



WEST SEAHORSE PROJECT

GEOPHYSICAL & GEOTECHNICAL SURVEY

ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)

(GIPPSLAND BASIN)

Doc No : WSH-CHP-10-RG-LC-002

Rev	Issue Date	Reason For Issue	Originator	Reviewer	Approver
1	09/01/2014	REVISED FOR ALTERED SURVEY TIMEFRAME	L.CHAPMAN	B.SCHEEPERS	T. STENSGAARD
0	23/07/2013	ISSUED TO NOPSEMA	L. CHAPMAN	M. POOLE	T. STENSGAARD

	<h2>West Seahorse Project</h2>	Page 2 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

This is an electronically generated document which has been reviewed and approved in accordance with Hibiscus Petroleum Management System. An audit trail of review and approval is available within the electronic document management system.

The Electronic Document Management System Latest Revision of this document is the CONTROLLED COPY at all times. When printed it is considered a FOR INFORMATION ONLY copy, and it is the holder's responsibility that he / she holds the latest valid version.

☒, Hibiscus Petroleum Or A Subsidiary Thereof, Copyright 2012 And Design Right Reserved. Copying, Distribution And/Or Disclosure Of The Confidential Information Contained Herein Is Prohibited Without Written Permission Of The Proprietor.

TABLE OF CONTENTS

1.0	INTRODUCTION	5
2.0	ACTIVITY LOCATION	6
3.0	ACTIVITY DESCRIPTION	8
3.1	SURVEY SCOPE	8
3.2	SURVEY VESSELS	10
4.0	DESCRIPTION OF THE RECEIVING ENVIRONMENT.....	11
4.1	GENERAL ENVIRONMENTAL SETTING	11
4.2	PHYSICAL ENVIRONMENT.....	11
4.3	MARINE SPECIES.....	12
4.4	SOCIAL ENVIRONMENT.....	13
4.4.1	COMMERCIAL SHIPPING	13
4.4.2	FISHERIES	14
4.4.3	COMMONWEALTH/STATE HERITAGE	14
4.4.4	OIL & GAS DEVELOPMENT	15
5.0	ASSESSMENT OF ENVIRONMENTAL HAZARDS AND CONTROLS.....	16
6.0	SUMMARY OF MANAGEMENT APPROACH	24
7.0	CONSULTATION PROCESS.....	25
8.0	CONTACT DETAILS.....	26
9.0	REFERENCES	27

	<h2>West Seahorse Project</h2>	Page 3 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

ABBREVIATIONS

μPa	Micro-pascal
AFMA	Australian Fisheries Management Authority
AHO	Australian Hydrographic Office
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
AMSA	Australian Maritime Safety Authority
ASBTIA	Australian Southern Bluefin Tuna Industry Association
CAMBA	China/Australia Migratory Birds Agreement
CFA	Commonwealth Fisheries Association
CPT	Cone Penetration Tests
dB	Decibels
DEPI	Department of Environment and Primary Industry
DSDBI	Department of State Development, Business and Innovation
DOC	Department of Communication
DOE	Department of Environment
DP	Dynamic Positioning
DSDBI	Department of State Development, Business and Innovation
ENE	East-North-East
EPBC	Environment Protection Biodiversity Conservation
ESTF	Eastern Skipjack Tuna Fishery
ETBF	Eastern Tuna and Billfish Fishery
FSO	Floating Storage and Offloading Vessel
GHaT	Gillnet, Hook and Trap Sectors
Ha	Hectares
Hz	Hertz
IMO	International Maritime Organisation
IMS	Invasive Marine Species
JAMBA	Japan/Australia Migratory Birds Agreement
JVP's	Joint Venture Partners
kHz	Kilohertz
km	Kilometre
LEFCOL	Lakes Entrance Fisherman's Cooperative Pty Ltd
m	Metres
MARPOL	Marine pollution protocol
MBES	Multibeam Echo Sounders
MDO	Marine Diesel Oil
MGO	Marine Gas Oil
MOPU	Mobile Offshore Petroleum Unit
MSDS	Material Safety Data Sheet
NE	North East
NNTT	National Native Title Tribunal
NOO	National Oceans Office



West Seahorse Project

Page 4 of 27

WSH-CHP-10-RG-LC-0002

**GEOTECHNICAL & GEOPHYSICAL SURVEY
ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)**

Rev 1

NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
NOx	Nitrous oxides
OCNS	Offshore Chemical Notification Scheme
ODME	Oil Detection Monitoring Equipment
OIW	Oil in Water
OPGGSA	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OPGGSER	Offshore Petroleum and Greenhouse Gas Storage (Environment) regulations 2009
OSCP	Oil Spill Contingency Plan
PLONOR	Poses Little or No Risk
POB	Persons on Board
PROD	Portable remotely operated drill
R	Regulation
RAMSAR	RAMSAR Convention on Wetlands
RCC	Rescue Coordination Centre
ROKAMBA	Republic of Korea/ Australia Migratory Birds Agreement
SBTF	Southern Bluefin Tuna Fishery
SEL	Sound Exposure Level
SESSF	Southern and Eastern Scalefish and Shark Fishery
SETFIA	South East Trawl Fishing Industry Association
SFD	Seafloor Drilling
SIV	Seafood Industry Victoria
SOLAS	Safety of Life at Sea Convention
SOPEP	Shipboard Oil Pollution Emergency Plan
SOx	Sulphur oxides
SPF	Small Pelagic Fishery
SSE	South-south east
SSW	South-South-West
STCW95	International Convention on Standards of Training, Certification and Watch-keeping
SW	South West
Tcf	Trillion cubic feet
TTS	Temporary Threshold Shift
VIC	Victoria
W	West
WA	Western Australia
WNW	West-North-West
WSH	West Seahorse
WSW	West-South-West

	<h2>West Seahorse Project</h2>	Page 5 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

1.0 INTRODUCTION

Carnarvon Hibiscus ('Hibiscus'), on behalf of the West Seahorse (WSH) Joint Partners (JVPs), Hibiscus and 3D Oil Limited, is proposing to undertake a Geotechnical and Geophysical Survey in the Commonwealth waters (Gippsland Basin) to support site selection for the WSH Development infrastructure. The WSH survey area lies in Petroleum Production Licence VIC/L31 and Exploration Permit VIC/P57.

The purpose of the survey is to:

- Obtain information on the seabed conditions at the WSH location for the proposed development infrastructure (Mobile Offshore Production Unit [MOPU], export crude flowline and Floating Storage and Offloading [FSO] Vessel); and
- Geotechnical information for the MOPU foundations and anchoring of the FSO's Rigid Arm.

Hibiscus, as nominated Environmental Operator for this petroleum activity within VIC/L31 and VIC/P57, has prepared an Environment Plan in accordance with the requirements of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* which has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

This Environment Plan Summary document has been prepared to comply with the requirements of Regulation 11(7) and (8) of the referenced *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*.

	<h1>West Seahorse Project</h1>	Page 6 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

2.0 ACTIVITY LOCATION

The WSH Field is located in Production Licence VIC/L31 in Bass Strait. The survey area is located within VIC/L31 with a small portion located in Exploration Permit VIC/P57. The WSH Field is located approximately 18km SSE of Loch Sport, with the closest landfall site 14km north-west on the Ninety Beach at a point midway between Loch Sport and Golden Beach (refer **Figure 2-1**).

The WSH Geophysical/Geotechnical survey will be undertaken within the area defined by the coordinates provided in **Table 2-1** which covers an area of approximately 1500Ha in approximate water depths of between 35-45m. **Figure 2-2** provides details of the proposed WSH survey area.

Table 2-1: WSH Development Survey Area (GDA94)

Point	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
PSLM1	38	11	38.97	147	38	52.23
PSLM2	38	10	21.60	147	37	38.60
PSLM3	38	12	01.12	147	34	52.69
PLSM4	38	13	17.51	147	36	02.62

Figure 2-1: Regional Location of the WSH Field

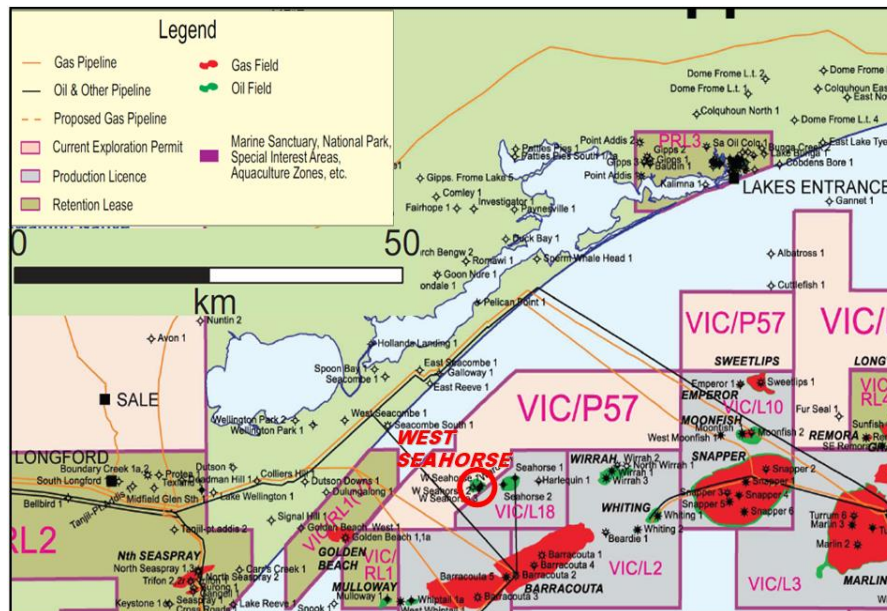
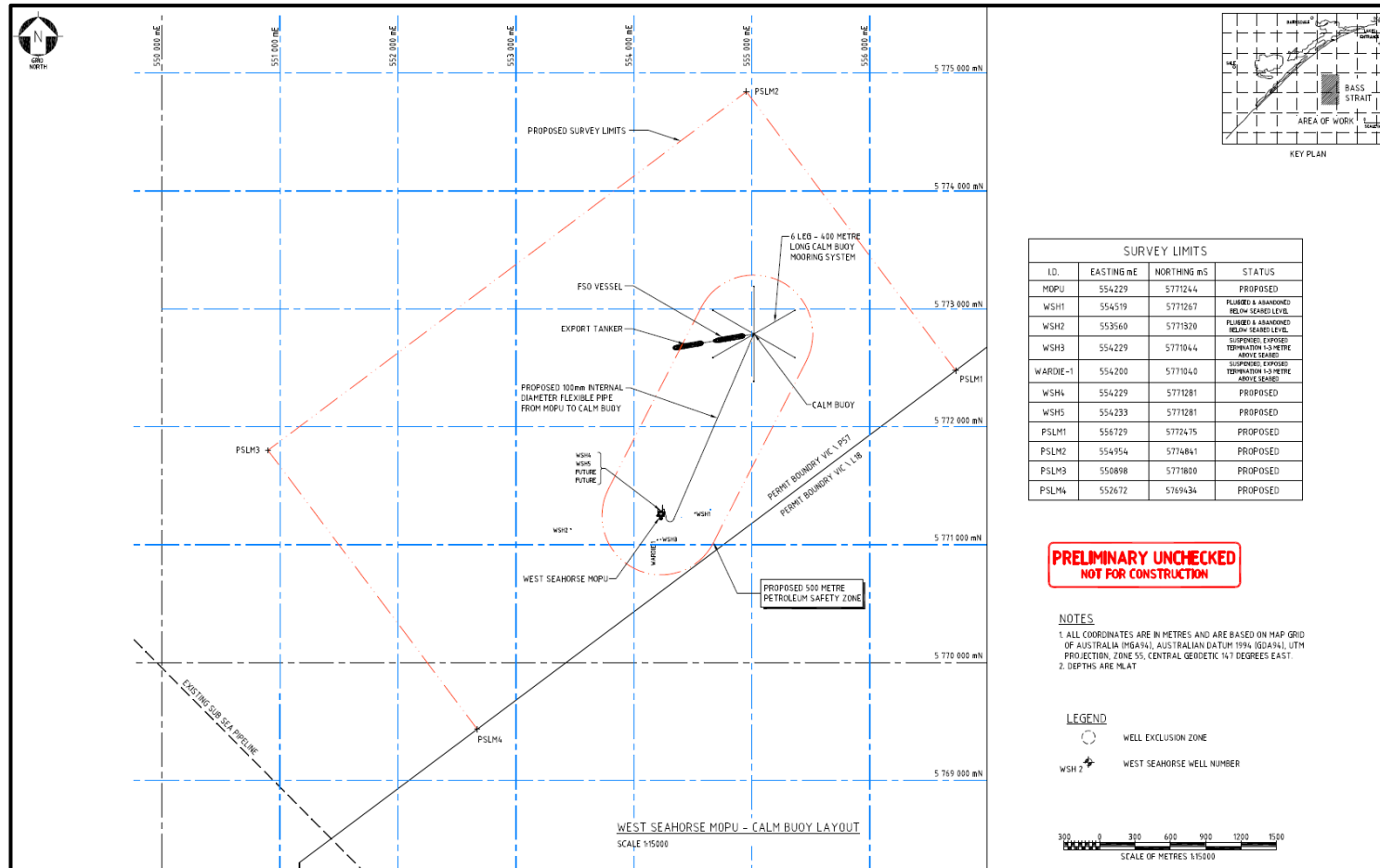


Figure 2-2: WSH Development Survey Area



	<h2 style="margin: 0;">West Seahorse Project</h2>	Page 8 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

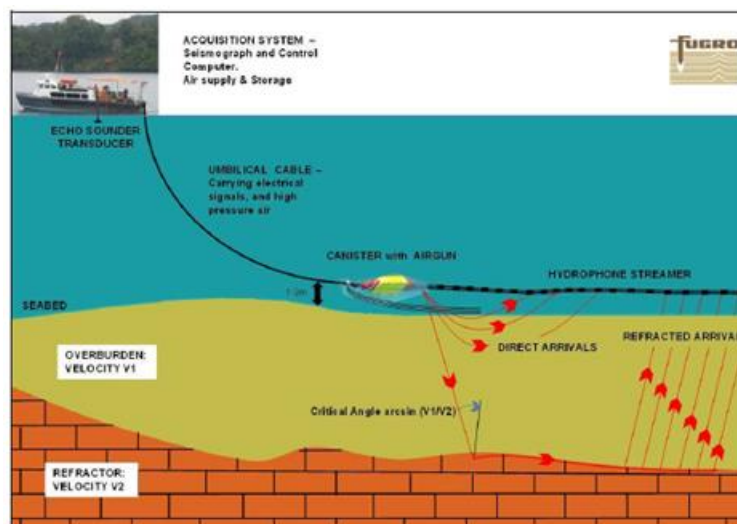
3.0 ACTIVITY DESCRIPTION

3.1 SURVEY SCOPE

The survey scope consists of the following two components:

- **Geophysical Survey** which may consist of:
 - **Bathymetry** assessment across the alignment measured using a Multibeam Echo Sounder (MBES). This equipment emits sound levels of 220dB re 1 μ Pa at a frequency of approximately 200kHz (high frequency);
 - **Refraction sub-bottom profiling** (obtaining subsurface data to depths of 6-8m below seabed) will be undertaken using a small airgun (volume 5in³@1000psi) towed just above the seabed (0.5-1.0m) and a 32m long hydrophone streamer to collect reflected signals. The maximum sound source pressure level emitted by this small airgun is 168dB re 1 μ Pa at frequencies less than 200Hz (low frequency)¹. A schematic of the Refraction system is provided in **Figure 3-1**; and
 - **Reflection sub-bottom profiler** boomer system (obtaining data to 20m depth below seabed). This equipment emits sound levels of 215dB re 1 μ Pa at a frequency centred around 3kHz (mid frequency).
- **Geotechnical Survey** which may consist of:
 - Cone Penetration Test (CPT):
 - 2 x 40m (i.e. 2 CPTs to 40m below seabed);
 - 9 x 25m;
 - 5 x 6m;
 - Boreholes:
 - 2 x 40m (100mm diameter) boreholes (MOPU Location)
 - 9 x 25mm (100mm diameter) (mooring anchor locations);
 - Vibrocores: 14 x 6m; and
 - Grab Samples: 14 x 1.5m of seabed sediment (to 0.5-1m depth).

Figure 3-1: Refraction Profiler Configuration



¹ As a comparison, marine seismic arrays emit sound source levels between 230-255dB re 1 μ Pa; vessels such as tugs and barges emit sound source levels of approximately 171dB re 1 μ Pa; and trawlers emit sound at 158dB re 1 μ Pa.

	<h2>West Seahorse Project</h2>	Page 9 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

For the geophysical survey activities the MBES bathymetry data will be collected concurrently with the refraction (airgun) survey lines and additional bathymetry infill lines will be obtained to achieve 100% bathymetry coverage. The refraction and reflection sub-bottom profiling surveys cannot be undertaken simultaneously, therefore following a preliminary onboard assessment of the refraction data, the reflection (Boomer) survey will be carried out along the same refraction lines to allow for overlap of data.

Equipment which may be utilized for the geotechnical survey activities include:

- **Seabed CPT Unit:** This testing method pushes an instrumented cone into the sediment using a seabed reaction frame and records the resistance of the head of the cone. The footprint of the equipment when resting on the seabed is approximately 2m x 2m. The diameter of the CPT rod pushed into the seabed is ~44 mm and is expected to generate a surface diameter of 66mm (the hole will be self-closing after the CPT rod is withdrawn);
- **Vibrocore Equipment:** Vibrocore equipment is an electrically driven vibrating corer capable of obtaining 76mm diameter cores. Corers consist of a demountable tower, and watertight aluminium/steel vibrating drive unit containing two 3-phase electric motors. The corer stands freely on the seabed, braced by three 2.5m long retractable legs with attachments to winch cable and an independent electrical cable;
- **Seabed Drilling Systems:**
 - **Sea Floor Drilling (SFD):** The SFD package utilizes wire-line coring to obtain subsurface soil samples from an aluminium core barrel installed by a rotary drill bit. The footprint of the equipment is 3.8m (W) x 5.4m (L) x 6.6m (H). The equipment produces a core diameter of up to 83mm.
 - **ROVDrill:** A self-contained drilling and geotechnical testing system utilizing a polymer injection mud system with real-time monitoring of the operation (cameras and sensors). The footprint of the equipment when resting on the seabed is 2.3m (W) x 5.5m (L) x 5.4m (H). The equipment produces a core diameter of up to 85mm.
 - **Portable Remotely Operated Drill (PROD) System:** This fully self-contained PROD system utilizes a rotary system to undertake geotechnical surveys and has a seabed footprint of 2m (W) x 2m(L)x 3m(H). This equipment produces a core diameter of 44mm.

All units are controlled manually from surface vessels utilizing closed-system hydraulics.

All seabed drilling units may utilize additives to the seawater drilling fluid to optimize coring activities. These chemicals include polymer muds such as Pure-Bore Liquid or equivalent.

The Geotechnical and Geophysical survey may be undertaken as two separate activities (i.e. two vessel mobilizations) with the geophysical survey informing the location of subsequent geotechnical activities within the survey area. Scopes for these survey(s) are found in **Table 3-1**.

Table 3-1: Possible Geophysical/Geotechnical Program Scope

Survey	Scope/Details
Survey 1: Geophysical/ Geotechnical Survey Duration: ~10-12days	Scope: <ul style="list-style-type: none"> • Bathymetry Assessment (MBES) • Refraction Sub-bottom Profiling (Airgun) • Reflection Sub-bottom Profiling (Boomer) • 10 x 5m Cone Penetration Tests • 14 x 1.5m grab samples of seabed sediment (to 0.5m-1m depth).

	<h2>West Seahorse Project</h2>	Page 10 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

Survey	Scope/Details
	Vessel Requirements: Small local marine survey vessel with crane capability to launch CPT unit with the following typical specifications: <ul style="list-style-type: none"> • Gross Tonnage ~300tonnes; • Length ~35m; • Breadth ~11m; • Draft~2m; • POB~32 persons; • Max Fuel Tank size~25m³ (Marine Diesel Oil)
Survey 2: Geotechnical Survey Duration: ~25days	Scope: <ul style="list-style-type: none"> • 2 x 40m (100mm diameter) borehole (MOPU location); • 9 x 25m (100mm diameter) boreholes (mooring anchor locations); • CPTs: 2 x 40m; 9 x 25; 5 x 6m; • 14 x 6m vibrocores; • 14 x 1.5m grab samples of seabed sediment (to 0.5m-1m depth). Vessel Requirements: Larger Marine Survey vessel with the following typical specifications: <ul style="list-style-type: none"> • Gross Tonnage ~2440-4500tonnes; • Length ~67-90m; • Breadth ~16-20m; • Draft~6m; • POB~40-60 persons; • Max Fuel Tank size~80m³ (Marine Diesel Oil)

The Geophysical and Geophysical Surveys will operate on a 24hr/7day basis and will be undertaken during the period January 1st and April 30th 2014.

Timing of the commencement of the geophysical and geotechnical fieldwork is dependent on sea states suitable for data acquisition, the availability of a survey vessel and the granting of approvals from appropriate government authorities.

3.2 SURVEY VESSELS

The survey vessel for the proposed WSH geophysical and geotechnical survey has not yet been selected. Dependent on the geotechnical scope of work², it is possible that the selected geophysical survey vessel may undertake the complete geophysical/geotechnical work-scope. In this instance a smaller geophysical survey vessel may mobilize to the WSH location from Lakes Entrance. If a larger geotechnical vessel is required to undertake boring works, the vessel will mobilize from Australian waters, however from ports located outside the Gippsland Basin.

All vessels selected for the WSH survey activities will have the necessary Class Certification/Registration and will be compliant with all the requirement of the MARPOL/SOLAS conventions including a Shipboard Oil Pollution Emergency Plan (SOPEP) (or equivalent appropriate to size and class) in accordance with MARPOL 73/78 Annex I (Regulation 37) and the *Protection of the Seas (Prevention of Pollution from Ships) Act 1983*.

During the survey, no 'at sea' refueling will take place. All crew changes and resupply of vessels will take place at port.

The supply port for the smaller geophysical survey is expected to be Lake Entrance. The supply port for a larger geotechnical survey vessel, if required, is expected to be Port of Geelong.

² Seabed Drilling System deployment (for bores) will require a larger multi-purpose dynamically-positioned (DP) geotechnical survey vessel for the activity.

	<h2 style="margin: 0;">West Seahorse Project</h2>	Page 11 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

4.0 DESCRIPTION OF THE RECEIVING ENVIRONMENT

4.1 GENERAL ENVIRONMENTAL SETTING

The WSH survey area is located on the Twofold Shelf Bioregion of the South East Marine Region (NOO, 2002). The continental shelf is relatively narrow in the northern section, becoming much broader and shallower in the southern area of the Gippsland Basin. The Twofold Shelf area is strongly influenced by a number of different currents that run through and near by the shelf, bringing both warm and cool currents. Nutrients from cooler upwellings supply rich biota that thrives in the warmer, shallower shelf region (NOO, 2002). Fauna is characterized by assemblages of reef fish, echinoderms, gastropods and bivalves (NOO, 2002).

The coastline consists of long sandy beaches broken by rocky headlands and numerous coastal lagoons. Estuary systems occur along the coastline within the region, with the larger estuaries located at Lakes Entrance (Gippsland Lakes); Sydenham Inlet and Mallacoota Inlet (NOO, 2002). Most of these estuary systems are normally closed to the marine environment.

The nearest **Victorian State Marine Reserves** to the survey area are:

- Ninety Mile Beach Marine National Park is located approximately 37km southwest;
- Nooramunga Marine and Coastal Park (Vic) is located approximately 77km southwest;
- Beware Reef Marine Sanctuary located approximately 105km ENE;
- Wilsons Promontory Marine Park is located approximately 130km SW; and
- Point Hicks State Marine National Park (VIC) located approximately 150km ENE.

The nearest **Commonwealth Marine Reserves** to the survey area are:

- East Gippsland Commonwealth Marine Reserve located approximately 200km ESE; and
- Beagle Commonwealth Marine Reserve located approximately 110km SSW.

The nearest **Coastal Park** to the survey area is the Gippsland Lakes Coastal Park, located approximately 14km west, and is a narrow coastal reserve covering 17000Ha along the Ninety Mile Beach from Seaspray to Lakes Entrance. The park consists of lakes and wetlands and is jointly managed by Parks Victoria and the Gunaikurnai as traditional owners of the land. The area is popular for camping along Shoreline Drive, surf fishing and swimming and is rich in wildlife including Eastern Grey Kangaroos, Black Wallabies and the Common brush-tail and Ring-tailed possums (Parks Victoria, 2013). This coastal park forms a dune barrier which protects the Gippsland Lakes RAMSAR site from sea-based impacts. This RAMSAR area contains 540 flora species and 300 species of indigenous fauna and migratory bird species listed under the Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) (Parks Victoria, 2003).

4.2 PHYSICAL ENVIRONMENT

The climate of the Twofold Shelf bioregion is moist, cool temperate with warm summers and a tendency towards winter-spring rainfall (NOO, 2002).

Tenements VIC/L31 and VIC/P57 are protected from south-westerly swells by Tasmania but are strongly influenced by south-easterly and easterly swells of height 1-1.5m with maximum heights varying between 1.9-2.7m (LCC, 1993; cited in Barton et al, 2012). Stalled low pressure systems in the Tasman Sea during summer can generate higher wave energy at this time (NOO, 2002).

Tides within the South East Marine Region show seasonal variation with spring tides of approximately 0.9m and neap tides of 0.6m (Parks Victoria, 2013). Strong semi-diurnal tidal currents (2-2.5knots) run parallel to the coast and are characteristic of this area (Barton et al, 2012).

The seabed at the WSH location is relatively flat and featureless on a sandy seabed with localized depressions (not considered pock-marks) in water depths of approximately 38-40m. No debris is evident at the current WSH-3 location [*part of the survey area*] (Fugro, 2007).

	<h2>West Seahorse Project</h2>	Page 12 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

4.3 MARINE SPECIES

The Southeast Marine Region displays a large diversity of plant and animal species. In addition to high diversity, the region has large numbers of endemic species including 600 species of fish, of which 85% are thought to be endemic and 11% are common only to waters of neighbouring New Zealand.

Mega fauna species such as whales, shark and turtles migrate through these waters. A search of the EPBC Act Protected Matters Database (SEWPC, 2013a) identified the following species as potentially having habitat within the survey area (refer **Table 3-1**):

- Twelve (12) species of cetacean are listed. Three (3) species have a threatened status and eight (8) species have a migratory status. *It is possible that some of the listed cetacean species may be encountered in the survey area on a transitory basis only. The survey area is not considered biologically significant (i.e. breeding, feeding or resting) for these species;*
- Three (3) reptile species have a threatened and migratory status. *Encounter with marine turtles is expected to be low as the WSH survey area is considered outside the usual range or does not contain suitable habitat (i.e. deep water) for a number of the listed turtle species;*
- Three (3) species of shark are listed. Two (2) species have a threatened status and all species have a migratory status. *Species are expected to have a transitory presence in the survey area and encounter is expected to be low;*
- Eighteen (18) bird species are listed as threatened and sixteen (16) listed as migratory marine bird species. *These birds may overfly and forage in the WSH survey area, however the survey area is not biologically significant for these marine bird species;*
- Twenty-seven (27) species of fish are listed including one which is vulnerable, nineteen (19) species of pipefish, three (3) species of pipe-horse, one (1) species of sea-dragon and four (4) species of sea-horse; and
- Two additional mammal species also have habitat within Bass Strait waters, the New Zealand Fur Seal (*Arctocephalus forster*) and Australian Fur Seal (*Arctocephalus pusillus doriferus*) (Shaughnessy, 1999). These species do not have an EPBC protection status but are listed under that legislation and may be encountered foraging within the survey area. The closest breeding site is at Wilson's promontory (~130km SW) and the Skerries (~175km NE).

Table 4-1: EPBC Listed Threatened/Migratory Species for the WSH Survey Corridor (SEWPC, 2013a)

Status:

E: Endangered
V: Vulnerable
M: Migratory
L: Listed

Likelihood of Occurrence:

LO: Species/species habitat likely to occur in area
MO: Species/species habitat may occur within area
KO: Species/species habitat known to occur within area
BLO: Breeding Likely to Occur
FLO: Foraging Likely to Occur

Species Type	Scientific Name	Common Name	EPBC Status	Type of Presence
Marine Birds	<i>Apus pacificus</i>	Fork-tailed Swift	M	LO
	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	KO
	<i>Diomedea epomophora epomophora</i>	Southern Royal Albatross	V, M	MO
	<i>Diomedea epomophora sanfordi</i>	Northern Royal Albatross	E, M	MO
	<i>Diomedea exulans antipodensis</i>	Antipodean Albatross	V, M	FLO
	<i>Diomedea exulans exulans</i>	Tristan Albatross	E, M	MO
	<i>Diomedea exulans gibsoni</i>	Gibson's Albatross	V, M	FLO
	<i>Diomedea exulans (sensu lato)</i>	Wandering Albatross	V, M	FLO
	<i>Fregetta grallaria grallaria</i>	White-bellied Storm Petrel	V	LO

Status:

E: Endangered
V: Vulnerable
M: Migratory
L: Listed

Likelihood of Occurrence:

LO: Species/species habitat likely to occur in area
MO: Species/species habitat may occur within area
KO: Species/species habitat known to occur within area
BLO: Breeding Likely to Occur
FLO: Foraging Likely to Occur

Species Type	Scientific Name	Common Name	EPBC Status	Type of Presence
	<i>Halobaena caerulea</i>	Blue Petrel	V	MO
	<i>Macronectes giganteus</i>	Southern Giant-Petrel	E, M	MO
	<i>Macronectes halli</i>	Northern Giant-Petrel	V, M	MO
	<i>Puffinus carneipes</i>	Flesh-footed Shearwater	M	FLO
	<i>Sternula nereis nereis</i>	Fairy Tern	V	KO
	<i>Thalassarche bulleri</i>	Buller's Albatross	V,M	MO
	<i>Thalassarche cauta cauta</i>	Tasmanian Shy Albatross	V, M	MO
	<i>Thalassarche chrysostoma</i>	Grey-headed Albatross	E, M	MO
	<i>Thalassarche melanophris</i>	Black-browed Albatross	V, M	MO
	<i>Thalassarche cauta salvini</i>	Salvin's Albatross	V, M	MO
	<i>Thalassarche impravida</i>	Campbell Albatross	V,M	MO
Marine Mammals	<i>Balaenoptera acutorostrata</i>	Minke Whale	L	MO
	<i>Balaenoptera edeni</i>	Bryde's Whale	M	MO
	<i>Balaenoptera musculus</i>	Blue Whale	E, M	LO
	<i>Caperea marginata</i>	Pygmy Right Whale	M	MO
	<i>Delphinus delphis</i>	Common Dolphin	L	MO
	<i>Eubalaena australis</i>	Southern Right Whale	E, M	KO
	<i>Grampus griseus</i>	Risso's Dolphin	L	MO
	<i>Lagrorhynchus obscurus</i>	Dusky Dolphin	M	MO
	<i>Megaptera novaeangliae</i>	Humpback Whale	V, M	LO
	<i>Orcinus orca</i>	Killer Whale	M	MO
	<i>Tursiops aduncus</i>	Spotted Bottlenose Dolphin	L	LO
	<i>Tursiops truncatus</i>	Bottlenose Dolphin	L	MO
	<i>Arctocephalus forsteri</i>	New Zealand Fur Seal	L	MO
	<i>Arctocephalus pusillus</i>	Australian Fur Seal	L	MO
Sharks/Fish	<i>Carcharodon carcharias</i>	Great White Shark	V, M	MO
	<i>Lamna nasus</i>	Porbeagle, Mackerel Shark	M	LO
	<i>Irurus oxyrinchus</i>	Shortfin Mako, Mako Shark	M	LO
	<i>Rhincodon typus</i>	Whale Shark	V, M	MO
	<i>Prototroctes maraena</i>	Australian Grayling	V	LO
Reptiles	<i>Caretta caretta</i>	Loggerhead Turtle	E, M	LO
	<i>Chelonia mydas</i>	Green Turtle	V,M	KO
	<i>Dermochelys coriacea</i>	Leatherback Turtle	E, M	LO

4.4 SOCIAL ENVIRONMENT

4.4.1 Commercial Shipping

Bass Strait is one of Australia's busiest commercial shipping routes in Australia with more than 3000 vessels making the east-west passage through Bass Strait each year (NOO, 2002). A vessel traffic separation scheme has been instituted between the Victorian/NSW border and Wilsons Promontory to enhance maritime safety in the area separating shipping into discrete, one direction lanes. Additionally, an "Area to be Avoided" has been designated by the International Maritime Organisation (IMO) to protect the Esso-BHP Bass Strait Oil and Gas Facilities. As such all ships over 200 gross tonnage are restricted to the shipping channels to the east and south of this area.

	<h2>West Seahorse Project</h2>	Page 14 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

The proposed WSH survey area is located within the Bass Strait 'Area to be Avoided'. AMSA (2013) has advised that vessel encounter will be limited to commercial fishing and recreational vessels.

4.4.2 Fisheries

Commonwealth fisheries, managed by the Australian Fisheries Management Authority (AFMA), and Victorian state-managed fishing areas, managed by the Victorian Department of Environment and Primary Industries (DEPI) are located in the WSH survey area. Fisheries form a significant source of employment and income to the region.

AFMA (2012) have advised that the WSH survey area lies in the following Commonwealth-managed fishing areas:

- Southern and Eastern Scalefish and Shark Fishery (SESSF) (includes the Commonwealth Trawl Sector (CTS), Gillnet, Hook and Trap Sectors (GHaT)) (*consultation has identified that Danish seine operators, predominantly located at Lakes Entrance, may be present in the area at the time of the WSH survey*);
- Small Pelagics Fishery (SPF) (*consultation has identified that it is unlikely that members of the SPF will be present in the WSH survey area during the survey*);
- Southern Bluefin Tuna Fishery (SBTF) (*consultation has identified that this fishery does not operate in the WSH survey area*);
- Eastern Tuna and Billfish Fishery (ETBF) (*consultation has identified that members of this fishery will not be present in the WSH survey area*);
- Skipjack Tuna Fishery (*consultation has identified that this fishery does not operate in the WSH survey area*); and
- Southern Squid Jig Fishery (*consultation has identified that it is unlikely that members of this fishery will have a presence in the area at the time of the WSH Survey*).

DEPI (2013) has advised that the following state-managed fisheries which are permitted to operate within the WSH Survey area include the following:

- Ocean Access Fishery (*this fishery may be active within the area during the survey*);
- Ocean Purse Seine Fishery (*consultation identified that only one Licence is active in Victorian waters*);
- Rock Lobster Fishery (*consultation has identified that given the sandy substrates within the WSH survey area, rock lobster fishermen do not actively fish the area*);
- Giant Crab Fishery (*consultation has identified that no commercial fishery is present in the area and crab fishermen do not actively fish the area*);
- Inshore (Ocean) Trawl Fishery (*this fishery has not been recorded as having a fishing presence in the WSH survey area*); and
- Ocean Scallop Fishery (*this fishery opened on April 1, 2013 (12 month season) and given the predominant fishing season (May to November) is not likely to be present in the WSH survey area during survey activities*).

DEPI (2013) also advises that in the past ten years only two fisheries have been active within the WSH survey area – the Ocean Access Fishery and the Ocean Scallop Fishery.

4.4.3 Commonwealth/State Heritage

There are no listed Commonwealth Heritage Places, National Heritage Places or places on the Register of National Estate within, or in the immediate vicinity of the proposed WSH survey area. The closest Commonwealth Heritage Place is the Gabo Island Lighthouse located 215km ENE of the survey area (SEWPC, 2013b).

	<h2>West Seahorse Project</h2>	Page 15 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

Review of the National Shipwreck Database showed that no Historic Shipwrecks lay within the WSH survey area (SEWPC, 2013c). The closest shipwreck is the *Julius* (16km NE of the survey location). Other wrecks include an unknown wreck 45km south of the survey area, *Trinculo* (1879) wrecked on Ninety Mile Beach (25km from survey location) and the *Norfolk*, also wrecked on Ninety Mile Beach approximately 20km from the survey location (SEWPC, 2013c).

4.4.4 Oil & Gas Development

The Gippsland Basin has been producing hydrocarbons since 1969 (a total of 4 billion barrels of liquids and 9.8Tcf of gas to the end of June 1998). Currently the Gippsland Basin has (DPI, 2011):

- Seventeen (17) developed offshore oil and gas fields;
- Twenty-four (24) offshore production facilities (platforms, mono-towers & subsea completions); and
- Over 600km of pipeline network.

Onshore oil and gas processing facilities are located at both Longford and Orbost. Most of this infrastructure is operated by Esso Australia Resources Pty Ltd.

The WSH survey is located approximately 11.5km WNW of Esso-BHP's Barracouta platform and 5km west of the Seahorse subsea wellhead. The survey location is 38km east of the Longford Onshore Processing Facility.

The WSH survey area is located within Production Licence Area VIC/L31 and Exploration Permit VIC/P57.

	<h2>West Seahorse Project</h2>	Page 16 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

5.0 ASSESSMENT OF ENVIRONMENTAL HAZARDS AND CONTROLS

In accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* R14(3) and R14(3A), an environmental hazard identification and risk assessment has been undertaken to evaluate the potential sources of environmental impact associated with the WSH survey activities. This included an assessment of risks arising from operational activities, unplanned events (non-routine/accident) and incident response activities and can be grouped into the following broad categories:

- Mobilization of Survey Vessel to Survey area:
 - Introduction of Invasive Marine Species (IMS) from biofouling;
- Physical presence of the Survey Vessel³:
 - Disruption to commercial fishing activities and third party vessel movement;
- Sound impacts to the marine environment⁴:
 - Discharge of acoustic sound sources in the survey area;
 - Sound from operation of vessels;
- Seabed Disturbance Activities;
 - Cone Penetration Tests (CPTs)/boring;
 - Drilling fluid releases;
- General vessel operations:
 - Routine waste discharges from the survey vessel:
 - Oily water discharge;
 - Sewage discharges;
 - Food-scrap discharges; and
 - Air Emissions (combustion sources);
- Non-Routine events;
 - Accidental hydrocarbon spill due to collision with another vessel or vessel integrity incident;
 - Chemical/oil spill through deck drain system;
 - Solid non-biodegradable/hazardous waste overboard incident;
 - Towed Equipment loss in the marine environment;
 - Hydraulic line liquid release from subsea equipment; and
 - Collision with a cetacean.

Implemented control measures identified in **Table 5-1** ensure that the environmental risk associated with these hazards is as low as reasonably practicable (ALARP). Control measures are taken into consideration in calculating the residual risk associated with the activity impact reflected in **Table 5-1**.

³ Lighting on-board vessel will be limited to navigation lighting and workplace safety requirements. The WSH location is not in proximity to sensitive location such as turtle or seabird nesting beaches (i.e. ~14km from shore). This hazard, and its possible impact, is considered ALARP on this basis.

⁴ No helicopter operations will occur for these survey activities.



West Seahorse Project

WSH-CHP-10-RG-LC-0002

GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)

Rev 1

Table 5-1: WSH Geotechnical/Geophysical Survey Environmental Risk Summary

Aspect	Possible Impacts	Control/Mitigation Measures	Residual Risk
Mobilisation			
Vessel entry into Twofold Shelf Waters (Introduction of IMS)	Alteration of local ecosystem by IMS through Vessel Bio-fouling	<p><u>Prevention Controls:</u> Vessels entering Twofold Shelf waters will be risk-assessed in accordance with the <i>National Biofouling Management Guidelines for the Petroleum Production & Exploration Industry</i> (2009). Corrective actions identified within that risk assessment will be completed and the vessel will be considered low risk prior to mobilisation; In-field equipment is inspected and cleaned between survey operations; Where possible, local vessels will be used for survey activities.</p>	LOW
Presence of Vessel in Permit Area			
Presence of Vessel Activities	Interference with Commercial Fishing Activities (Spatial Conflicts)	<p><u>Prevention Controls:</u> Stakeholder consultation with fisheries to advise of activity, understand issues and identify practicable controls to reduce impacts; Detailed notifications to marine users prior to survey commencement and on survey completion; On-going consultation with relevant fisheries during activity; Notification issued to AMSA RCC who will issue shipping warnings (AusCoast) to minimise potential for marine activity conflicts; Notice to Mariners issued by AHO for activity.</p> <p><u>Mitigation:</u> During Survey 1 (geophysical/geotechnical) vessel can deviate to avoid fishermen presence (i.e. no substantial trailing equipment); Radio communication with third party vessels (if spatial conflict).</p>	LOW
	Disruption to Other Marine Stakeholders (Third Party Vessels) (Diversion)	<p><u>Prevention Controls:</u> Stakeholder consultation with commercial shipping to advise of activity and identify any issues to identify controls to minimise impacts; Notification issued to AMSA RCC who will issue shipping warnings (AusCoast) to minimise potential for marine activity conflicts; Notice to Mariners issued by AHO for activity.</p> <p><u>Mitigation:</u> Bridge manned 24/7 to identify third party vessel presence via navigational safety equipment (radar, radio, navigation lights and AIS); Trained marine Crew (STCW95 or equivalent); WSH Survey area lies in the Bass Strait 'Area to be Avoided' hence large commercial vessels will not be present.</p>	LOW



West Seahorse Project

WSH-CHP-10-RG-LC-0002

GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)

Rev 1

Aspect	Possible Impacts	Control/Mitigation Measures	Residual Risk
Survey Operations			
Operation of Survey Acoustic Sources	Damage to &/or behavioural changes to marine fauna (Cetaceans)	<p><u>Prevention Controls:</u></p> <p>Acoustic sources adopted for the survey are low in sound output. Only the reflective (boomer) portion of the survey has acoustic sound energy levels (SELs) above 160dB re 1µPa².s. This is the nominated level of harm published in the EPBC Policy 2.1.</p> <p>Crew members will be trained and experienced in whale observation, distance estimation and reporting;</p> <p>All crew provided with an environmental induction containing controls which must be adopted during the survey to protect whales;</p> <p>Implement & comply with requirements of the DEWHA Industry Guidelines <i>Policy Statement 2.1 – Interaction between Offshore Seismic Exploration and Whales (2008)</i> (includes 30minute prestart watch, 35min soft-start, 3km precautionary zone, 1km low power zone & power-down procedures, 500m shutdown zone & shut-down procedures; controls for start-up during periods of low visibility; acoustic source powered-down to lowest possible setting when not acquiring data);</p> <p>Continuous whale watch while acoustic source (boomer) is operational.</p> <p><u>Mitigations:</u></p> <p>Cetaceans will avoid area if sound disturbance is too high;</p> <p>WSH Survey location lies in area where cetaceans may transit as part of annual migrations but there are no significant breeding, feeding or resting areas present.</p> <p>Short, limited geophysical survey duration (~12days)</p>	LOW
	Behavioural changes to Pinnipeds	<p><u>Mitigation Controls:</u></p> <p>SELs of all equipment are below levels where Temporary Threshold Shift (TTS) has been measured in Otariid Seals;</p> <p>Pinnipeds exhibit some avoidance behaviour to high sound sources however not as consistent or as strong as that measured in cetaceans. Monitoring record review shows limited avoidance around acoustics sources.</p> <p>Controls implemented from the DEWHA Industry Guidelines <i>Policy Statement 2.1 – Interaction between Offshore Seismic Exploration and Whales (2008)</i> will alert and deter pinnipeds from the area (if present and disturbed by the sound levels.</p> <p>Survey 1 (geophysical) is very short duration (~12days).</p>	LOW



West Seahorse Project

WSH-CHP-10-RG-LC-0002

GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)

Rev 1

Aspect	Possible Impacts	Control/Mitigation Measures	Residual Risk
	Damage/ behavioural changes to fish & shark species	<p><u>Mitigation Controls:</u> Shark and fish species sensitive to low frequency sounds (<1.5kHz); Effects of large magnitude sound impacts (~220dB) have damaged fish eggs/larvae at very close range; Fish species sensitive to sound will temporarily displace from area affected; Vessel is constantly moving (i.e. not situated in one area); Survey duration is very short (i.e. 12 days); Controls implemented from the DEWHA Industry Guidelines <i>Policy Statement 2.1 – Interaction between Offshore Seismic Exploration and Whales (2008)</i> will alert and deter sharks/fish from the area (if present and disturbed by the sound levels).</p>	LOW
Propulsion of Vessel	Sound pollution & behavioural disturbance to marine fauna	<p><u>Prevention Controls:</u> Vessel propulsion systems undergo regular preventative maintenance and routine inspection against manufacturers requirements; Sound levels emitted from vessels are below levels which cause damage to marine fauna; Comply with proximity distances and vessel speeds as required for cetaceans as per EPBC Regulations 2000 (Part 8) for vessel where streamers are not deployed. Survey vessel will travel at low speeds (no wake). Vessel crew will observe for cetaceans. Requirement included in Environmental Induction.</p> <p><u>Mitigations:</u> Small area of impact given the rapid dissipation of sound in the marine environment; Marine species will avoid area if noise disturbance is too high; Survey duration is very short (i.e. 12 days).</p>	LOW
Geotechnical Impacts (Seabed Coring/Sampling)	Disturbance to benthic habitats (permanent loss of function)	<p><u>Prevention Controls</u> Geophysical survey results will inform the location of geotechnical activities/sampling; Grab and core sampling will impact on very small areas of seabed during each sampling/coring activity; Use of method statements for equipment to place equipment on the seabed.</p> <p><u>Mitigation Control</u> Sandy substrate rapidly recolonized by adjacent benthic flora/fauna; Seabed currents rapidly fill sample depressions; Adjacent fishing activity distributes sediments.</p>	LOW



West Seahorse Project

WSH-CHP-10-RG-LC-0002

GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)

Rev 1

Aspect	Possible Impacts	Control/Mitigation Measures	Residual Risk
Geotechnical Impacts (Subsea Coring Chemical Use)	Reduction in water quality (organics & toxics) leading to impacts on marine fauna and flora	<p><u>Prevention Controls:</u> All chemicals utilised will be OCNS GOLD, Non-CHARMable Group E or PLONOR (or equivalent in toxicity, biodegradability or persistence); Small volumes of chemical utilised for coring activities.</p> <p><u>Mitigation:</u> Rapidly dispersed in the Bass Strait environment; Marine fauna are transitory / mobile and exposure rates will not be significant.</p>	LOW
Vessel Discharges			
Vessel Oily water Discharges	Reduction in water quality (organics & toxics) leading to impacts on marine fauna and flora	<p><u>Prevention Controls:</u> Survey vessel has equipment and discharge practices which comply with MARPOL Annex 1 requirements; Oily water treated through a treatment to an oil-in-water (OIW) content <15ppm prior to discharge <i>en-route</i>; Oil Detection Monitoring Equipment (ODME) is regularly calibrated to maintain OIW discharge concentration overboard (recorded in oil record book); Equipment routinely maintained (Preventative/Planned Maintenance System); Separated oil stored in dedicated tank for onshore disposal. Vessels without oil/water treatment systems store water on-board for onshore disposal.</p> <p><u>Mitigation:</u> Low volumes discharged and rapid dilution/dispersion in Bass Strait marine waters. Survey activity is for a short duration.</p>	LOW
Grey water/sewage Discharge	Reduction in water quality (organics & visual amenity) leading to impacts on marine fauna and flora	<p><u>Prevention Controls:</u> Sewage is treated in accordance with MARPOL 73/78 requirements prior to discharge; Sewage treatment systems routinely maintained and inspected; POB strictly controlled on vessel not to exceed sewage treatment facility capacity; On breakdown of equipment discharge directed in-board for tank storage until equipment operational or discharged at port facilities.</p> <p><u>Mitigation:</u> Low volume of sewage generated with small numbers of personnel on board; High dispersal/dilution in Bass Strait marine environment; Survey is for a short, limited duration.</p>	LOW



West Seahorse Project

WSH-CHP-10-RG-LC-0002

GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)

Rev 1

Aspect	Possible Impacts	Control/Mitigation Measures	Residual Risk
Putrescible waste (food-scraps) Discharges	Reduction in water quality (organics & visual amenity) leading to impacts on marine fauna and flora	<p><u>Prevention Controls:</u> Waste Management on board Vessels in accordance with the Vessel's Garbage Management Plan; Food-scraps macerated to less than 25mm particle size in accordance with MARPOL 73/78 requirements and discharged whilst <i>en route</i> at distances greater than 3nm from land or frozen on-board for onshore disposal; Equipment routinely maintained and inspected; Personnel trained in the requirements of the Vessel's Waste Management Plan with placards providing on-board guidance to personnel.</p> <p><u>Mitigation:</u> Low volumes discharged and rapid dilution/dispersion in marine waters; Survey is for a short, limited duration period.</p>	LOW
Combustion Emissions from Vessels	Reduction in air quality (NO _x , SO _x , CO ₂) & aesthetic impacts of smoke	<p><u>Prevention Controls:</u> Survey vessel utilises MDO/MGO which meets MARPOL Annex VI requirements for SO_x emissions; Vessel engines (as required) meet MARPOL Annex VI requirements for NO_x emissions; Regular equipment monitoring and maintenance undertaken on combustion equipment to ensure maximum efficiencies are obtained; and Fuel usage is monitored for abnormal consumption and corrective action initiated (as required).</p> <p><u>Mitigation:</u> Low volumes generated and rapid dilution/dispersion in atmosphere; Survey is for a short limited period.</p>	LOW
Non-routine Activities (Incidents)			
Oil spill due to tank rupture (Spill volume – largest fuel tank is 25 or 80m ³)	Toxic & Physiological impacts to marine biota (including Cetaceans, Seals & Fish)	<p><u>Prevention Controls:</u> Survey vessel is class certified to undertake marine survey activities; Navigational aids on survey vessel include navigation lighting, radar, radio and AIS to avoid collisions; Vessel operated by experienced and competent crew (STWC95/Elements of Shipboard Safety or equivalent) with 24/7 bridge watch; Notice to Mariners issued by AHO; AMSA RCC AusCoast marine warning issued; Vessels can manoeuvre to avoid collisions; Consultation with and notification to, marine stakeholders of activity.</p> <p><u>Mitigation:</u> Availability of approved, implemented and tested SOPEP and OSCOP arrangements for survey. AMSA response to oil spill as Combat Agency for marine vessels in Commonwealth waters and Victorian DTPLI in Victorian Waters.</p>	LOW



West Seahorse Project

WSH-CHP-10-RG-LC-0002

GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)

Rev 1

Aspect	Possible Impacts	Control/Mitigation Measures	Residual Risk
Packaged Oil/Chemical spill through deck system	Localised Reduction of Water Quality leading to impacts on marine fauna and flora	<p><u>Prevention Controls:</u> Small volumes of chemicals/oils held on-board (usually in packages of limited volume); Chemicals stored in suitable containers in contained areas isolated from the deck drainage system; Deck bunding provided for temporary activities where there is an increased risk of oil spills; MSDSs are to be made available for all chemicals/oils on-board; Spill kits to be provided in appropriate locations close to high-risk spill locations; Routine inspection of storage areas and spill kits to ensure adequate stocking and labelling; Crew members trained in the handling and response requirements of specific chemicals via induction; Deck spills are cleaned up immediately and prior to any deck washing. Clean-up waste materials containerised for onshore disposal; Biodegradable detergents used on vessels; High levels of housekeeping maintained on the vessel.</p> <p><u>Mitigation:</u> Availability of implemented and tested SOPEP Low volumes generated and rapid dilution/dispersion in marine environment; Survey is for a short limited duration.</p>	LOW
Solid, Non-biodegradable/ Hazardous Waste overboard incident	Toxicity impacts to marine flora & fauna Harm to Marine Fauna by Ingestion	<p><u>Prevention Controls:</u> Survey vessel operates in accordance with an approved Garbage Management Plan which includes identification of waste reduction measures (at source) to prevent waste generation; All waste materials (solid, non-biodegradable & hazardous) are stored in containers on-board the vessel (i.e. No Waste Overboard Policy) for onshore recycling, reuse or disposal; Where possible wastes are segregated, compacted and stored on-board the vessel for onshore recycling, reuse or disposal; Waste storage areas are routinely inspected and high standards of housekeeping maintained; All wastes are sent to shore for treatment and disposal in accordance with Victorian Waste Disposal legislation; Induction reinforces to all crew (& other) personnel of waste management requirements.</p>	LOW
Trailing Equipment Loss to the Marine Environment	Hazard to Third Party Marine Users (Shipping & Fishing Hazard)	<p><u>Prevention Controls:</u> Survey vessel adheres to training equipment deployment and retrieval procedures; Trailing equipment maintain a secondary retaining device to prevent loss; Equipment undergoes routine inspection and equipment checks to replace damaged or worn components.</p> <p><u>Mitigation:</u> In the event of trailing equipment loss, marine stakeholders are notified.</p>	LOW



West Seahorse Project

WSH-CHP-10-RG-LC-0002

GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)

Rev 1

Aspect	Possible Impacts	Control/Mitigation Measures	Residual Risk
Hydraulic line Liquid Release from Subsea Equipment	Toxicity impacts to marine flora & fauna	<p><u>Prevention Controls:</u> Subsea equipment is 'hard-piped' as far as possible to prevent leaks; Regular maintenance of umbilical components/subsea equipment and inspection prior to deployment and during subsequent deployment events; Hoses and fittings carry an appropriate pressure rating.</p> <p><u>Mitigation Controls:</u> Rapid dispersion in the marine environment.</p>	LOW
Collision with Cetaceans	Damage/Death to Individual Cetacean	<p><u>Prevention Controls:</u> Comply with proximity distances as required for cetaceans in Part 8 of the EPBC Regulations 2000 (avoids cetacean strikes). This includes (within caution zone – whales (300m) & dolphins (150m)):</p> <ul style="list-style-type: none"> • Operate vessel at constant speed of 6knots & minimise noise; • Vessel not to drift closer than 50m (dolphins) & 100m (whales); • If cetacean is disturbed immediately withdraw from the area; • Make sure the vessel does not restrict path of cetacean and the vessel does not pursue cetacean. <p><u>Mitigation:</u> Cetaceans deterred from high sound areas.</p>	LOW

	<h2>West Seahorse Project</h2>	Page 24 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

6.0 SUMMARY OF MANAGEMENT APPROACH

Hibiscus, as the ‘Environmental Operator’ of the Geophysical/Geotechnical survey activity, is accountable for the environmental outcomes of the survey and will ensure that this activity is managed in accordance with the requirements of this Environment Plan. The selected survey contractor will undertake survey operations on Hibiscus’s behalf, and, under contractual arrangements with Hibiscus, will implement and comply with all environmental controls and procedures nominated in this accepted Environment Plan.

Hibiscus is committed to the protection of the environment in all activities it undertakes. Activities are undertaken in accordance with relevant legislated standards and where legislated standards do not exist, responsible standards are adopted. Successful environmental outcomes are achieved by understanding how proposed activities interact with the environment, identifying possible and foreseeable impacts, and implementing management controls which eliminate or reduce the environmental risk to a level which is As Low as Reasonably Practicable (ALARP).

Environmental performance objectives have been defined for each environmental aspect. Control measures adopted to manage the environmental risk to ALARP have been assigned measurable performance standards to ensure that controls meet their stated environmental outcomes. Environmental performance and control measure implementation is monitored and verified throughout the activity by the Hibiscus Offshore Representative.

Key elements of the implementation include:

- Definition of specific roles and responsibilities as they relate to environmental protection and control implementation;
- Induction activities to educate personnel of specific environmental aspects of the survey including environmental sensitivities within the region, control measures which require implementation; monitoring and reporting requirements; and ongoing communication/awareness sessions to reinforce requirements and identify/resolve possible issues;
- Incident reporting and investigation of environmental incidents; and
- Compliance assurance of the survey activities and its adherence to the Environment Plan requirements through auditing and inspection activities.

Hibiscus adopts a philosophy of continuous improvement. Learnings from the survey performance appraisals and incident investigations are documented and incorporated as improvement actions for future activities.

	<h2>West Seahorse Project</h2>	Page 25 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

7.0 CONSULTATION PROCESS

In accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* R11A & R14(9) the following stakeholders and interested parties have been identified and consulted as part of the stakeholder engagements process for the survey:

Commonwealth Department or Agency

- Australian Fisheries Management Authority (AFMA);
- Australian Maritime Safety Authority (AMSA);
- Australian Hydrographic Office (AHO);
- National Offshore Petroleum Titles Administrator (NOPTA);
- Department of Environment (DOE);
- Department of Defence;
- Border Protection Command;
- Department of Communications (DOC); and
- National Native Title Tribunal (NNTT).

Victorian Departments or Agencies

- Department of Environment and Primary Industries (DEPI);
- Department of Transport; and
- Department of State Development, Business and Innovation (DSDBI).

Fishing Interest Groups

- Lakes Entrance Fisherman's Cooperative Pty Ltd (LEFCOL);
- South-East Trawl Fishing Industry Association (SETFIA);
- Sustainable Shark Fishing Inc.;
- Southern Shark Industry Alliance;
- Australian Southern Bluefin Tina Industry Association (ASBTIA);
- Commonwealth Fisheries Association (CFA);
- Seafood Industry Victoria (SIV);
- Scallop Fishermen's Association;
- Eastern Rock Lobster Industry Association; and
- VRFish.

Adjacent Oil and Gas/Commercial Operators

- Esso Australia Resources Pty Ltd;
- Cape Energy Resources;
- Telstra; and
- Basslink.

Feedback obtained in these consultation activities has allowed for the development of a communication and engagement strategy for each relevant stakeholder identifying the level, type, 'triggers' and schedule of on-going engagement through the WSH geophysical/geotechnical survey. Hibiscus will maintain communications with stakeholders identified in this communications/engagement strategy to ensure they are informed of relevant aspects of the survey or changes that may affect them.

	<h2>West Seahorse Project</h2>	Page 26 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

8.0 CONTACT DETAILS

Further information associated with the environmental aspects of the WSH Geophysical/Geotechnical survey may be obtained from Hibiscus by contacting:

Tom Stensgaard

Carnarvon Hibiscus Pty Ltd;

Level 5/165 Flinders Lane,

Melbourne, Victoria, 3000

Telephone: 0432 696 855

Email: tom@hibiscuspetroleum.com

	<h2>West Seahorse Project</h2>	Page 27 of 27
WSH-CHP-10-RG-LC-0002	GEOTECHNICAL & GEOPHYSICAL SURVEY ENVIRONMENT PLAN SUMMARY (VIC/L31 & VIC/P57)	Rev 1

9.0 REFERENCES

Australian Fisheries Management Authority (AFMA), 2012 – Email between Anne Duncan and L. Chapman regarding Commonwealth Fisheries in the Survey Area (29/10/12)

Australian Maritime Safety Authority (AMSA), 2013 – Email between James Bond and Leonie Chapman regarding vessel encounter in WSH Survey area (05/03/13)

Barton, J., Pope, A, and Howe, S. (2012) – Parks Victoria Technical Series No 79 – Marine Natural Values Study Vol 2: Marine Protected Areas of the Flinders and Twofold Shelf Bioregions, available at http://parkweb.vic.gov.au/_data/assets/pdf_file/0009/545517/PV_TS79_complete.pdf

Department of Environment & Primary Industries (DEPI) (2013) – Email M. Schubert to L. Chapman regarding Victorian Fisheries sent on 23/05/2013.

Department of Environment, Water, Heritage & the Arts (DEWHA), 2008 - EPBC Act Policy Statement 2.1- Interaction between offshore seismic exploration and whales downloaded on 25/5/13 at <http://www.environment.gov.au/epbc/publications/pubs/seismic-whales.pdf>

DPI, 2011 – Gippsland Basin Oil and Gas Field Map available at <http://www.dpi.vic.gov.au/earth-resources/oil-gas/reserves-production>

Fugro, 2007 – Report for the West Seahorse 3 Site Survey, Fugro Survey Job No: P0635-7, prepared for Australian Drilling Associates, Melbourne

National Oceans Office (NOO), 2002 – Ecosystems – Nature’s Diversity – The South-East Regional Marine Plan Assessment Reports downloaded on 27th June 2012 at <http://www.environment.gov.au/coasts/mbp/publications/south-east/pubs/natures-diversity.pdf>

Parks Victoria, 2013 – Park Notes – Gippsland Lakes Coastal Park available at http://parkweb.vic.gov.au/_data/assets/pdf_file/0004/314572/Park-note-Gippsland-Lakes-Coastal-Park.pdf

Parks Victoria, 2003 – Gippsland Lakes Ramsar Site Strategic Management Plan, downloaded on 24/1/13 at

http://parkweb.vic.gov.au/_data/assets/pdf_file/0007/313279/gippsland-lakes-ramsar-site.pdf

SEWPC, 2013a – Protected Matters Database Search for WSH Survey Area undertaken on 4th June 2013 at www.environment.gov.au

SEWPC, 2013b – Australian National Shipwrecks Database, downloaded on 26/1/13 at <https://apps5a.ris.environment.gov.au/shipwreck/public/maps/shipwreck-map-search-load.do>

SEWPC, 2013c – Heritage Listing – Gabo Island Lighthouse – downloaded on 15th May 2013 at http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place_detail;search=state%3DVIC%3Blist_code%3DCHL%3Blegal_status%3D35%3Bkeyword_PD%3D0%3Bkeyword_SS%3D0%3Bkeyword_PH%3D0;place_id=105379

Shaughnessy, P.D. 1999 – The Action Plan for Australian Seals, accessed on 20th May 2012 @ www.environment.gov.au/coasts/publications