Controlled Source Electromagnetic Survey in the Orphan Basin and South Bank

Project Description

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Prepared for:

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Abbreviations

Accord Acts	*Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* and *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act*
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CSEM	controlled-source electromagnetic
CWS	Canadian Wildlife Service
DFO	Fisheries and Oceans Canada
EA	environmental assessment
EEZ	Economic Exclusion Zone
EL	Exploration Licence
EM	electromagnetic
EMGS	Electromagnetic Geoservices Canada Inc.
FLO	Fisheries Liaison Officer
km	kilometre
m	metre
mm	millimetre
MARPOL	International Convention for the Prevention of Pollution from Ships
NL	Newfoundland and Labrador
QHSSE	Quality, Health, Safety, Security and Environment
SARA	*Species at Risk Act*
SBA	Significant Benthic Area
SMMO	seabird and marine mammal observer

1.0 INTRODUCTION

Electromagnetic Geoservices Canada, Inc. (EMGS) is proposing to conduct a controlled source electromagnetic (CSEM) survey over two areas in offshore Newfoundland and Labrador (NL): the Orphan Basin, and South Bank (the Project) (Figure 1).

In accordance with section 138 of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* and section 134 of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act* (the Accord Acts) the Project requires the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) to issue an authorization (as a geophysical survey) to proceed.

This Project Description has been prepared and submitted in accordance with the Geophysical, Geological, Environmental and Geotechnical Guidelines (C-NLOPB 2019) to initiate an environmental assessment (EA) process and allow the C-NLOPB to provide a Scoping Document that will help confirm EA requirements and inform the planning, preparation, and submission of the EA report.

2.0 PROJECT DESCRIPTION

2.1 PROJECT OVERVIEW AND RATIONALE

The purpose of the Project is to collect data to inform potential future exploration drilling programs within the two target areas. CSEM uses electromagnetic (EM) remote sensing technology, which maps subsurface electric sensitivity distribution; this aids in determining the presence and extent of hydrocarbons below the seabed.

A pattern of receivers is deployed on the seafloor prior to the start of the survey. The survey vessel tows the EM source along predetermined tow lines at a height of approximately 30 m above the seabed (where receivers are located) (see Figure 2 for a survey schematic). EMGS is still in the survey design planning stage; anticipated survey details are listed in Table 1. Once finalized, program mapping will be submitted to the C-NLOPB and shared with fisheries stakeholders prior to survey mobilization.

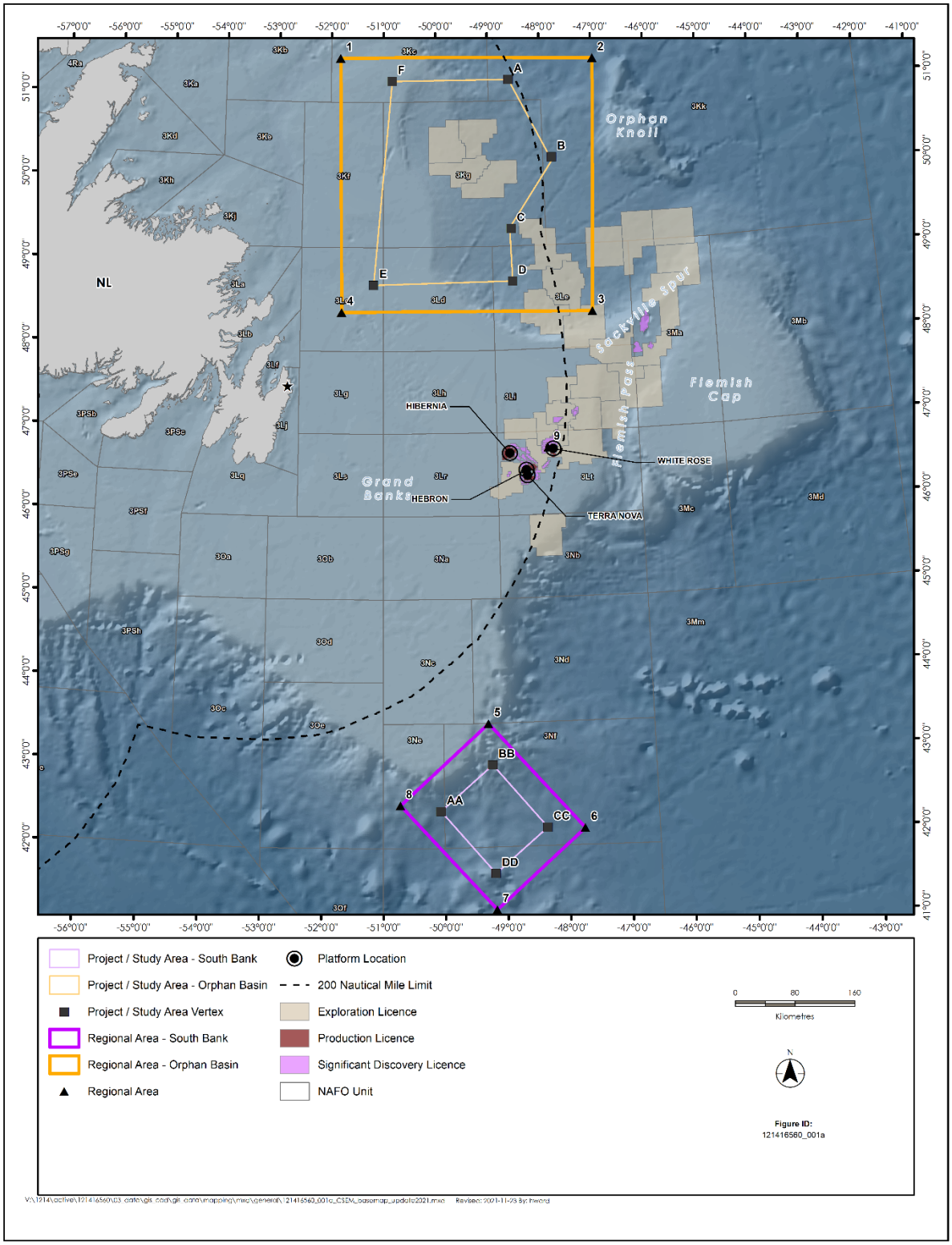
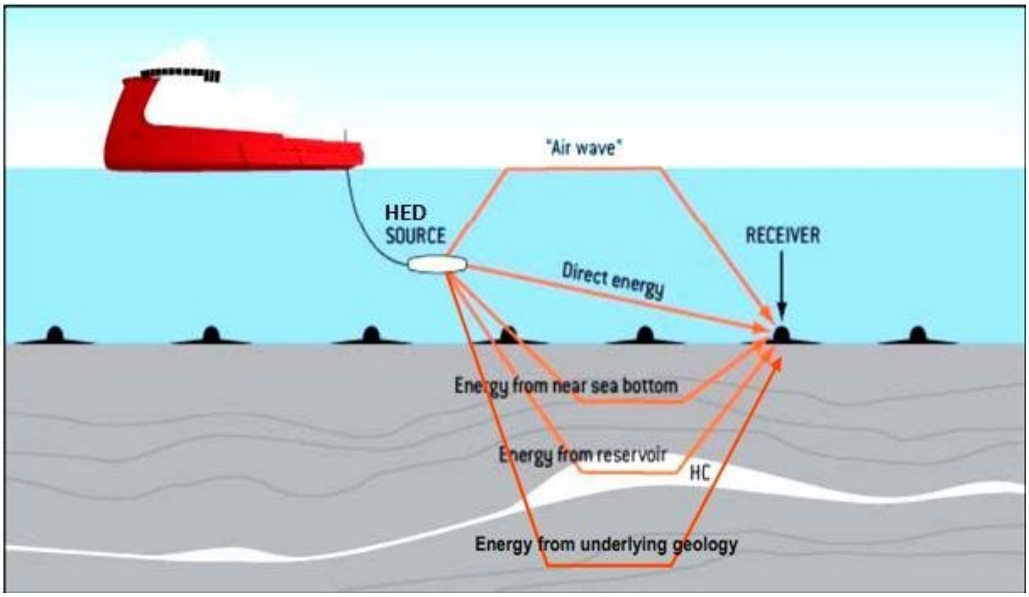


Figure 1 EMGS Project / Study and Regional Areas



Source: Ganguli 2014

Figure 2 Schematic of CSEM Survey

Table 1 Anticipated Survey Details

Location	Minimum Receiver Spacing (km)	Maximum Length of Combined Towlines (km)
Orphan Basin	2	1,400
South Bank	1.5	400

Each towline length will range from approximately 100 km to 150 for each survey site within a Project / Study Area. There will be no active source or receivers deployed outside the Project / Study Areas, but the vessel may do line changes with the source deployed.

2.2 PROJECT LOCATION

There are two Project / Study Areas: Orphan Basin; and South Bank (Figure 1). Water depth ranges from 1,000 to 3,000 m in the Orphan Basin Project / Study Area and 2,000 to 4,000 m in the South Bank Project / Study Area. The Project / Study Areas provide a footprint to encompass gear deployment and vessel turns while towing. The deployment and testing of survey equipment and vessel turning during the survey will not occur outside of the Project / Study Areas, including vessel transit between the two areas.

“Corner” coordinates for the Orphan Basin Project / Study Area and Regional Area (a 40-km border around the Project / Study Area) are listed in Tables 2 and 3, respectively. “Corner” coordinates for the South Bank Project / Study Area and Regional Area (a 40-km border around the Project / Study Area) are listed in Tables 4 and 5, respectively.

Table 2 Coordinates for Orphan Basin Project / Study Area in Longitude / Latitude and Degrees / Minutes / Seconds

Vertex	Decimal Degrees		Degrees, Minutes Seconds	
	Longitude (X)	Latitude (Y)	Longitude (X)	Latitude (Y)
A	-48.607244	51.253739	48° 36' 26.080" W	51° 15' 13.460" N
B	-47.839589	50.303783	47° 50' 22.520" W	50° 18' 13.620" N
C	-48.640144	49.455803	48° 38' 24.520" W	49° 27' 20.890" N
D	-48.640144	48.824467	48° 38' 24.520" W	48° 49' 28.080" N
E	-51.184375	48.795578	51° 11' 3.750" W	48° 47' 44.080" N
F	-50.833444	51.253739	50° 50' 0.400" W	51° 15' 13.460" N

Table 3 Coordinates for Orphan Basin Regional Area in Longitude / Latitude and Degrees / Minutes / Seconds

Vertex	Decimal Degrees		Degrees, Minutes Seconds	
	Longitude (X)	Latitude (Y)	Longitude (X)	Latitude (Y)
1	-51.82745	51.529676	51° 49' 38.820" W	51° 31' 46.832" N
2	-46.977527	51.47251	46° 58' 39.098" W	51° 28' 21.037" N
3	-47.209892	48.429824	47° 12' 35.610" W	48° 25' 47.366" N
4	-51.762661	48.465733	51° 45' 45.578" W	48° 27' 56.639" N
5	-49.257122	43.49557	49° 15' 25.640" W	43° 29' 44.051" N

Table 4 Coordinates for South Bank Project / Study Area in Longitude / Latitude and Degrees / Minutes / Seconds

Vertex	Decimal Degrees		Degrees, Minutes Seconds	
	Longitude (X)	Latitude (Y)	Longitude (X)	Latitude (Y)
AA	-50.061592	42.443531	50° 3' 41.730" W	42° 26' 36.710" N
BB	-49.203461	42.995425	49° 12' 12.460" W	42° 59' 43.530" N
CC	-48.328883	42.228708	48° 19' 43.980" W	42° 13' 43.350" N
DD	-49.185506	41.684583	49° 11' 7.820" W	41° 41' 4.500" N

Table 5 Coordinates for South Bank Regional Area in Longitude / Latitude and Degrees / Minutes / Seconds

Vertex	Decimal Degrees		Degrees, Minutes Seconds	
	Longitude (X)	Latitude (Y)	Longitude (X)	Latitude (Y)
6	-47.718779	42.208882	47° 43' 7.606" W	42° 12' 31.976" N
7	-49.177329	41.247512	49° 10' 38.383" W	41° 14' 51.044" N
8	-50.722883	42.51484	50° 43' 22.378" W	42° 30' 53.423" N
9	-48.105279	46.806492	48° 6' 19.005" W	46° 48' 23.373" N

2.3 SCHEDULE

The Project is planned to be conducted between May and October 2022, pending authorization from the C-NLOPB. It is estimated that the Project (surveying both Project / Study Areas within one season) would take approximately 90 days.

2.4 PROJECT COMPONENTS AND ACTIVITIES

2.4.1 Survey Vessel and Crew

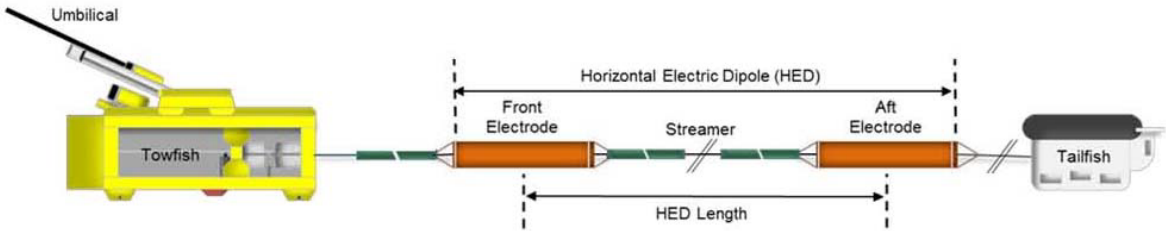
EMGS will conduct the CSEM survey using a company-owned survey vessel, which will have the necessary operational procedures, protocols, and equipment requirements to safely conduct the work. As demonstrated by previous CSEM surveys conducted by EMGS offshore Newfoundland, the vessel will be capable of working in harsh offshore conditions, and will comply with the *Canada Shipping Act, 2001*, the International Convention for the Prevention of Pollution from Ships (MARPOL), and other applicable standards. Transport Canada will inspect the selected vessel and the C-NLOPB will be required to provide operational approval of the vessel prior to the onset of Project-related work. Station keeping during CSEM receiver deployment and retrieval will be maintained using dynamic positioning.

Existing shore-based facilities in the St. John's region will be used to mobilize the vessel for the Project. The 90-day anticipated survey time (exclusive of downtime due to inclement weather or mechanical issues) will likely require a single mobilization and any crew changes and re-supply will be also use existing facilities in the St. John's region.

The total vessel persons on board will be approximately 45 people and will include the vessel's officers and crew, as well as technical and scientific personnel, a fisheries liaison officer (FLO) and seabird and marine mammal observers (SMMOs).

2.4.2 CSEM Source

The CSEM towed subsea system is approximately 1,800 m and includes a single streamer comprised of tow and conductor cables and a solid flotation section (see Figure 3 for an illustration). As the flotation section will not be fluid-filled, a streamer break will not result in an accidental spill.



Source: LGL 2014a

Figure 3 Schematic of the CSEM Source

The power supply and control unit is contained within the topside transmitter mounted on a towed subsea-frame (towfish) (Figure 3), which generates a predefined EM signal from a trailing, neutrally buoyant horizontal electric dipole (antenna) connected to the towfish. The antenna is kept straight, level, and extended in the water by the tailfish (Figure 3). The signal is transferred to the subsea system via an umbilical, which is transformed to high voltage / low current and transformed back to low voltage / high current at the subsea system. The topside operator station can change the waveform and periodic time and the towfish and tailfish are capable of carrying additional survey and navigational equipment (LGL 2014a).

2.4.3 CSEM Receivers

CSEM receivers are attached to compacted sand anchors comprised of ingredients found in natural gravel, limestone and/or seawater. Each anchor is typically approximately 920 mm x 810 mm x 102 mm and expected to deteriorate on the seabed within approximately one year after submersion in seawater. The CSEM receivers include electrical and magnetic sensors, a data acquisition unit, electrical and magnetic sensors, and a positioning transponder. The positioning transponder allows tracking of the receiver's location via acoustic signals to the vessel during its descent to the seabed and ascent back to the surface, where it is retrieved for data download. An acoustic command from the vessel triggers the release of the receiver from the compact sand anchor; each receiver has a primary release and a back-up system.

2.5 ACCIDENTAL EVENTS

As the streamer is solid-filled, there is little chance of an accidental event resulting from a streamer break. Although unlikely, an on-deck spill could occur and result in a small hydrocarbon release, which would be immediately contained, resulting in a very low risk of pollution to the marine environment. An accidental release of vessel fuel is also unlikely; however, the vessel's Shipboard Oil Pollution Emergency Plan would be implemented in the event of a hydrocarbon release.

3.0 QUALITY, HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL MANAGEMENT

EMGS's Quality, Health, Safety, Security and Environment (QHSSE) Policy provides the guiding principles for EMGS QHSSE culture regarding the protection of life, health and the environment while delivering goods and services of the highest quality.

It is EMGS policy, to demonstrate, build, and perpetuate a strong QHSSE culture based on:

- Compliance – EMGS is an organization that is in full compliance with all applicable laws and regulations where we conduct our business and enforces more stringent requirements when these do not meet EMGS's minimum criteria
- Leadership – EMGS is an organization whose Line Management has the responsibility for ensuring that priority is given to QHSSE in all parts of our business. We are committed to building a culture that promotes safe behaviour and where employees understand their right and obligation to stop unsafe work
- Implementation – EMGS is an organization that sets the protection of people first, by systematically identifying and implementing measures to reduce risks to a level as low as reasonably practicable
- Continuous Improvement – EMGS is an organization that reports, monitors, learns and acts proactively on incidents and non-conformities and sets itself ambitious QHSSE objectives. We are an organization that demonstrates innovation through continuously looking for new and safer ways to deliver our products to the industry
- Openness and Integrity – EMGS is an organization that works in a transparent and honest dialog with its stakeholders and the environment in which it operates
- Happiness – EMGS is an organization that invests in job satisfaction and a good working environment

The Project will generate EM signals, underwater and atmospheric sound emissions, light emissions, air emissions, and solid and liquid (e.g., grey water, sewage, bilge water, deck drainage) waste discharges.

The following mitigation measures will be implemented to reduce environmental effects associated with the Project.

- Liquid waste discharges from the vessel will be managed in accordance with MARPOL and the *Canada Shipping Act, 2001.*
- Solid and domestic waste will be collected and shipped to shore for recycling / disposal at an existing onshore waste management facility in accordance with applicable regulatory requirements.
- As per the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (CNLOPB 2019), an SMMO will be on board to record seabird, shark, and marine mammal and sea turtle observations (including transit to and from the Project Area) and oversee ramp up procedures.
- The SMMO will be on board to conduct routine checks for stranded birds and Canadian Wildlife Service (CWS) bird handling and release procedures (e.g., Environment and Climate Change Canada 2016) will be implemented if stranded birds are encountered on the vessel.

- In accordance with the *Migratory Birds Convention Act, 1994*, a Federal Migratory Bird Permit will be obtained from the CWS for handling stranded birds that may be encountered on the vessel. A salvage report will be filed with CWS as required by the permit.
- The EM source will be ramped up over a 20-minute period. In areas where water depth is greater than 500 m, the EM source will not be initiated if a shark, marine mammal or sea turtle is observed 30 minutes prior to ramp-up within a 500 m safety zone of the energy source. Ramp-up will not occur until the animal has moved beyond the 500 m zone or 20 minutes have elapsed since the last sighting.
- In areas where water depths are less than 500 m, the EM source will be shut down if a *Species at Risk Act* (SARA)-listed species is observed within 500 m of the energy source.
- The EM source will be turned off when data are not being collected (e.g., during vessel turns).
- Low vessel speed during data collection (4 to 5.5 km/hr [2 to 3 knots]) will reduce underwater noise and the risk of collision with marine mammals and sea turtles including SARA-listed species.
- Dead or distressed marine mammals or sea turtles and SARA-listed species will be reported to the C-NLOPB and Fisheries and Oceans Canada (DFO).
- Vessel lighting will be reduced to the extent practical without compromising safe operations.
- The vessel will follow established shipping lanes in proximity to shore and will travel at speeds not exceeding 24 km/hour (14 knots), except as needed in the case of an emergency.
- Compacted sand anchors, designed to degrade within one year, will be used for the CSEM receivers.
- An FLO will be present onboard the survey vessel to facilitate communication with fishers and provide advice and coordination in regard to avoiding fishing vessels and fishing gear.
- Planning will be conducted in cooperation with fisheries stakeholders in advance of the survey to avoid high concentrations of fishing vessels in the Project Area and along the transit route.
- A Single Point of Contact will be established to respond to queries and concerns from other ocean users.
- The timing and location of proposed activities will be communicated by means of Notice to Mariners and Navigational Warnings.
- Advance communication with DFO and Department of National Defence during survey planning will limit potential for conflict with research vessel cruises or military activities.
- In the unlikely event that Project activities damage fishing gear, compensation will be awarded to affected parties in accordance with the Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity (C-NLOPB and Canada-Nova Scotia Offshore Petroleum Board 2017).

4.0 INDIGENOUS AND STAKEHOLDER CONSULTATION

EMGS will engage with the following fisheries stakeholder and Indigenous groups on the Project during survey planning:

- Fisheries Stakeholders:
  - One Ocean
  - Fish, Food and Allied Workers – Unifor
  - Ocean Choice International
  - Association of Seafood Producers

  - Atlantic Groundfish Council
  - Canadian Association of Prawn Producers
- Indigenous Groups:
  - Nunatsiavut Government
  - NunatuKavut Community Council
  - Innu Nation
  - Qalipu First Nation Band
  - Miawpukek First Nation

EMGS will communicate the proposed survey plan including timing and location to commercial fisheries stakeholders and Indigenous groups prior to mobilization via a Single Point of Contact and an FLO will be onboard the survey vessel. The FLO will implement communication procedures intended to reduce conflict with the program with the fisheries stakeholder groups and Indigenous groups listed above/

5.0 ENVIRONMENTAL SETTING

The waters offshore eastern NL have an abundant diversity of marine life. Of the many species of fish, marine birds, marine mammals, and sea turtles that could potentially occur in the Orphan Basin and South Banks Regional Areas, approximately 30 are considered a species of concern. They are either listed under Schedule 1 of the SARA, or NL *Endangered Species Act*) and/or are assessed as such by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

5.1 ORPHAN BASIN PROJECT / STUDY AREA

The Orphan Basin Project / Study Area is located in an area with a high diversity of corals, sponges, and sea pens (Amec 2014). The Northeast Newfoundland Shelf contains a large DFO-defined Significant Benthic Area (SBA) for sea pens, with additional SBAs for small and large gorgonian corals along the Northeast Newfoundland Slope. The Orphan Basin Project / Study Area overlaps the Northeast Newfoundland Slope Closure, a DFO-designated marine refuge that is closed to bottom contact fishing to protect corals and sponges in this area. The Northern Grand Banks encompasses designated critical habitat for northern and spotted wolffish (both listed as Threatened under SARA Schedule 1). The Orphan Basin Project / Study Area overlaps both the northern and spotted wolffish critical habitat.

Redfish, Greenland halibut, roughhead and roundnose grenadier, witch flounder, and northern wolffish are present in the Orphan Basin Project / Study Area year-round. The coasts of the eastern and northeastern NL are home to several million seabirds that forage off eastern NL during and following the nesting season. There are 24 marine mammal species known to occur within or near the Orphan Basin Project / Study Area, 19 cetaceans (whales, dolphins, and porpoises) and 5 pinnipeds (seals). While rare, three species of sea turtles (leatherback, loggerhead, and green) may also potentially occur within or near the Orphan Basin Project / Study Area.

The Orphan Basin Project / Study Area is located within Northwest Atlantic Fisheries Organization (NAFO) Unit Areas 3Kg and 3Ld. Key species harvested commercially in the Orphan Basin Project / Study Area include Greenland halibut, redfish, greysole / witch flounder, Atlantic halibut, American plaice, roughhead grenadier, Atlantic cod, skate, snow crab, and northern shrimp. Species that may be found within the Orphan Basin Project / Study Area and harvested outside this Project / Study Area by Indigenous peoples could potentially include Atlantic salmon, American eel, swordfish, and tuna, as well as birds and seals.

5.2 SOUTH BANK PROJECT / STUDY AREA

The South Bank Project / Study Area is a deep ocean basin ecosystem (2,000 to 4,000 m water depth) located outside of Canada's Exclusive Economic Zone (EEZ) (200 nm limit). The South Bank Regional Area includes areas of the continental slope, with water depths around 500 m.

Distribution maps in Wareham (2009), based on various research vessel surveys, indicate that large gorgonians, small gorgonians, soft corals, sea pens, and Antipatharian species have been recorded along the southwest slope of the tail of the Grand Banks (within the South Bank Regional Area). However, the area beyond the continental slope of the tail of the Grand Banks is not sampled during research vessel surveys as it is outside the EEZ (Wareham 2009). Murillo et al. (2011, in LGL 2024b) observed 17 species southeast of the Grand Banks. Sponges are also present and provide important deep-sea habitat structures.

Characteristic deep subtidal invertebrate species in the southern Grand Banks area include crab (snow, toad, and rock), lobster, scallop (Iceland and Atlantic sea), northern shrimp, clams (Stimpson's surf and propeller), ocean quahogs, and sea urchins (LGL 2014b). The South Bank Project / Study Area is predominantly located within NAFO Unit Area 3Nf, with a portion of the southern corner in NAFO Unit Area 3Nn; the South Bank Regional Area also includes a portion of NAFO Unit Area 3Ne. Key species harvested commercially in the South Bank Regional Area (slope of the South Bank) include snow crab, redfish, and Atlantic cod (LGL 2014b). There is a longline fishery for swordfish in the southern Grand Banks area (DFO 2016a). The section of slope within the South Bank Regional Area is within the NAFO Regulatory Area (NRA). NAFO manages most fisheries in the NRA, including straddling stocks (i.e., species that also occur within the Canadian EEZ), including cod, redfish, American plaice, yellowtail flounder, witch flounder, white hake, capelin, skates, and Greenland halibut (DFO 2016b, in Equinor Canada 2020). Joint industry-DFO halibut and post season crab survey stations are located at the tail of the Grand Banks, within the South Bank Regional Area (LGL 2014b).

Black-legged kittiwake, northern fulmar, storm-petrel, auks, large gulls, and shearwater were identified in the South Bank Regional Area (LGL 2010). Marine mammals observed in the South Bank Regional Area include humpback whale, minke whale, sperm whale, long-finned pilot whale and a variety of dolphin species (common bottlenose, short-beaked common, and other) (LGL 2014b). The Southeast Shoal and Adjacent Areas on the Tail of the Grand Bank Conventional on Biological Diversity Ecologically and Biologically Significant Area is the only identified special area (Equinor Canada 2020). The Southeast Shoal and Tail of the Banks Ecologically and Biologically Significant Area is north of the South Bank Regional Area (Equinor Canada 2020).

6.0 SUMMARY AND CONCLUSION

EMGS's proposed CSEM survey over the Orphan Basin and South Bank Project / Study Areas would take place over a 90-day period between May to October 2022. The Project requires an authorization from the C-NLOPB under the Accord Acts.

This Project Description is being submitted to initiate an EA in accordance with the Geophysical, Geological, Environmental and Geotechnical Program Guidelines (C-NLOPB 2019).

EMGS will liaise with commercial fisheries stakeholders and Indigenous groups about the Project and address questions and concerns they may have about the Project.

7.0 REFERENCES

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