

ENVIRONMENT PLAN SUMMARY

North Browse Semi-Regional Seabed Sampling Program



LIST OF ACRONYMS/ABBREVIATIONS

RPS

Acronym	Description
АНО	Australian Hydrographic Office
AMSA	Australian Maritime Safety Authority
DAFF	Department of Agriculture, Fisheries and Forestry
DMP	Department of Mines and Petroleum
DoF	Department of Fisheries
DotE	Department of the Environment
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
NBSRSSP	North Browse Semi-Regional Seabed Sampling Program
ODS	Ozone Depleting Substance
RCC	Rescue Coordination Centre
WGS84	World Geodetic System 84



TABLE OF CONTENTS

LIST OF	ACRONYMS/ABBREVIATIONSi
1.0	INTRODUCTION1
2.0	COORDINATES OF THE ACTIVITY1
3.0	DESCRIPTION OF THE RECEIVING ENVIRONMENT4
3.1	Physical Environment4
3.2	Biological Environment5
3.3	Values and Sensitivities6
4.0	DESCRIPTION OF THE ACTIVITY7
5.0	MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS
6.0	SUMMARY OF MANAGEMENT APPROACH13
6.0 6.1	Environmental Performance Objectives, Standards and Criteria13
6.1	Environmental Performance Objectives, Standards and Criteria13
6.1 6.2	Environmental Performance Objectives, Standards and Criteria
6.1 6.2 6.3	Environmental Performance Objectives, Standards and Criteria
6.16.26.36.4	Environmental Performance Objectives, Standards and Criteria
 6.1 6.2 6.3 6.4 6.5 	Environmental Performance Objectives, Standards and Criteria
 6.1 6.2 6.3 6.4 6.5 6.6 	Environmental Performance Objectives, Standards and Criteria 13 Implementation Strategy 13 Training and Competencies 13 Monitoring, Auditing, Non-Conformance and Review 14 Roles and Responsibilities 14 Reporting 14

Page

	Environment Plan Summary North Browse Semi-Regional Seabed Sampling Program SEARC	
TABLES		Ра
Table A:	Location coordinates (WGS84) for proposed geochemical sampling for the	
	NBSRSSP	
Table B:	Risk assessment summary for routine and non-routine operations	
FIGURES		
		Pa
Figure A:	Searcher Seismic North Browse Semi-Regional Seabed Sampling Program.	



1.0 INTRODUCTION

Searcher Seismic Pty Ltd (Searcher) proposes to undertake a bathymetry and geochemical survey in the Timor Sea, referred to as the North Browse Semi-Regional Seabed Sampling Program (NBSRSSP).

2.0 COORDINATES OF THE ACTIVITY

The NBSRSSP will take place in the offshore Browse Basin near Ashmore Reef and Cartier Island, in the Timor Sea. The NBSRSSP will take place in the following offshore petroleum permits (Figure A):

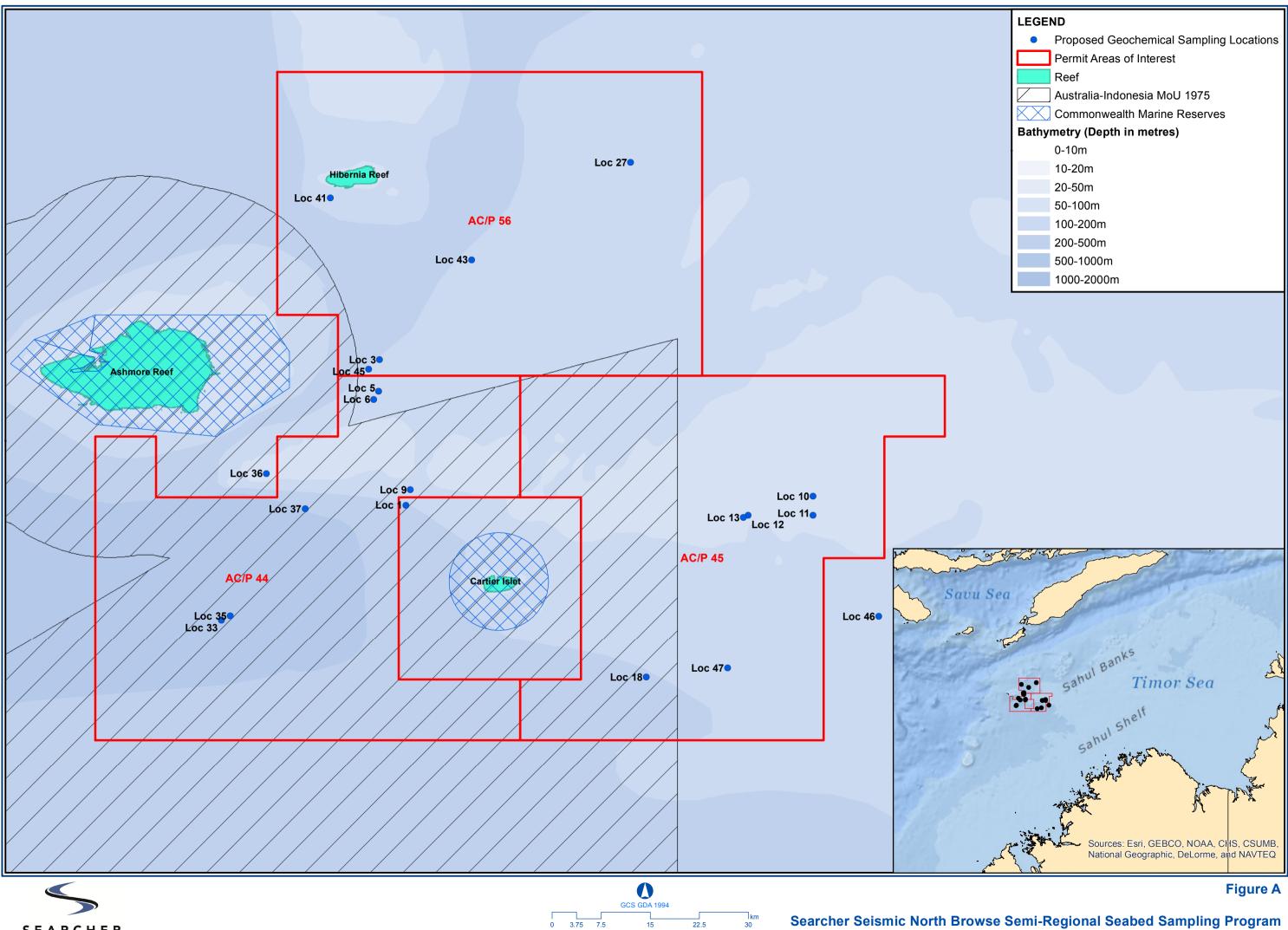
- AC/P-44
- AC/P-45
- AC/P-56
- Unreleased acreage.

Coordinates for the planned sampling locations are provided in Table A.



Table A: Location coordinates (WGS84) for proposed geochemical sampling for the NBSRSSP

Sample Location ID	Latitude (decimal °)	Longitude (decimal °)	Water Depth (m)
Loc 01	12.42580S	123.42772E	342
Loc 03	12.22646S	123.39158E	208
Loc 05	12.26941S	123.39060E	194
Loc 06	12.28089S	123.38362E	188
Loc 09	12.40462S	123.43371E	288
Loc 10	12.41387S	123.98693E	77
Loc 11	12.43988S	123.98702E	84
Loc 12	12.44006S	123.89755E	65
Loc 13	12.44286S	123.89135E	65
Loc 18	12.66171S	123.75789E	203
Loc 27	11.95572S	123.73642E	160
Loc 33	12.58402S	123.17444E	609
Loc 35	12.57795S	123.18662E	612
Loc 36	12.38263S	123.23613E	100
Loc 37	12.43082S	123.28961E	508
Loc 41	12.00475S	123.32420E	230
Loc 43	12.08937S	123.51792E	223
Loc 45	12.23927S	123.37669E	215
Loc 46	12.57865S	124.07722E	165
Loc 47	12.64924S	123.86961E	209



Scale: 1:500,000 @ A3

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LEGEN	LEGEND				
• F	Proposed Geochemical Sampling Locations				
F I I I I I I I I I I I I I I I I I I I	Permit Areas of Interest				
F	Reef				
A	Australia-Indonesia MoU 1975				
	Commonwealth Marine Reserves				
Bathym	etry (Depth in metres)				
C	0-10m				
1	0-20m				
2	20-50m				
5	50-100m				
1	00-200m				
2	200-500m				
5	500-1000m				
1	000-2000m				



3.0 DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1 Physical Environment

The NBSRSSP will take place in the vicinity of Ashmore Reef and Cartier Island, which lie on the outer edge of the Sahul Shelf (Figure A). Ashmore Reef consists of two extensive lagoons, several channelled carbonate sand flats, an extensive reef flat, and three vegetated islands. Cartier Island consists of a single unvegetated sandy cay surrounded by a reef flat. Hibernia Reef does not have permanently emergent land, as the reef flat is only exposed at low tide. Subtidal shoals and banks in the vicinity of the NBSRSSP include Johnson Bank and Barracouta Shoal.

The survey area experiences a dry (arid tropical) climate. The region experiences two distinct seasons – the north-west (summer) monsoon (November to March) and the south-east (winter) monsoon (April to September), with a short transitional period between each. Most rainfall is restricted to the relatively short summer monsoon period and is associated with storm activity. Winds during the summer monsoon are typically westerly/north-westerly and humid; while during the winter monsoon winds are typically drier south-easterlies which originate from over the Australian mainland.

The region is subject to cyclone activity, and the cyclone season officially runs from November to May. Highest cyclone activity in the region typically occurs during March and April.

The mean air temperature in the region is around 28° C and shows little variation, ranging from 28.3° C during summer to 27.0° C in winter. Relative humidity follows similar seasonal patterns, with highest humidity during summer months and lowest relative humidity during winter months.

Surface currents in waters on the Sahul Shelf show a strong seasonal component and are linked to the seasonal monsoonal winds. During the south-eastern winter monsoon the surface current flows across the shelf to the west, and is driven by locally generated winds and an east-west pressure gradient. During the north-westerly summer monsoon the surface current weakens and may reverse in direction over the inner part of the shelf.

During the winter monsoon the surface water layer on the Sahul Shelf can develop relatively high salinities (≥35.0 Practical Salinity Units) due to evaporation exceeding freshwater inputs from rainfall. During the summer monsoon rainfall in the region can reduce surface salinities.

Tides in the region are semi-diurnal with a spring tidal range of 4 m and a neap tidal range of 1.8 m. Tidal currents are a component of the broader circulation in the region,



with tidal currents of 0.6 m/s and 0.2 m/s for spring and neap tides, respectively. Surface waves in the region comprise of locally generated surface wind waves and distant swell waves.

3.2 Biological Environment

Several island and shallow coral reef communities occur in the vicinity of the NBSRSSP. These islands and reefs are associated with benthic habitats consisting predominantly of sand and coral rubble, with hard coral, soft coral, algae and seagrasses. The reefs host similar benthic communities, with areas of relatively high live coral cover. Benthic primary producers as seagrasses, macroalgae and zooxanthellate corals are typically restricted to shallower waters around the reefs, although in the clear tropical waters may be found at considerable depths. The islands and emergent reefs in the area provide roosting/nesting sites for seabirds and nesting beaches for marine turtles.

Soft sediment benthic habitats are widespread in the region, with sediment infauna communities dominated by polychaetes and crustaceans. The region is documented as containing naturally occurring hydrocarbon seeps, which occur along geological faults. These seeps potentially support more productive or diverse benthic communities and such seeps may play a role in the geological development of some geomorphic features of the seabed.

A range of marine fauna were identified as potentially occurring within the vicinity of the NBSRSSP, including the following taxa listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):

- 23 species of birds, of which one is listed as Vulnerable and 15 as Migratory
- 25 species of marine mammals, of which one is listed as Endangered, one as Vulnerable and eight as Migratory
- 21 species of marine reptiles, of which two are listed as Critically Endangered, three as Endangered, three as Vulnerable and six as Migratory
- One species of shark listed as Vulnerable and Migratory.

In addition to taxa listed under the EPBC Act, the survey area is expected to host a range of demersal and pelagic fish species that may be of commercial importance. A number of Commonwealth and state managed fisheries overlap the area of the NBSRSSP. However, consultation with fisheries agencies and commercial fishers prior to the survey indicates that within the vicinity of the NBSRSSP the level of fishing activity in these fisheries is expected to be very low. Consultation indicated recreational fishing in the vicinity of the survey is unlikely. Consultation confirmed that no major commercial shipping routes traverse the area of the NBSRSSP. The area in which the NBSRSSP will



take place is subject to the Australian Indonesian Memorandum of Understanding 1975 and as such traditional Indonesian fishers may be active in the vicinity of the survey.

3.3 Values and Sensitivities

RPS

In addition to being listed as a National Nature Reserve, Ashmore Reef has been designated a Ramsar Wetland of International Importance due to the importance of the islands in providing a resting place for migratory shorebirds and supporting large breeding colonies of seabirds. The reserve provides a staging point for many migratory wading birds from October to November and March to April as part of the migration between Australia and the northern hemisphere. Migratory shorebirds use the reserve's islands and sand cays as feeding and resting areas during their migration. Ashmore Reef and the surrounding marine environment support the following biologically important features:

- a small genetically distinct dugong population
- high density and diversity of seasnakes
- high diversity of corals
- three endemic species of mollusc
- high endemism of sponges
- nesting beaches for marine turtles.

Although not listed as a Ramsar Wetland, Cartier Island shares many of the environmental values described for Ashmore Reef and is a marine reserve. The island supports a number of EPBC Act listed Migratory bird species that stopover during their annual migration to Australia. The island also supports a high relative abundance and diversity of sea snakes and marine turtles including green, hawksbill and loggerhead turtles. The reserve hosts a variety of marine habitats, including a mature reef flat, a small submerged pinnacle and two shallow pools to the north-east of the island.

There are a number of subtidal reefs, banks and shoals in the vicinity of the NBSRSSP that are not listed as marine parks or reserves, including:

- Hibernia Reef
- Johnson Bank
- Barracouta Shoals.



The relatively shallow depths of these features (compared to surrounding deeper waters) supports benthic primary producers such as zooxanthellate corals and algae. Bare sand and coral rubble habitats are common. Such communities support a range of marine taxa including reef fish and sea snakes.

4.0 DESCRIPTION OF THE ACTIVITY

The NBSRSSP will be undertaken by the survey vessel MV *Duke*, which is operated by Gardline. The survey will consist of a bathymetry and geochemical survey at up to 20 locations (Figure A) and transiting between locations. The bathymetry component of the NBSRSSP consists of acquiring acoustic data using multibeam sonar and a sub-bottom profiler on the characteristics of the seabed at each location and to scout the geochemical survey locations. The geochemical component of the NBSRSSP consists of water and sediment core sampling. The NBSRSSP is scheduled to take place in December 2013.

5.0 MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Major environmental hazards were identified, with each identified hazard subject to a risk assessment in accordance with methodology and principles described by the International Organisation for Standardisation (ISO) *31000:2009 – Risk management – Principles and guidelines* (2009), Standards Australia *Handbook 203:2012 – Managing environment-related risk* (2012) and the Searcher Risk and Hazard Management Procedure. For each hazard, alternatives were considered where possible and controls identified to reduce the likelihood or mitigate the consequence of environmental hazards identified. Environmental hazards and controls are summarised in Table B.

Environment Plan Summary North Browse Semi-Regional Seabed Sampling Program



Table B: Risk assessment summary for routine and non-routine operations

Sources of Risk (Hazards)	Potential Environmental Impacts	Controls to Reduce Risk
Marine Organisms on Vessel Hull	Alteration of marine environment due to Introduced Marine Species (IMS)	Ensure that hull anti-fouling certificate is valid and that the condition of the anti-fouling coating is sound. Ensure regular cleaning of hull and equipment.
		Ensure that the vessel has a Department of Agriculture, Fisheries and Forestry/Department of Fisheries (DAFF/DoF) approved marine pest inspection prior to commencing the NBSRSSP.
Marine Organisms in Ballast Water	Alteration of marine environment due to IMS	Vessel will adhere to ballast water management guidelines outlined in DAFF (2011) Australian Ballast Water Management Requirements.
		No planned ballast water exchanges, but if required ballast water exchange will not occur within 12 nautical miles (NM) of land.
		Fresh water ballast used, which is unsuitable for marine species.
Presence of Vessel	Interference with or displacement of recreational,	Vessel will maintain appropriate lighting, navigation and communication to inform other uses of the position and intentions of the survey vessel.
	commercial and traditional	Vessel operated by accredited seamen in accordance with all maritime standards and regulations.
	fishing Interference with or	Notice to Mariners issued by the Australian Hydrographic Office (AHO).
	displacement of commercial	Consultation with Australian Maritime Safety Authority (AMSA) and fishing stakeholders.
	shipping Artificial Lighting Disruption to behaviour of light sensitive marine fauna	Vessel to provide daily reports to AMSA Rescue Coordination Centre (RCC).
Artificial Lighting		Vessel lighting will be reduced as much as practical, whilst maintaining appropriate lighting for safe navigation and vessel operations.
		Non-essential external lighting switched off when not in use.
		Distance from closest sampling location to emergent land is 18 km (Cartier Island).
Vessel Noise	Disruption of behaviour of	Vessel propulsion system maintained in good working order in accordance with manufacturer specifications.
	noise sensitive marine fauna	Bow and stern thrusters used to maintain the vessel's position only as required.
		Vessel master will maintain spatial separation from cetaceans in compliance with Part 8 of the EPBC Regulations – Interacting with Cetaceans and Whales, which will reduce likelihood of cetaceans being exposed to disruptive underwater noise levels.



Sources of Risk (Hazards)	Potential Environmental Impacts	Controls to Reduce Risk
Oily Water Discharge	Potential localised and temporary acute toxic effects	All discharged bilge water to be passed through an oil water separator prior to discharge to the marine environment to reduce hydrocarbon concentrations to <15 ppm. Separated oil will be stored onboard and disposed of appropriately at an onshore waste facility. Offshore discharge only (>12 NM from coastline). No discharge in marine reserves.
Grey Water / Sewage Discharge	Adverse effects on marine biota due to localised increase in turbidity and nutrient concentrations	All sewage treated onboard prior to discharge. Biodegradable detergents to be used. Offshore discharge only (>12 NM from coastline). Discharge at speed >4 knots. No discharge in marine reserves.
Putrescible Waste (Food Scraps) Discharge	Adverse effects on marine biota due to localised increase in turbidity and nutrient concentrations	No discharge within 12 NM of land. No discharge within the boundaries of marine reserves.
Greenhouse Gas Emissions	Greenhouse gas emissions to the atmosphere from engines and incinerator	Ensure that vessel engines and incinerator are maintained and operated in accordance with manufacturer specification in accordance with MARPOL 73/78 Annex VI Prevention of Air Pollution from Ships. Vessel has valid International Air Pollution Prevention certificate. Marine gas oil used will comply with standards outlined in MARPOL 73/78 Annex VI with regards to sulphur.
Ozone Depleting Substances	Release of Ozone Depleting Substances (ODS) from refrigeration and fire fighting equipment.	Register of all equipment containing ODS listed in accordance with MARPOL 73/78 Annex VI. All equipment containing ODS to be appropriately maintained in accordance with the manufacturer's specifications.



Sources of Risk (Hazards)	Potential Environmental Impacts	Controls to Reduce Risk
Underwater Noise From Multi-Beam	Disruption of behaviour of noise sensitive marine fauna.	Frequency and intensity of noise energy sources to be reduced as appropriate for the task. Soft start procedure for the sub-bottom profiler.
and Sub Bottom Profiler		Marine fauna observer employed to watch for cetaceans and whale sharks during operation of the sub-bottom profiler.
		Adherence with EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales.
		Low energy acoustic sources.
		Noise energy directed downwards.
		Frequency and intensity of underwater noise sources to be reduced as appropriate for the task.
Deployment of Corers	Physical disturbance to benthic habitat	Preliminary investigation of coring locations undertaken using multi-beam sonar and areas of high relief, e.g. vertical structures which may support local biodiversity hotspots, avoided.
		All sample locations >60 m depth and as such are unlikely to host coral communities.
		Disturbance from coring will be very localised and restricted.
		Low number of locations (≤20) and short survey duration (<20 days) will result in low levels of disturbance.
Vessel Collision	Acute/chronic toxic effects on	AHO advised of survey prior to commencement to enable Notice to Mariners to be circulated.
Resulting in Hydrocarbon Spill	marine life from hydrocarbons	Vessel operated by appropriately qualified and experienced crew in accordance with all applicable maritime standards and regulations.
		Vessel equipped with modern navigation and positioning equipment.
		Low speed of vessel (10 knots when transiting).
		Adherence to Convention on the International Regulations for Preventing Collisions as Sea 1972 (COLREGS) in every regard, including adequate lookout/watch, navigational shapes and lights reflecting operations at all times.
		Vessel master to advise AMSA RCC of movements to ensure navigation warnings are issued and kept up to date.
		Radar onboard (Automatic Radar Plotting Aid) with collision alarm.
		Double bottomed fuel storage tanks to reduce the likelihood of fuel loss in the event of a collision.
		Vessel has a sealer-class reinforced hull, reducing the likelihood of hull rupture in the event of a collision.
		Total of 12 fuel tanks (largest single tank = 130 m^3) that can be isolated.



Sources of Risk (Hazards)	Potential Environmental Impacts	Controls to Reduce Risk
Vessel Grounding Resulting in	Acute/chronic toxic effects on marine life from hydrocarbons	Vessel operated by appropriately qualified and experienced crew in accordance with all applicable maritime standards and regulations.
Hydrocarbon Spill		Vessel equipped with modern navigation and positioning equipment.
		Low speed of vessel (10 knots when transiting).
		Vessel master to advise AMSA RCC of movements to ensure navigation warnings are issued and kept up to date.
		Master to ensure navigational charts are maintained up to date.
		24 hour operations with survey team noting vessel position at all times.
		Vessel to avoid known shallow areas, with a vessel policy requiring >10 m clearance below keel at all times during the NBSRSSP.
		In the event of loss of main propulsion the independent bow thruster system will still be available.
		Double bottomed fuel storage tanks to reduce the likelihood of fuel loss in the event of grounding.
		Vessel has a seater-class reinforced hull, reducing the likelihood of hull rupture in the event of a collision.
		Total of 12 fuel tanks (largest volume = 130 m^3) that can be isolated.
Collision with	Injury or death of marine fauna	Bridge watch to maintain standard watch procedures and avoid cetaceans or other marine fauna where possible
Marine Fauna		Vessel master will comply with Part 8 of the EPBC Regulations – Interacting with Cetaceans and Whales, by travelling at slow speed within 50 m of an observed dolphin and within 100 m of a whale.
Loss of Solid / Hazardous Waste	Contamination of marine environment with localised	Vessel crew to take precautions against the loss of waste over the side, including ensuring all equipment on deck to be secured when not in use.
Overboard	effects.	In the event of solid / hazardous material being lost overboard attempts to recover the material will be made.
Oil or Chemical	Contamination of the marine	All materials to be handled in accordance with Material Safety Data Sheet.
Spill Through	environment with localised	All liquid chemicals and oils to be stored in bunded containers.
Deck Drainage	acute toxic effects.	Appropriate spill kits available for use in areas of spill risk.
		Good housekeeping/seamanship in stowing chemicals and oils.
		Drains maintained and monitored.
		All deck areas where equipment leaks may occur are bunded.
		Hydraulic deck equipment will be checked for leaks during operations prior to being subjected to load.



/	Sources of Risk (Hazards)	Potential Environmental Impacts	Controls to Reduce Risk
	Entanglement of Marine Fauna in Equipment	Injury or death of marine fauna	Bridge and deck crew to maintain watch for marine fauna and delay deployment of wet equipment if marine fauna risk being entangled. Any marine fauna found entangled in equipment will be returned to the water.
	Loss of Equipment	Localised disturbance to benthic habitat	All equipment deployments carried out in accordance with manufacturer's specifications and safe work procedures.
/			All lifting gear to be load rated as appropriate for the working load.
			Equipment deployments carried out during appropriate weather conditions.
			Visual inspection of lifting gear every six months and annual load testing for wires. Evidence of tests and inspections verified in Common Marine Inspection Document audit.



6.0 SUMMARY OF MANAGEMENT APPROACH

The NBSRSSP will be conducted in accordance with the objectives outlined in the Searcher Environmental and Occupational Health and Safety policies and all relevant legislation, conventions and other requirements.

6.1 Environmental Performance Objectives, Standards and Criteria

Specific objectives, standards and performance criteria for each aspect of the surveys were determined in relation to the environmental hazards identified in Table B. Environmental performance will be measured and reported against these standards and criteria as part of Searcher's commitment to continuous improvement of environmental, health and safety performance.

6.2 Implementation Strategy

The NBSRSSP will be conducted in accordance with the documented systems and practises that comprise the Searcher Integrated Management System. This system contains five core elements:

- 1. Leadership
- 2. Plan
- 3. Do
- 4. Check
- 5. Act

In addition to the adherence with the systems and practices of the Searcher Integrated Management System, vessel specific plans and procedures will be implemented to manage environmental hazards.

6.3 Training and Competencies

All survey personnel will be appropriately trained and required to undertake an on-site induction that includes a description of environmental responsibilities. Induction and training of personnel will be augmented through supervisory review and practical drills during the campaign. Emergency response and/or accidental oil spill response drills will be conducted. A matrix detailing the relevant training, inductions and qualifications relating to the implementation of the environmental responsibilities will be maintained during the survey.



6.4 Monitoring, Auditing, Non-Conformance and Review

During the NBSRSSP the implementation of the controls described in Table B will be monitored and audited for compliance. Audit outcomes will be recorded in a compliance register, which will be sufficiently detailed to demonstrate whether the environmental performance objectives for the NBSRSSP have been met. Any observed nonconformance will be managed in accordance with the requirements of the Searcher Integrated Management System. Searcher will undertake an internal review of the environmental performance of the NBSRSSP at the conclusion of the survey. The outcomes of the review will be incorporated into environmental management measures applied to future activities to further improve Searcher's environmental performance.

6.5 Roles and Responsibilities

Specific roles and responsibilities in relation to the implementation of the EP have been defined. Survey personnel will be informed of their roles and responsibilities during the project specific induction prior to the survey.

6.6 Reporting

Searcher will maintain a record of environmental performance during the NBSRSSP, including an assessment of performance in relation to the environmental performance objectives and standards detailed within the EP. All Reportable and Recordable incidents will be reported as required. Searcher will report on the environmental performance of the NBSRSSP in accordance with the requirements described in Sections 15 and 26 of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*



7.0 CONSULTATION

Consultation with the following organisations and individuals was undertaken during June and August 2013 detailing the survey characteristics, locations, duration and proposed activities. Stakeholders consulted include:

- Australian Customs Service (Coast Watch)
- Australian Fisheries Management Authority (AFMA)
- Australian Hydrographic Office (AHO)
- Australian Maritime Safety Authority (AMSA)
- Australian Southern Bluefin Tuna Industry Association
- Border Protection Command
- Commonwealth Fisheries Association
- Department of Defence (Cwlth) Royal Australian Navy
- Department of Fisheries (Western Australia)
- Department of Mines and Petroleum (Western Australia) (DMP)
- Department of Resources, Energy and Tourism (Cwlth)
- Department of the Environment (Cwlth) (DotE) formerly the Department of Sustainability, Environment, Water, Population and Communities
- Jamaclan Marine Services
- RecFishWest
- Western Australian Fishing Industry Council
- Western Australian Northern Trawl Owners Association.

Stakeholders were initially consulted regarding the NBSRSSP on 4 June 2013, with a follow up consultation to stakeholders who had not replied to the initial consultation on 24 June. An additional round of stakeholder consultation was undertaken between 31 July and 7 August to update stakeholders of a change in the survey timing, giving



further opportunity for comment. All stakeholders who replied to consultation were acknowledged and further information supplied if requested.

Stakeholder responses indicated that:

- Conflicts with other users of the area are unlikely given the distance offshore.
- The survey may affect matters of national environmental significance and as such should be considered for referral to DotE for assessment under the EPBC Act¹
- The survey should not interfere with commercial or recreational fishers providing a Notice to Mariners advising of the survey is issued.
- The vessel master should adhere with all applicable maritime rules and standards.
- The AMSA Rescue Coordination Centre (RCC) should be advised of vessel movements during the NBSRSSP.
- The NBSRSSP will take place in proximity to the Cartier Island Air Weapons Range and there is the potential for unexploded ordinance both within and beyond the boundary of the range. The Department of Defence advised that all survey activities undertaken are at Searcher's own risk.
- The risk to fish larvae from underwater noise and the risk of translocation of marine species should be considered.
- The following parties requested notification of the survey prior to commencement
 - DMP (and upon completion of the survey)
 - AHO
 - Border Protection Command
 - AMSA RCC.

¹ The NBSRSSP was referred to DotE for assessment under the EPBC Act and on 26 September 2013 was determined to be "Not a controlled action if undertaken in a particular manner" (EPBC 2013/6980)



8.0 PROPONENT CONTACT DETAILS

The proponent for the NBSRSSP is Searcher Seismic Pty Ltd. Contact details for the operator are as follows:

Paul Miller

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