that will include ship's officers, marine crew, and technical personnel.

All project personnel will have the required certifications (safety, medical) as specified by the relevant Canadian legislation and the C-NLOPB.

2.2.5 Seismic Vessel

The MV *Ramform Atlas* or a similar vessel(s) will be used for the 3D and 4D seismic surveying, and the MV *Sanco Swift* or a similar vessel for 2D surveying. Seismic vessels will typically travel at a speed of ~8.2–9 km/h (4.4–4.9 knots) while conducting 3D, 4D and 2D seismic surveying.

The MV *Ramform Atlas* was built in 2013 and is flagged in Norway (Figure 2.1). It is 104.2 m long, with a beam of 70 m and a draft of about 6.4 m. The *Ramform Atlas* has six diesel electric engines that have 20,400 kW of total power. The *Ramform Atlas* and its sister ships (*Ramform Titan, Ramform Tethys*) have previously been used by MKI for 3D seismic surveying in the Project Area.

Figure 2.1. A representative 3D/4D seismic vessel: MV *Ramform Atlas*.

For 2D seismic surveying or a source vessel for undershoots, the MV *Sanco Swift* or similar vessel will be used (Figure 2.2). The MV *Sanco Swift* was built in 2013 and is flagged in Gibraltar. It is 96.15 m long, with a beam of 23 m and a draft of about 7 m. The *Sanco Swift* has four 4000 kW diesel engines.

Figure 2.2. A representative 2D seismic vessel or source vessel for undershoots: MV *Sanco Swift*.

For seismic surveys during 2025-2029, vessel specifics will be provided once the vessel(s) has been identified.

2.2.6 Seismic Energy Source Parameters

For surveying, the typical sound sources for the proposed 2D/3D/4D survey program will consist of one, two or three airgun arrays. For any sound source that consists of either two or three airgun arrays, the arrays will be discharged alternately (i.e., multiple airgun arrays will not be discharged simultaneously). The total volume of an airgun array will range from 3000–6000 in^3. The airgun array(s) will be deployed at depths ranging from 6–15 m. The airguns will be operated with compressed air at pressures ranging from of 2000–2500 psi and a source level of ~260–266 dB re 1 µPa ·m $_{pk-pk}$. A typical shotpoint interval will be one array pulse every 12.5 m, 18.75 m or 25 m. Detailed specifications of the airgun array for the 2025 seismic program will be provided once the project design is completed and parameters are selected.

In one or more years, MKI may optionally use a two-airgun configuration called "Gemini". Two 4000 in^3 airguns are configured in a barbell-type arrangement and deployed at similar depths to a multi-airgun array (i.e., 6-15 m). The two airguns activate simultaneously (8,000 in^3 total), operate at 2000 psi and have an estimated source level of ~248.7 dB re 1µPa ·m $_{pk-pk}$ (Grooms et al. 2019). The Gemini configuration enhances the low frequency broadband portion of the sound spectrum (1-4 Hz), which produces higher-quality seismic images than other configurations. This is also expected to result in lower sound pressure levels relative to a conventional, multi-airgun array of the same total volume (Grooms et al. 2020). As with a conventional airgun array, a typical shotpoint interval will be one array pulse every 12.5 m, 18.75 m or 25 m. Further details will be provided in the EA.

2.2.7 Seismic Streamers and Ocean Bottom Nodes

For 3D and 4D seismic surveys, vessels will tow as many as 16 solid streamers, ranging in length from 6–14 km at depths ranging from 9–25 m. The streamers are typically spaced 100 m apart. For 2D seismic surveys, vessels will tow one solid streamer that may range from 8–12 km in length.

MKI may use OBNs in conjunction with streamers to acquire seismic data. OBN acquisition produces very detailed imaging of complex subsurface structures and strata types. It is used mainly in locations where towed-streamer data is difficult to collect (e.g., close to existing marine structures) or where other methods cannot provide the data quality needed. These types of data can be used for many purposes, such as determining best drilling locations, or quantifying reservoir size and behaviour over time. In an OBN survey, the nodes are placed on the seafloor in an orderly grid enabling recording of cleaner, high-fidelity data without gaps in coverage. OBN surveys also improve repeatability in 4D seismic surveying. Each OBN will have a footprint of about 0.1 m^2 and will contain a hydrophone and geophones (Figures 2.3 and 2.4). The OBNs are deployed over an area by a node installation vessel and then recovered and re-deployed again in new area within the larger survey area. A Remotely Operated Vehicle (ROV) may also be used for OBN deployment and recovery; otherwise nodes are lowered and retrieved by a cable ('node on a rope'). The OBN spacing is typically 300–500 m on the ocean floor, and approximately 1000–3000 OBNs may be used in total depending on the size of the seismic survey. These units are completely autonomous to operate on the seabed until retrieved and can be left unattended for up to 100–150 days. OBNs can operate in water depths down to 3500 m.

Detailed specifications of the streamers (and potential OBNs) for the 2025 seismic program will be provided once the project design is completed and parameters are selected.

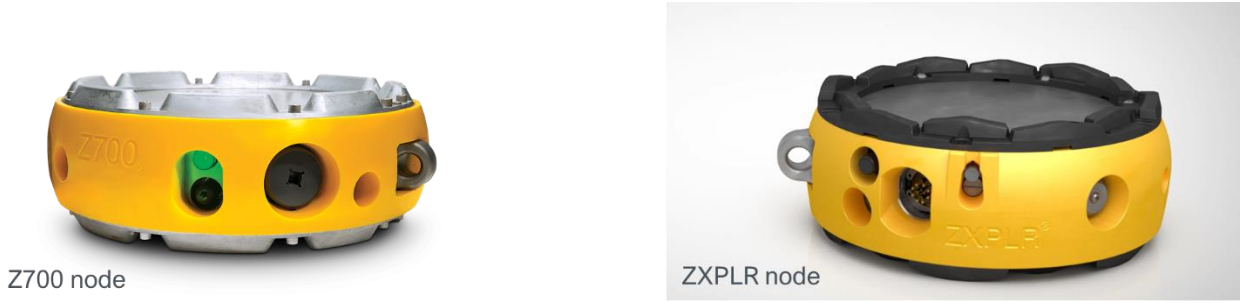

Figure 2.3. Typical Ocean Bottom Nodes (models Z700 and ZXPLR) used by MKI.

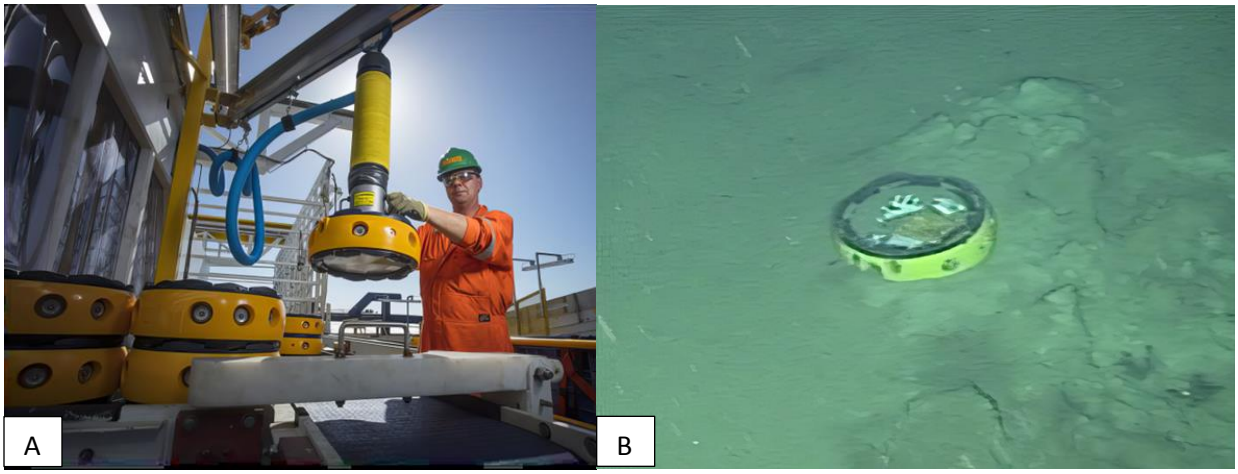

Figure 2.4. Node handling on a vessel (A) and node on the seafloor (B).

2.2.8 Floating Lidar Systems

MKI is proposing to deploy FLS in the Project Area. The FLS will collect meteorological and oceanographic data via a series of sensors affixed to the buoy and seabed mooring frame (Table 2.2). A representative FLS that may be deployed is the Eolos FLS200 model (Figure 2.5). This FLS weighs 4500 kg and is 4 m wide x 4 m long with a height of 4 m. The Eolos FLS200 is powered by renewable energy sources and batteries, which allow full autonomy. The buoy is typically deployed with a seabed frame that is typically 1.3 m wide x 1.8 m long. Depending on the water depth, the moorings lines would be chain or rope. The FLS requires power to operate sensors, store data, and provide real-time data access via satellite. It is typically powered by a series of solar panels and small wind turbines. Some FLS models have a backup ethanol fuel cell and generator. The FLS is equipped with the following key safety features: bright colouring, radar reflector, marine lantern, drift alarm, and Maritime Mobile Service Identity (MMSI) number, which enables it to broadcast a signal for detection in the international Automatic Identification System (AIS) and electronic navigation charts.

Table 2.2. Summary of the meteorological and oceanographic data that may be collected by the FLS.

Meteorological Sensor/Data	Oceanographic Sensor/Data
LiDAR (Light Detecting and Ranging) – pulsed laser - wind speed / direction	Acoustic Doppler Current Profiler (ADCP) – current speed and direction
Anemometer (cup and ultrasonic) – wind speed / direction	Single point current meter
Barometer – atmospheric pressure	Wave Sensors and Wave Buoy – wave height, period, and direction
Temperature Sensor – air temperature	CTD – conductivity, temperature (sea water), and depth (pressure)
Humidity Sensor – relative humidity	Water Level Recorder (high precision tide gauge) – for tidal harmonic analysis / tidal predictions
Pyranometer – solar irradiance sensor	
Rainfall (derived from LiDAR data)	

Figure 2.5. Example of a Floating LiDAR System, the Eolos FLS200, which may be deployed by MKI.

2.2.9 Logistics/Support

2.2.9.1 Vessels

MKI's primary support and supply will be provided by either the TGS vessel MV *Thor Magni* or a similar vessel. The operational objective is to have one escort vessel available with each seismic vessel. When necessary, escort vessels will be used to scout ahead of the seismic vessels for fishing vessels and gear, as well as for hazards such as ice and floating debris. Resupply will be provided by *Thor Magni* or a similar vessel.

It is anticipated that a node installation vessel will be used to deploy and retrieve OBNs. Vessel specifics will be provided once the vessel has been identified.

It is anticipated that an anchor handling vessel or support vessel will be used to deploy, retrieve and service the FLS. Vessel specifics will be provided once the vessel has been identified.

2.2.9.2 Crew Changes

Crew changes for the seismic vessels will be conducted by either ship-to-ship transfer or ship-to-shore transfer.

2.2.9.3 Shore Base, Support and Staging

MKI will have a shore representative based in St. John's for the duration of the seismic and environmental data collection program. No new shore base facilities will be established as part of the Project.

2.2.10 Waste Management

Waste management will be consistent with industry best practices in offshore Newfoundland and Labrador. MKI follows MARPOL 73/78 Annex IV: Pollution by Sewage from Ships, and Annex V: Pollution by Garbage from Ships.

2.2.11 Air Emissions

Air emissions will be those associated with standard operations for marine vessels, including the seismic vessel and support vessel(s). MKI follows MARPOL 73/78 Annex VI: Regulations for the Prevention of Air Pollution from Ships.

2.2.12 Accidental Events

In the unlikely event of the accidental release of hydrocarbons during the Project, the measures outlined in MKI's oil spill response plan will be implemented. The oil spill response plan will be filed with the C-NLOPB. In addition, MKI will have an emergency response plan in place.

2.3 Mitigation and Monitoring for Marine Mammals, Sea Turtles and Seabirds

Project mitigation measures will be detailed in the EA. The C-NLOPB's *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2019) will be used as the basis for the marine mammal and sea turtle monitoring and mitigation program for the seismic surveys. MMOs will monitor for marine mammals and sea turtles and implement mitigation measures as appropriate. PAM Operators will also monitor for marine mammals. The airgun array will be ramped up, and ramp ups will be delayed if a marine mammal or sea turtle is detected within the appropriate safety zone (minimum of 500 m as noted in the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment*). The airgun array will be shut down any time an *endangered* or *threatened* (as listed on Schedule 1 of SARA) marine mammal or sea turtle (as well as a beaked whale) is detected within the safety zone. These measures are designed to minimize the potential for effects (e.g., auditory, disturbance) on marine life, particularly marine mammals and species considered at risk under the SARA.

In addition, the MMOs will conduct a monitoring and release program for seabirds which may strand on Project vessels. Seabird monitoring will include systematic counts based on protocols issued by the Environment and Climate Change Canada-Canadian Wildlife Service (ECCC-CWS). Likewise, mitigation measures and monitoring for stranded birds will follow established ECCC-CWS procedures.

3.0 Environmental Assessment

The EA will closely follow previous assessments of seismic programs in the Newfoundland and Labrador offshore (e.g., LGL 2018). The primary issue of concern relates to the potential effects of

underwater noise from the airgun arrays on marine fauna and the effects of the seismic survey on fisheries.

3.1 Physical and Biological Environment

The Eastern Newfoundland Strategic Environmental Assessment (SEA; C-NLOPB 2014), Southern Newfoundland SEA (C-NLOPB 2010), and the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador (Bangay et al. 2020) provide descriptions of the biophysical environment in much of the Study Area. A description of the physical and biological environments will be provided in the EA for this Project. Background information will be provided for the anticipated Valued Environmental Components (VECs): fish and fish habitat, fisheries and other ocean users, marine birds, marine mammals, sea turtles, species at risk and sensitive areas using the most recent literature and data sources.

3.2 Effects of the Environment on the Project

A discussion of expected effects of the physical environment on the Project, based partly on information in the relevant SEAs and Regional Assessment (C-NLOPB 2010, 2014; Bangay et al. 2020), will be included in the EA. This information will be supplemented with more recent literature and data sources available for the Study Area.

3.3 Effects of the Project on VECs

The effects of Project activities on VECs, most notably the underwater sound from airgun arrays, will be assessed in detail. Information on the known effects of Project activities on the VECs, with emphasis on the effects of underwater sound on marine fauna, will be reviewed and used to predict residual effects on VECs. The EA will also examine potential effects of OBNs on benthic habitat. Input received during consultations will be considered when determining the mitigation and monitoring procedures that will be included in the EA.

Accidental events associated with Project activities, such as an unplanned hydrocarbon release, will also be assessed in the EA. The EA will also include an analysis of cumulative environmental effects.

3.4 Consultations

As part of the EA process, MKI will consult with stakeholders who have an interest in the Project. This will assist in scoping the effects assessment and monitoring and mitigation plan. The results of the consultations (i.e., issues of concern) will be presented and addressed in the EA.

MKI will undertake a consultation program with various municipal, provincial, and federal agencies, fisheries groups, and other stakeholders, including but not limited to:

- Fisheries and Oceans Canada (DFO);
- ECCC;

- Department of National Defense (DND);
- One Ocean;
- Fish, Food and Allied Workers (FFAW)-Unifor;
- Study Area fishers;
- Indigenous groups;
- Nature Newfoundland and Labrador (NNL);
- Transport Canada (TC);
- Various fish processors; and
- Other identified Newfoundland and Labrador fisheries industry stakeholders.

In-person consultations will be held in St. John's. MKI will distribute an annual Newsletter describing the seismic survey plans for a given year to over 60 stakeholders (see Appendix B in LGL 2022).

4.0 References

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