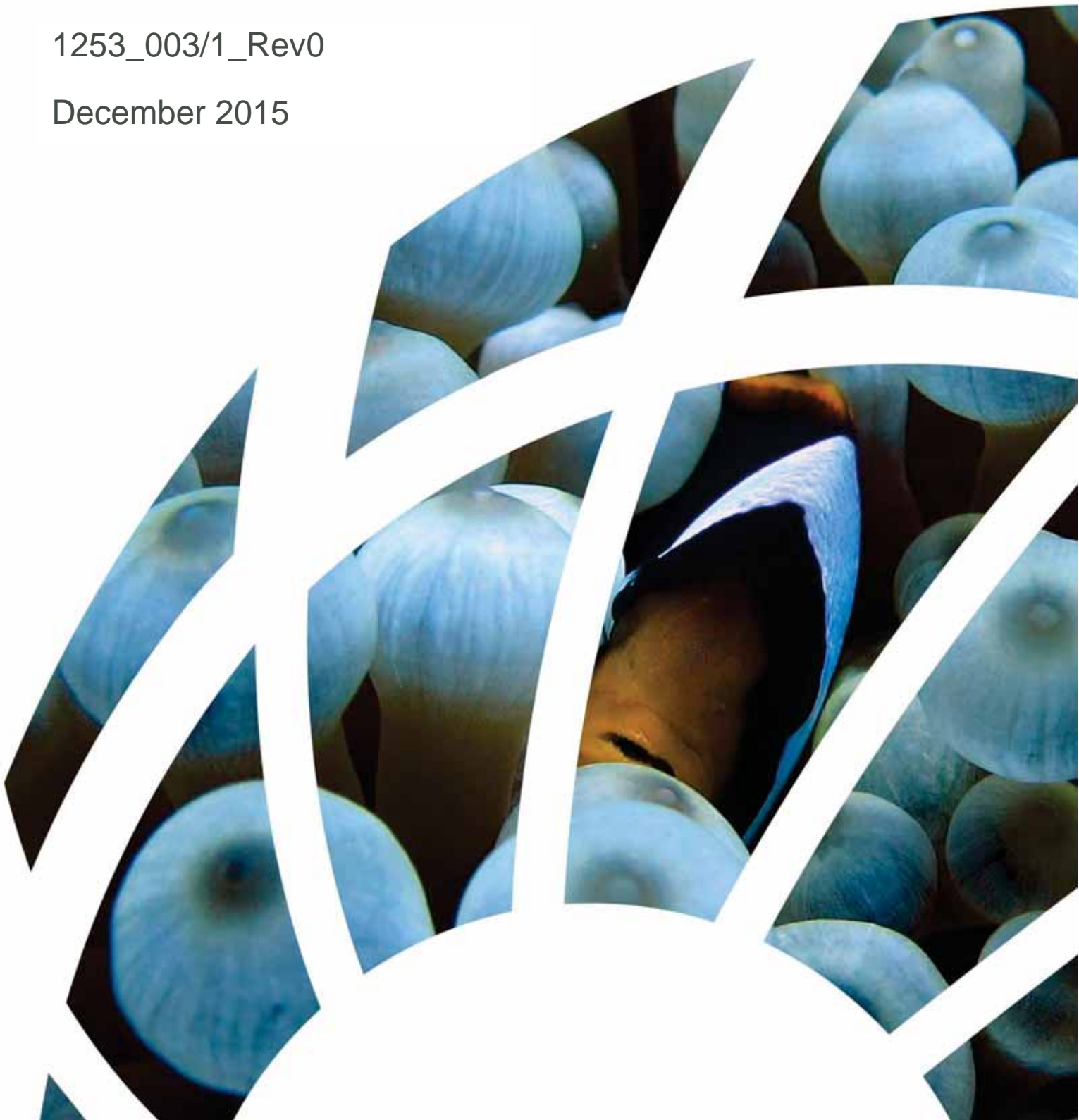


# CETO 6 Garden Island Marine Environmental Management Plan

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December 2015





## **CETO 6 Garden Island Marine Environmental Management Plan**

*Prepared for*

**Carnegie Wave Energy Limited**

*Prepared by*

**BMT Oceanica Pty Ltd**

**December 2015**

*Report No. 1253\_003/1\_Rev0*



## Client: Carnegie Wave Energy Limited

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Appendix B	Hydraulic Fluid Safety Data Sheet
Appendix C	Marine Fauna Observation Log Sheet
Appendix D	Antifoulant Safety Data Sheet

## Acronyms

AFMA	Australian Government Australian Fisheries Management Authority
AHD	Australian Height Datum
AHO	Australian Hydrographic Office
AMSA	Australia Maritime Safety Authority
ARENA	Australian Renewable Energy Agency
AS	Australian Standard
AS/NZS ISO 19011	Guidelines for quality and/or environmental management systems auditing
BA	Buoyancy Actuator
BPPH	Benthic Primary Producer Habitat
CCP	Community Consultation Plan
CEFAS	Centre for Environment, Fisheries and Aquaculture
CETO	The name (not an acronym) and trademark of a wave energy technology developed by Carnegie Wave Energy Ltd.
CMT	Crisis Management Team
DER	WA Department of Environment Regulation
DoA	Australian Government Department of Agriculture and Water Resources
DoD	Australian Government Department of Defence
DoF	WA Department of Fisheries
DoL	WA Department of Lands
DPaW	WA Department of Parks and Wildlife
DoT	WA Department of Transport
DSG	Defence Support Group
EAG	Environmental Assessment Guideline
ECC	Environmental Clearance Certificate
EMF	Electromagnetic fields
EMP	Environmental Management Plan
EP Act	<i>Environmental Protection Act 1986</i>
EPA	WA Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EQMF	Environmental Quality Management Framework
GPS	Global Positioning System
Ha	Hectare
HMAS	Her Majesties Australian Ship (the Australian Navy follows the British tradition of referring to naval establishments as ships)
HSE	Health, Safety and Environment
HV	High Voltage
IMP	Introduced Marine Pest
IALA	International Association of Lighthouse Authorities
ISO	International Organisation of Standardisation
JUP	Jack-up Platform
km	kilometres
kW/m	Kilowatt per metre
LAA	<i>Land Administration Act 1997</i>
LFC	Lower foundation connection

MEMP	Marine Environmental Management Plan
m	metres
mm	millimetre
MW	MegaWatt
MFO	Marine fauna observer
MW	Megawatt: measurement of energy/electricity
MNES	Matters of National Environmental Significance as protected by the EPBC Act
NZS	New Zealand Standard
OEPA	Office of the Environmental Protection Authority
POI	Point of Interconnection
PTO	Power Take Off
PWEP	Perth Wave Energy Project
RVSRG	Rockingham Volunteer Sea Rescue Group Inc.
SCADA	Supervisory Control and Data Acquisition
SCUBA	Self Contained Breathing Apparatus
SDS	Safety Data Sheet (previously known as MSDS)
SEP	State Environmental (Cockburn Sound) Policy 2005
TNTM	Temporary Notice to Mariners
TEMP	Terrestrial Environmental Management Plan
UCS	Unit control system
UFC	Upper foundation connection
UWTR	Underwater tracking range
UXO	Unexploded ordnances
WA	Western Australia

# 1. Introduction

## 1.1 The proposal

Carnegie Wave Energy Limited (Carnegie), the developer and owner of the CETO wave energy technology, has built the world's first grid-connected wave energy array, the Perth Wave Energy Project (PWEP). The PWEP was built offshore of Garden Island in the Perth metropolitan region of Western Australia (WA) utilising its 5th generation CETO technology with the support of the Federal and State Government.

Carnegie has been granted funding for their next stage of CETO development, the CETO 6 Project (the 'Project'), which will design and demonstrate the next generation of CETO technology (Figure 1.1). Carnegie (2015a) (Appendix A) has prepared a technical note describing the Project components and installation requirements which has been included within Figure 1.1, Each CETO 6 unit will generate up to 1 MW of electricity. Carnegie proposes to deploy an array of up to 3 units (totalling 3 MW) south west of Garden Island, WA, in ~30–35 m of water (Carnegie 2015a, Appendix A).



Source: Carnegie (2015a)

Figure 1.1 CETO unit development pathway

## 1.2 Project justification and benefits

The Project will be located further offshore from Garden Island than the existing PWEP, at a site that has a higher wave energy resource, and allows for the operation of CETO technology in higher sea states. Additionally, the Project will demonstrate a number of technical and commercial innovations that will significantly advance the CETO technology towards commercialisation and expand its potential market (Carnegie 2015a, Appendix A).

The Project builds on prior learnings from the PWEP and CETO concept studies. The CETO 6 Unit will have significantly larger capacity and will produce significantly more power than the current CETO 5 units (Figure 1.1). Additionally, the design will leverage initial offshore power generation trialled for CETO 3, i.e., locating the electrical generation subsea. This will expand the market for the CETO technology by providing the only wave power technology capable of operating both near-shore (using the CETO hydraulic system) and distant-to-shore locations

(using the CETO subsea system). The combination of these factors will deliver a significant reduction in the levelised cost of energy when built in large projects (Carnegie 2015a, Appendix A).

Financially, the CETO 6 Project will be funded via a \$13 million grant from the Australian Renewable Energy Agency (ARENA) and a \$20 million loan facility from the Commonwealth Bank of Australia. This financial backing exemplifies the market’s increasing comfort with Carnegie and advancement of the CETO technology (Carnegie 2015a).

### 1.3 Proponent details

The Project proponent is Carnegie Wave Energy Limited. The name and legal address of the proponent and key project contacts are given in Table 1.1.

**Table 1.1 Name and contact details of the project proponent and other key contacts**

Role	Name and contact details
Proponent	<b>Carnegie Wave Energy Limited</b> Unit 1, 124 Stirling Highway North Fremantle 6159 Western Australia
Principal	<b>Angus Nichols</b> Project Manager, Carnegie Wave Energy Limited Tel: (08) 9486 4466 Email: anichols@carnegiwave.com
Environmental Consultants	BMT Oceanica Pty Ltd 1/353 Cambridge Street, Wembley, WA, 6014 Tel:(08) 6272 0000 Email: ben.davis@bmtoceanica.com.au

### 1.4 Scope of this Marine Environmental Management Plan

The objective of this Marine Environmental Management Plan (MEMP) is to provide a framework for the environmental management of the marine aspects of the CETO 6 Project, as identified in the Environmental Impact Assessment (BMT Oceanica 2015a, Appendix A), and to ensure environmental impacts are minimised to as low as reasonably possible. This document may be used to support regulatory assessment of the Project (see Section 3).

This MEMP presents the following activity-based environmental management measures specific to the CETO 6 Project:

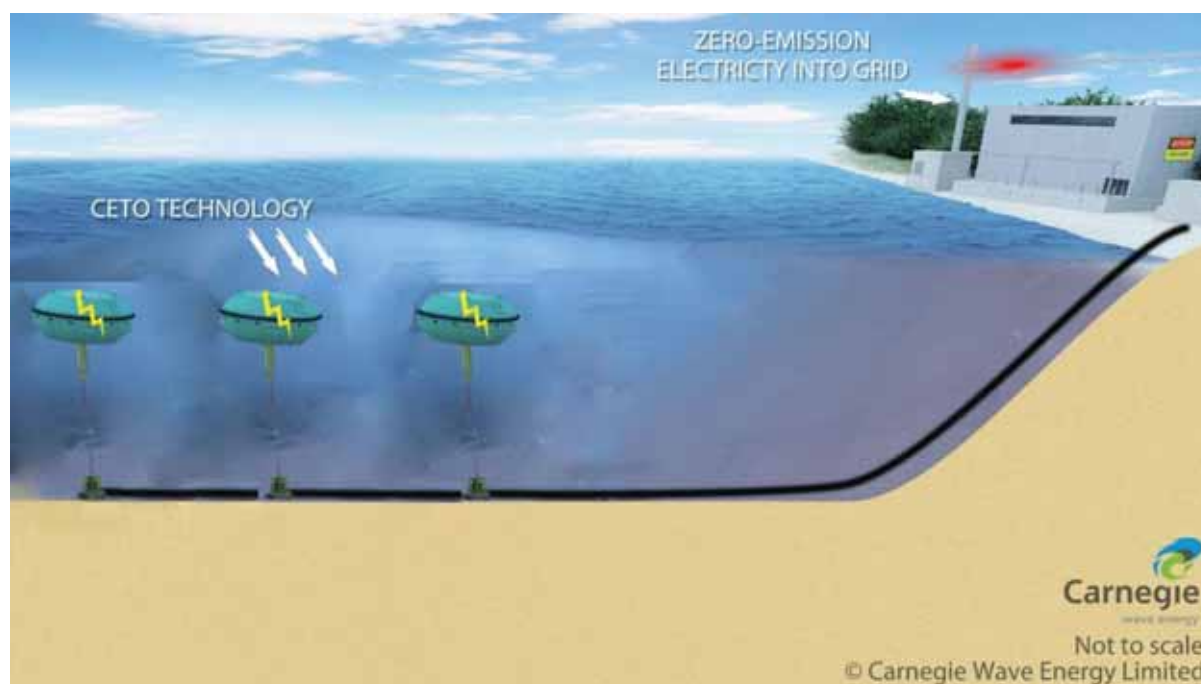
- General Management
- Construction Phase
- Operation Phase
- Decommissioning Phase
- Abnormal Operations

The MEMP covers the offshore aspects of the Project up to the low water mark. A separate Terrestrial Environmental Management Plan (TEMP) provides the framework for the environmental management of the terrestrial aspects of the Project down to the low water mark.

## 2. Project Description

### 2.1 Proposed activity

Carnegie proposes to design, build and operate a wave energy array using up to three CETO 6 units for power production southwest of Garden Island. This new generation of the CETO technology will provide a step-change in CETO development by introducing subsea generation and further increasing power capacity. The units will be connected to a shore-based substation, from where the power generated by the CETO 6 array would be distributed to the HMAS Stirling Defence Base on Garden Island.



Source: Carnegie (2015a)

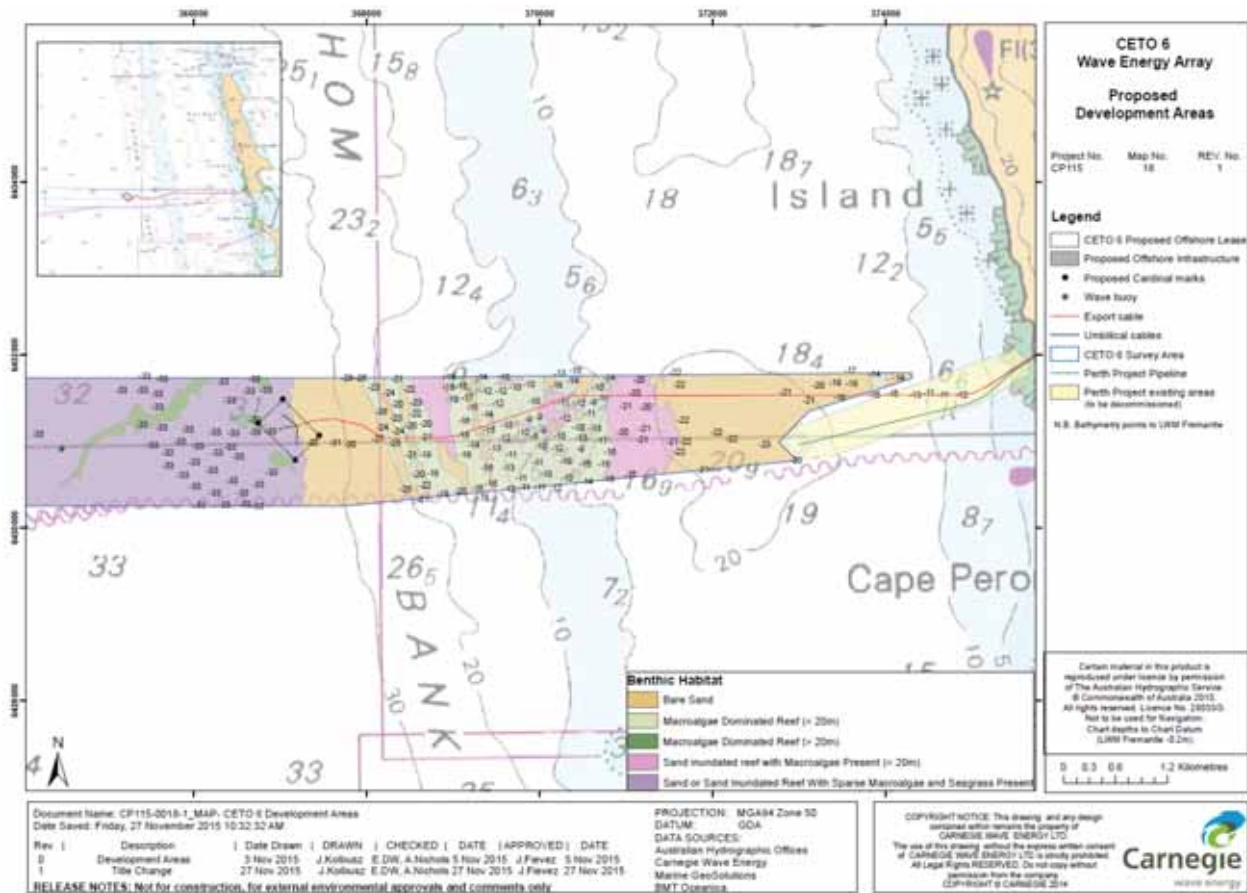
**Figure 2.1 CETO 6 Project schematic**

#### 2.1.1 Offshore site description

The Project will be located at a medium to high wave energy site that offers the potential for further commercial expansion, in the waters adjacent to the current PWEF off the Perth metropolitan coast (). Up to three submerged CETO 6 units will be installed in an array within a 400 m by 600 m offshore lease area (subject to Project approvals, ~8-10 km south-west of Garden Island (Figure 2.2, Figure 2.3, Figure 2.4)).

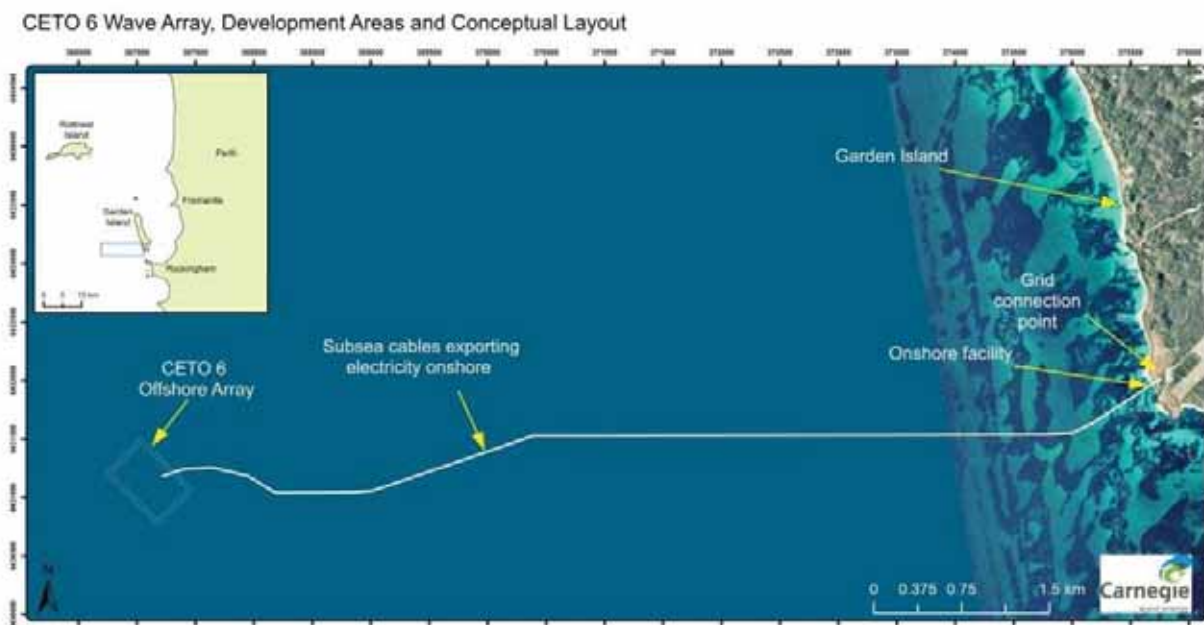
Wave energy flows in the direction of wave propagation and is measured as the amount of power (in kW) contained in each linear metre of wave front. Typically energy above 20 kW/m may be suitable for CETO wave farm projects. The chosen site will have a wave resource of approximately 30 kW/m in comparison to approximately 10 kW/m at the current PWEF site. This allows the CETO 6 generation to be operated in significantly higher sea states and extreme design waves.





Source: Carnegie Wave Energy Limited

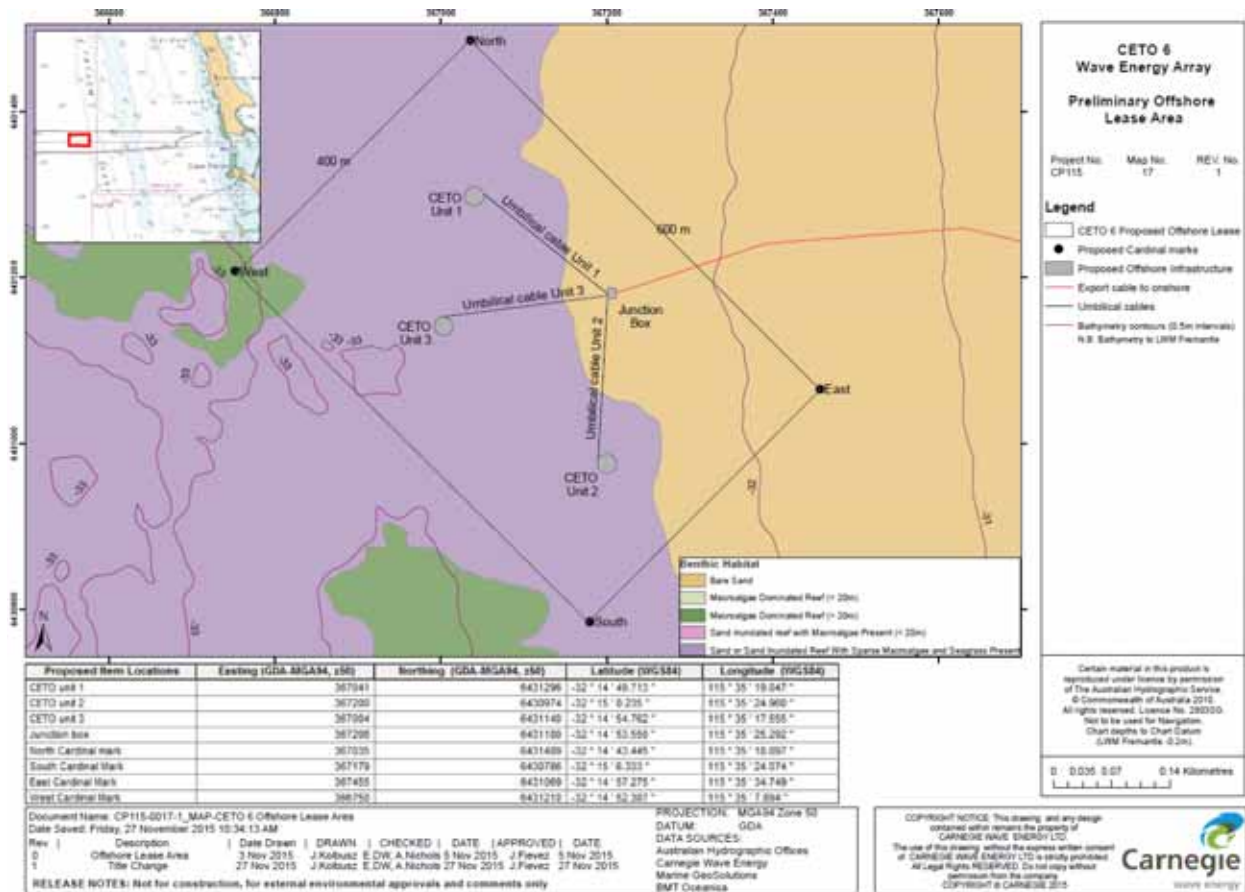
Figure 2.2 CETO 6 proposed development areas



Source: Carnegie Wave Energy Limited

Figure 2.3 CETO wave array, development areas and conceptual layout





Source: Carnegie Wave Energy Limited

**Figure 2.4 Detailed arrangement of the offshore CETO 6 units and preliminary offshore lease area**

### 2.1.2 Shore-based infrastructure

A substation will be located on the west coast of Garden Island. The Project will connect back to a substation on Garden Island via a subsea, high-voltage cable and provide power to the Department of Defence (DoD). It is expected that shore-based infrastructure for the CETO 6 Project will utilise pre-existing buildings and cleared spaces. If the equipment cannot be housed inside existing infrastructure, a small building may be constructed to house CETO 6 equipment.

Garden Island is the site of DoD's HMAS Stirling Base and was the site of the CETO 3 Unit deployment and the current PWEF (with the CETO 5 technology). As such, Carnegie has extensively studied the area and has well-developed understanding of site physical, ecological and social conditions.

## 2.2 Construction and decommissioning methods

A description of key Project phases and anticipated start and finish timing of works for the Project is provided in Table 2.1.

**Table 2.1 Timing of Perth Wave Energy Project key phases**

Project phase	Key characteristics	Completion date
Design	Requirements and concept design completed	31 October 2015
	Preliminary design completed	31 December 2015
	Critical/detailed design completed	30 June 2016
	Approvals, consents and permits completed	30 June 2016
Construction and Operation	Foundations installed	31 December 2016
	Project commissioned (operation commenced)	31 December 2017
	Completion of 12 months operation	31 December 2018
	Decommissioning complete	31 December 2019

Source: Carnegie Wave Energy (2015)

### 2.2.1 Proposed foundation installation

Foundation installation is scheduled to be completed by December 2016 (Table 2.1). The Project is currently in the Preliminary Design Phase and, as such, design specifications have not been finalised. The following methods have been proposed for foundation installation:

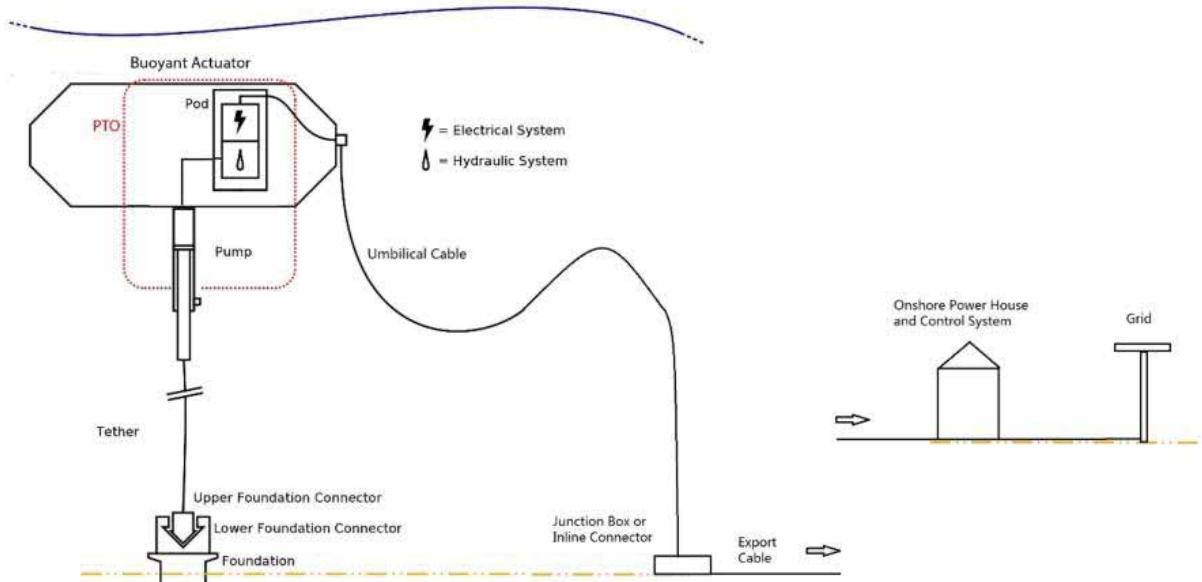
- Pile installation either by pile driving or drilling and grouting: the proposed pile installation will have maximum dimensions of 2.5 m with penetration of ~25 m into the seabed and protrude ~700 mm. The estimated timeframe for pile driving is ~24 hours over ~1-5 days for each pile installation with a maximum of up to three piles. Each foundation installation, involving drilling and grouting of the pile, has an anticipated timeframe of 5–10 days.
- Gravity base installation will have proposed maximum foundation dimensions of 70 x 25 x 4 m. The foundations will be towed to site and de-ballasted to sink to the seabed with an approximate weight of ~3500 t and constructed from steel and reinforced concrete. Carnegie estimate 5–10 days for gravity base foundation installation per unit.

Additionally, on-site positioning and demobilisation of equipment required for foundation installation are each expected to take ~1 day and all installation methods are subject to suitable weather conditions. During installation a Temporary Notice to Mariners (TNTM) will be issued and all relevant personnel notified.

### 2.2.2 CETO unit and cable installations

Installation of moorings and CETO 6 units will be undertaken in stages utilising offshore installation engineers supported by commercial vessels and divers as required. The main components of each CETO unit are outlined below and shown in Figure 2.5:

- CETO buoyant actuator (BA): subsurface energy-collection unit
- Mooring system: including the tether, foundation connector and foundation
- Power take off (PTO): includes the pump, pod and interconnection
- Subsea electrical system: connects each CETO 6 unit to a junction box, and transfers electricity back to the substation
- Substation and grid connection.



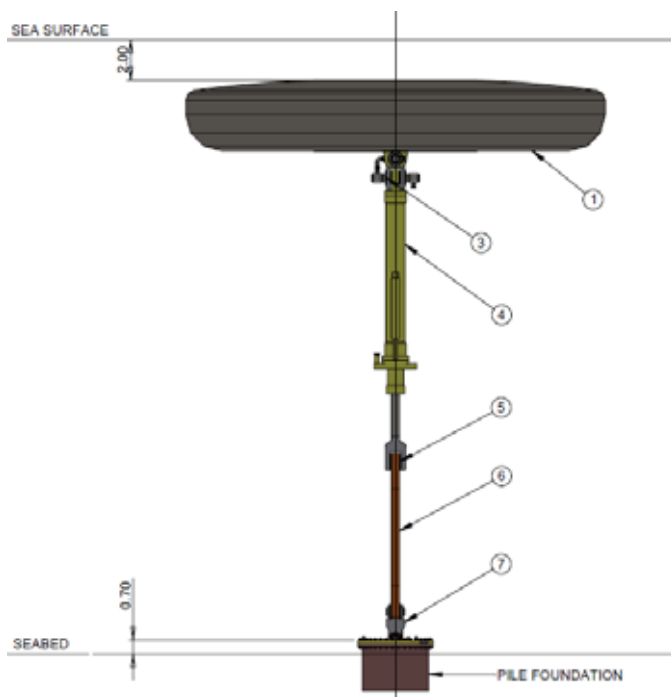
Source: Carnegie Wave Energy (2015)

**Figure 2.5 CETO 6 system architecture**

The Project involves the installation of up to three submerged CETO 6 units in an array, southwest of Garden Island. The fundamental aspects of the Project are outlined below.

**CETO buoyant actuator (BA)**

The CETO 6 generator consists of a large BA (~20 m diameter; item 1 in Figure 2.6), connected to the power take off (PTO) housing (also shown as item 1 in Figure 2.6) via a gimbal (item 3 in Figure 2.6). A hydraulic pump (Item 4 in Figure 2.6) generates electricity through the BA moving vertically through the water column. The tether connector and tether (items 6 and 7 in Figure 2.6) are then connected to an upper foundation (item 7 in Figure 2.6). This connector is mounted inside of the pile foundation. The BA unit will be towed out to site and connected to the mooring system using commercial divers.



**Figure 2.6 Buoyancy actuator assembly**

## **Mooring system**

The mooring system consists of the following:

- Tether: this connects the Pump to the Foundation Connector and consists of a synthetic rope with terminations at either end.
- Foundation Connector: this consists of the upper and lower parts that automatically mate to form the connection between the Unit and the Foundation
- Foundation: this provides the restraint at seabed level of the Unit and could be in the form of a pile or a gravity base (to be decided)
- Secondary Connection: a short rope or chain has been proposed between the Upper Foundation Connection (UFC) and Lower Foundation Connection (LFC) which functions as a secondary tether should the CETO Unit be released from the foundation.

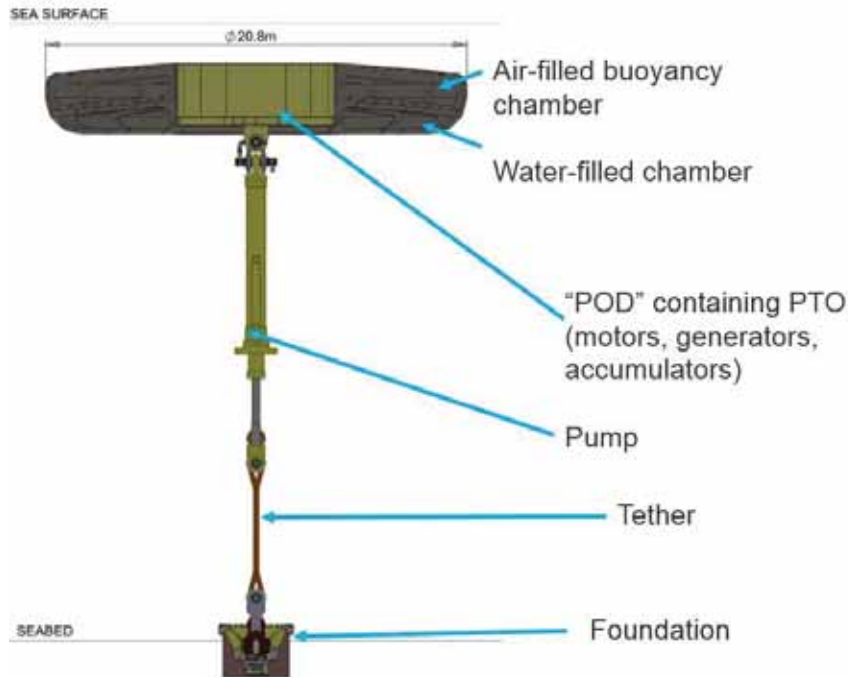
The Foundation Connector consists of an upper and lower connector. The foundation will have a release mechanism that is triggered under load to release the BA Unit from the foundation. The BA, Pump and Tether will remain connected to the foundation via the proposed secondary tether which will be a chain and have a length of approximately 20 m connected to the UFC at the other end. The release mechanism may take the form of a pyrotechnic device; similar to those used the oil and gas industry for cutting of slicklines during downhole operations.

The Foundation installation method is yet to be determined, but will be either via pile-driving or gravity-based (see Section 2.2.1 for more detail).

## **Power take off (PTO)**

The PTO consists of the following items:

- Pump: the main hydraulic cylinder that pumps fluid to and from the Pod.
- Pod: the system that converts the hydraulic energy from the Pump into electricity. It includes the large vessel that contains all the equipment, the hydraulic system, the electrical system and the Unit Control System (UCS)
- Hoses/Fluid Connection: a means to communicate fluid between the Pump and the Pod is required. There are a number of means by which this could happen
- The PTO Layout is shown in Figure 2.7.



Source: Carnegie Wave Energy (2015)

### Figure 2.7 Power take off arrangement

The PTO is expected to have a stored hydraulic fluid volume of 4000–5000 litres, with a maximum of 6000 litres. The expected fluid will be a mineral-based fluid, such as Shell Tellus (Appendix B). This is based on component supplier recommendations. This fluid will be contained in a sealed closed circuit hydraulic circuit. As there is no connection and flushing offshore there will be no potential for release during installation.

Through careful design and selection of bearing materials Carnegie plans to reduce any operational leakage rates through external seals to negligible levels. The Pod has a waterproof enclosure so any external leaks coming from hydraulic equipment inside the Pod will be contained within the Pod. It is acknowledged that during normal operation planned leakage per CETO 6 Unit may reach 10 litres per month as an estimate. This is considerably less than typical marine vessel stern tube lubricant loss and will be contained within the Pod, i.e. not released to the marine environment under typical operation.

If there were a catastrophic failure of the Pump, it is likely that all fluid in the cylinder volume will be lost (the Pump will extend fully) and the fluid in accumulators, as the system becomes depressurised. The rest of the fluid will probably remain in the hydraulic system. This loss would be reduced as far as possible through valve logic within the Pod.

The fluid connection between Pod and BA may be accomplished via hoses or fixed pipe and a rotary hydraulic connection at the joint between the BA and pump. If hoses are used they will be approximately 14 m long. The hose gap will vary from between 2 m and 6 m as the BA and pump cycles through its range of motion when operating. The pump is basically a hydraulic cylinder. It will have a diameter of approximately 1 m.

### ***Subsea electrical system***

The umbilical cable will be connected to the BA and to a subsea junction box. The subsea junction box will be built on a skid with lifting points to allow for deployment and retrieval. The subsea skid will have approximate maximum dimensions of 2 x 2 x 1 m. This dynamic cable will have a catenary arrangement suspended in the water by floatation modules (Figure 2.5). The modules will be approximately 1 m long and 1 m in diameter. The catenary arrangement may be moored to the sea floor via a single anchor point if required. This mooring line (should it be required) for the catenary arrangement will always be taught due to the floatation modules on the cable. Outline cable installation is expected to be conducted as follows:

- Pull export cable through shore-crossing conduit and allow enough cable to be installed through to HV substation.
- Barge (propelled by tugs) equipped with the necessary laying gear, such as turntables or drums, anchoring systems, cranes, chutes and winches will be used to lay the cable from shore out to CETO site. The cable will not be trenched and will lay on the seabed. Any movement will be restricted via clump weights and grout bags. The cable will have external protection attached should it be laid adjacent to exposed rock or reef.
- Onshore cable will be installed as per AS3000, AS2067 and any Defence requirements. The cable will require a trench and to be buried to a minimum depth of 750 mm. If buried to a depth of less than 900 mm it will be within a conduit. Nearshore, the cable will follow the same route as existing PWEF CETO 5 cables to the Carnegie onshore facility.

### ***Substation and grid connection***

The onshore power generation substation will be located at the current PWEF site. This substation will include transformers, high voltage (HV) switch gear, power smoothing gear and supervisory control and data acquisition (SCADA) system. It is intended to utilise existing infrastructure to house this equipment. If the equipment cannot be housed inside existing infrastructure, a building with maximum dimension of 4 x 5 x 2 m may be constructed. The grid connection includes the following items:

- Onshore Power Conditioning: could include a transformer and filtering
- Grid Protection System: would include metering, monitoring equipment and breakers for the connection between Carnegie and DoD and the existing connection between DoD and the utility if required
- Grid Connection Cabling: includes cables (probably buried) from the equipment building to the point of interconnection (POI)
- POI Equipment: could include breakers and telemetry (if required) for compliance. An HV substation will be located at the current PWEF site. This substation will include transformers, HV switch gear, power smoothing gear and SCADA system.

Once installed, the CETO 6 units will be unmanned, controlled remotely and accessed only during inspection and maintenance activities. Further details relating to the CETO units' operation and maintenance are provided in (Carnegie 2015a, Appendix A).



## **3. Regulatory framework**

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### **3.1 Carnegie Wave Energy Limited Environmental Policy**

The CETO 6 Project will be managed to comply with Carnegie's Environmental Policy (Carnegie 2015b), which commits to:

- identify, assess and manage the environmental risks and impacts of the existing and planned operations
- set and review objectives and targets that result in the prevention of pollution and continuous improvement to Carnegie's environmental performance
- provide leadership and resources that will enable Carnegie's workforce to meet improvement objectives and targets
- include Environmental performance when evaluating employees and contractors for compensation, rewards and recognition
- comply with applicable environmental laws and regulations and other legal requirements aligned with ISO 14001:2015 and apply due diligence where these do not exist or are considered insufficient
- communicate regularly with stakeholders and communities where Carnegie operates to develop and maintain mutual understanding of environmental values and expectations
- promote the conservation of energy and natural resources and reduce waste
- promote the value of team work and employee participation in suggesting and identifying improvement opportunities including consideration of associated risks
- provide adequate resources to plan and implement actions to address opportunities and risks thereby achieving improved results and preventing negative effects
- routinely monitor, assess and report on Carnegie's environmental performance, including conformance with the environmental policy.

This Environmental Policy applies to all personnel, contractors and joint ventures engaged in activities under Carnegie's control, thereby allowing Carnegie to systematically identify and manage environmental risks, while value adding to business, stakeholders and the broader environment.

Carnegie is committed to the health and safety of all our employees and the CETO 6 Project will also be managed to comply with Carnegie's Occupational Health and Safety Policy (Carnegie 2015c)

### **3.2 Relevant environmental legislation**

An outline of the Commonwealth and State legislative framework applicable to the CETO 6 Project is provided below, and further described in BMT Oceanica(2015a) (Appendix A).

#### **3.2.1 Environmental Protection Act 1986**

The EP Act is the principle legislation governing environmental protection and approvals in Western Australia, and is applied to State land and waters. Part IV of the EP Act relates to environmental impact assessment of a Project, including its referral to, and assessment by, the Environmental Protection Authority (EPA). Part V of the EP Act relates to the control and licensing of potentially polluting activities. In addition to requirements of the Act, relevant Environmental Assessment Guideline (EAG) statements have been applied. The WA Department of Environment Regulation (DER) is currently seeking feedback for draft guidance statements under Part V of the EP Act. Carnegie will consider the following guidance statements should they come into effect.

- Regulatory Assessment Framework,
- Environmental Risk Assessment Framework
- Regulatory controls

Carnegie may seek approval from the Environmental Protection Authority (EPA) for Project under the EP Act. This document has been prepared to satisfy the requirements of an Environmental Referral to the EPA under the provisions of Part IV of the *Environmental Protection Act 1986* (EP Act) and in accordance with the *Administrative Procedures 2012* (EPA 2012).

Should the Project not be formally assessed by the EPA under Part IV of the EP Act, however; managed under Part V of the EP Act, a Native Vegetation Clearing Permit will be required, in accordance with Part V of the EP Act. A clearing permit will be required to clear indigenous aquatic species for the subsea cable crossing onto Garden Island.

### **3.2.2 Environmental Protection and Biodiversity Conservation Act 1999**

The *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* is the Australian Government's central piece of environmental legislation, which is administered by the Commonwealth Department of the Environment (DotE). The EPBC Act provides a legal framework for the protection and management of nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the Act as matters of national environmental significance (MNES). The Act applies to seven matters of national environmental significance, which are:

- world heritage sites
- national heritage places
- wetlands of international importance
- nationally threatened species and ecological communities
- migratory species
- commonwealth marine areas
- nuclear actions.

The proposed works (as described in this document) may require referral to the Commonwealth DotE as there may potentially be impacts to Matters of National Environmental Significance including Commonwealth Marine Areas, Nationally Threatened Species and Migratory Species (see Appendix A) for EPBC protected matters report).

### **3.2.3 Biosecurity Act 2016**

The *Biosecurity Act 2016* is scheduled to come into effect on 16 June 2016 to provide a regulatory framework (which reflects and replaces the Quarantine Act 1908) for management of biosecurity risks including pests, disease and contaminants. This is managed under the Australian Government Department of Agriculture and Water Resources (DoA) Decisions made under the Act will depend on the likelihood and consequences of the risk presented resulting in the management of risks more appropriately. The Act will include regulations for ballast water, biofouling and biosecurity risks associated with marine pests and will be considered by Carnegie for management for these risks.

### **3.2.4 Control of Naval Waters Act 1918**

An area of the coastal waters around Garden Island are designated controlled naval waters out to 500 m under the *Control of Naval Waters Act 1918*. The purpose of this Act is to ensure suitable control over declared Naval Waters to facilitate their ongoing utility for naval operations. Carnegie has signed a formal licence for the Project that provides approval to work within naval waters.



The Commonwealth of Australia is the freehold landowner of Garden Island down to the low water mark, having been acquired in 1915 pursuant to the provisions of the Lands Acquisition Act 1989. Overall responsibility for Garden Island management, including various aspects of public access on the Island rests with the Commanding Officer, Royal Australian Navy. However land and facilities management, including environmental management support, is provided by the Defence Support Group (DSG), a division of the DoD.

The DoD's Environmental Management System requires that an environmental impacts analysis be undertaken prior to any project or activity taking place on its estate by Defence and other parties. The DoD manages the assessment and approvals through issue of an Environmental Certificate of Approval called Environmental Clearance Certificate (ECC). An ECC is an internal mechanism for proving due diligence by means of a proponent providing sufficient evidence that an Environmental Officer or equivalent can recommend that the proposed action be approved by a higher authority within the DoD. By signing the ECC, the Proponent, whether internal or external to the DoD, is committing to all of the risk management measures addressed in the ECC. The DoD must be confident from what is presented in the ECC, and where appropriate through additional documents and approvals, that all risks have been reduced to an insignificant level, particularly with respect to the EPBC Act.

### **3.2.5 Aboriginal Heritage Act 1972**

A search of the Aboriginal Heritage Enquiry System (Appendix A) showed no registered Aboriginal sites within the Project footprint. Therefore, a Notice under Section 18 of the *Aboriginal Heritage Act 1972* will not be required.

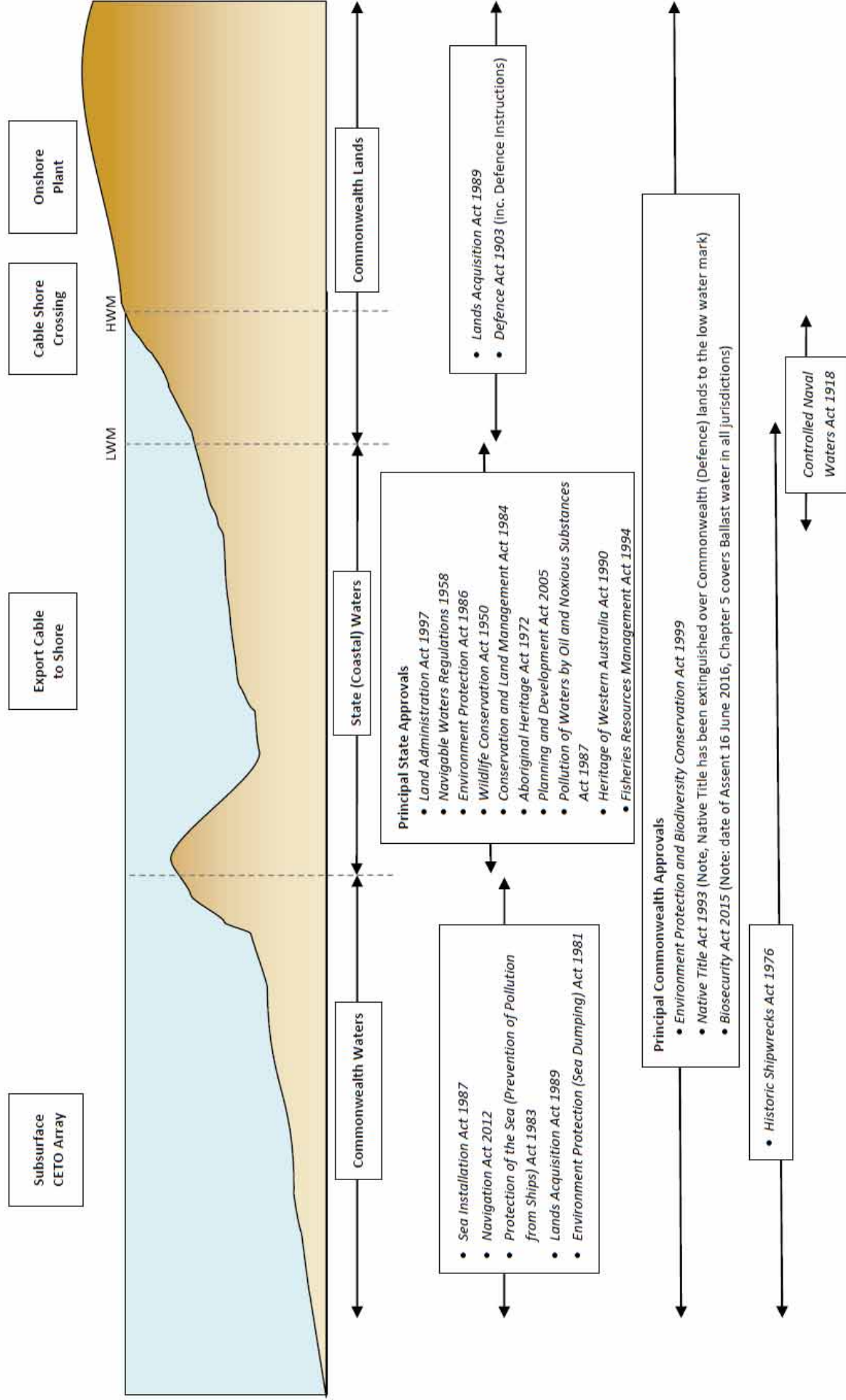
### **3.2.6 Other state legislation**

The *Navigable Waters Regulations 1958* (referring to the *Shipping and Pilotage Act 1967*, *Jetties Act 1926* and *Western Australian Marine Act 1982*) manage maritime activities in Western Australian navigable waters, including the territorial sea adjacent to the State. As a portion of the proposed Project lies within State Waters, permission is required from the WA Department of Transport (DoT) under Regulation 8 of the *Navigable Waters Regulations 1958* to install cables to shore.

The principal legislation governing land use of the seabed within Western Australian State Waters (Crown Lands) is the *Land Administration Act 1997*. Approval is required under Section 91 of the LAA 1997, in the form of an easement as appropriate to the development being proposed, i.e., the offshore components of the Project. The LAA 1997 is administered by the WA Department of Lands (DoL).

Additional State and Commonwealth legislation that may be applicable to the CETO 6 units is presented in Figure 3.1.





Source: Carnegie Wave Energy Limited

Figure 3.1 State and Commonwealth legislation relevant to the Project



## 4. Community consultation

Carnegie strongly values stakeholder input to ensure stakeholder views are understood and issues addressed early through project design and environmental management. Carnegie views community consultation as an important component of the CETO 6 Project, providing an opportunity for good working relationships to be established and continued with those parties whose attitudes and values towards the Project could define its success.

To ensure continued best practice, a Community Consultation Plan (Carnegie 2015d, Appendix A) has been prepared for the CETO 6 Project, providing a strategic approach and detailed engagement plan with clear objectives, activities and process evaluation specific to the CETO 6 Project. The Community Consultation Plan (Carnegie 2015d, Appendix A) identifies the engagement and feedback process for stakeholder consultation, integrating social and community components in line with key planning phases and Project milestones. The Community Consultation Plan has been reviewed and certified by Umwelt (Australia) Pty Limited as in accordance with relevant industry standards and will be reviewed and updated as required on an ongoing basis (Carnegie 2015d, Appendix A).

### 4.1 Community consultation processes and implementation

Carnegie has already undertaken extensive stakeholder consultation and environment studies as part of the development of CETO technology. Stakeholder consultation for CETO technology has been an ongoing process since early 2008 regarding seabed and land tenure, environmental issues, permits and approvals requirements. Previous community consultation information relating to the CETO 3 unit and PWEP deployment is outlined in Carnegie (2009) and Oceanica (2012).

Carnegie has established a register/database of stakeholders which has been utilised for the CETO technologies and in the development of the PWEP Community Consultation Plan (Sheridan Coakes Consulting 2012). This has been reviewed and expanded for the CETO 6 Project (Carnegie 2015d, Appendix A). Early community consultation was undertaken by Carnegie with the government and fishing associations outlined in Table 4.1. Feedback from early consultation is provided within Appendix A.

**Table 4.1 Early stakeholder consultation groups consulted by Carnegie as part of the CETO 6 Project**

Stakeholder category	Stakeholder Type	Stakeholder
Primary Stakeholders	Australian Federal Government	Australian Fisheries Management Authority
		Department of Industry
		Department of Defence
		Department of the Environment
	State Government	Department of Fisheries
		Department of Parks and Wildlife
		Department of Transport
Industry, Business and Research Associations: Fishing and Boating Associations	Recfishwest	

The key stakeholder groups identified and consulted with for the CETO 6 Project are outlined in Table 4.2. All of these groups have been consulted with to date by BMT Oceanica on behalf of Carnegie as part of their ongoing extensive stakeholder and community consultation process. Community consultation with the wider stakeholder group that were contacted and either no response was received or the invitations to comment was declined are provided in Appendix A.

**Table 4.2 Stakeholder groups consulted by BMT Oceanica on behalf of Carnegie as part of the CETO 6 Project**

Stakeholder category	Stakeholder Type	Stakeholder
Primary Stakeholders	Australian Federal Government	Department of Agriculture
		Department of Defence
		Department of the Environment
	State Government	Department of Fisheries
		Department of Transport
		Office of the Environmental Protection Authority
	Local Government	City of Rockingham
	Special Interest Groups: Recreational	Rockingham Volunteer Sea Rescue Group

#### 4.1.1 Community consultation summary to date

Throughout the consultation period for the CETO 6, the majority of feedback received has been very positive.

Very few concerns were raised about environmental issues due to the information provided during the community consultation process and presentation material given during meetings. Furthermore, management for the CETO 6 Project is similar to management processes and responses implemented for the PWEF whereby feedback provided by stakeholders outlined in Table 4.2 had previously been incorporated and applied to CETO 6.

All queries were answered with appropriate information and potential management processes, if required (Appendix A). Suggested management and mitigation measures provided by primary stakeholders in relation to the environment, flora and fauna, and maritime safety were considered and included where relevant within the MEMP.

Carnegie will maintain communications with relevant agencies, commercial and recreational groups, and other key stakeholders to ensure they are kept informed of Project activities and any changes which may affect other users of the area. This community and stakeholder consultation will be ongoing throughout the Project.

Temporary Notices to Mariners will be issued through the DoT to ensure that all vessel operators are aware of the installation activities, cable easement and exclusion zone applied. The cable easement and exclusion zone will be added to maritime charts.

## 5. Marine Environmental Management Plan Implementation

### 5.1 Roles and responsibilities

As specified in Section 1.3, Carnegie is the Project Proponent for CETO 6. As such, Carnegie will be ultimately responsible for all aspects of this Project, including the implementation of the identified management actions and commitments made within this MEMP. Carnegie also has a strong partnership with the DoD and regularly liaises with their Assistant Director Environment and Sustainability and Regional Environment Officer for Central and West, also covering Fleet Base West (Garden Island) and associated key personnel. Carnegie has engaged BMT Oceanica Pty Ltd (BMT Oceanica) to provide advice relating to the marine aspects of the Project. Key roles and responsibilities for the Project are detailed in Table 5.1.

**Table 5.1 Key roles and responsibilities**

Role	Name and contact details	Responsibilities
Project Manager Carnegie Wave Energy Limited	Angus Nichols Project Manager	Responsible for successful delivery of the Project including assurance that all personnel meet Carnegie's corporate expectations and legislative requirements.
Offshore Operations and Maintenance Manager Carnegie Wave Energy Limited	Andy Mercer Offshore Operations and Maintenance Manager Email: amercer@carnegiwave.com Phone: (08) 9486 4466	Responsible for operational and maintenance management including implementation of this Plan during operational and maintenance phases of the Project
Environment and Approvals Manager Carnegie Wave Energy Limited	Edwina Davies Ward Environment and Approvals Manager Email: edaviesward@carnegiwave.com Phone: (08) 9486 4466	Provide environmental technical support to the Project personnel including technical personnel and site personnel; informing Project staff of environmental obligations, site inductions, inspections and auditing and reporting of compliance.
Construction Manager	Contractor – appointment to be confirmed by Carnegie	Ensure all staff are aware of their environmental obligations in consultation with the Environmental Advisor. Coordinate and implement environmental inductions, inspections and audits. Report environmental incidents and outcomes of audits to the Environment Manager.
Site personnel and contractors	Various	Ensure awareness of all environmental management strategies and procedures, and reporting of all known breaches of the same.
Department of Defence Assistant Director Environment and Sustainability	Mark Sweetman Assistant Director Environment and Sustainability (WA) Defence Support Central and West Email: mark.sweetman1@defence.gov.au Phone. (08) 9311 2025	Environmental management for Department of Defence estates in Western Australia, including Garden Island. Authorising onshore environmental approvals in accordance with Defence policy and procedures.
Regional Environment Officer - Central and West	Georgia Davies Regional Environment Officer Estate Services - Central and West Defence Estate and Infrastructure Group Email: georgia.davies@defence.gov.au Phone: 0409 990 475	Environmental officer for Fleet Base West (Garden Island). Technical review and authorisation of environmental approvals, technical support. Receive, record, report and manage incidents and/or complaints arising from the Project.

Role	Name and contact details	Responsibilities
BMT Oceanica Pty Ltd Project Director	Dr Luke Twomey Director, Aquatic Ecologist Email: luke.twomey@bmtoceanica.com.au Phone: (08) 6272 0000	Engaged by Carnegie Wave Energy Limited to provide advice relating to the marine and coastal elements of the Project, undertake a marine risk assessment in consultation with Carnegie, and prepare this MEMP.
Terrestrial Environmental Advisor	Dr Boyd Wykes Independent consultant Email: majyx@inet.net.au	Engaged by Carnegie Wave Energy Limited to provide technical advice relating to the terrestrial and near-shore elements of the Project including terrestrial risk assessment, surveys, implementation measures in accordance with Defence policy and procedures.

## 5.2 Training and awareness

All construction personnel (Carnegie or sub-contractor) involved in any aspect of the Project will receive a formal environmental induction to ensure they are aware of their responsibilities and are competent to carry out their work in a responsible manner. The marine and terrestrial environmental induction will be prepared and delivered by the Carnegie Environment and Approvals Manager, or nominated representative, and will include regulatory requirements, roles and responsibilities, environmental values and issues, environmental management, incident reporting requirements, emergency response procedures and remedial actions to be applied across the entire Project. Specific requirements for induction of construction personnel on Garden Island are outlined further within the CETO 6 Terrestrial Environmental Management Plan.

## 5.3 Incident reporting

For the purposes of this MEMP, environmental incidents are defined as any breaches or non-compliance with environmental objectives and controls prescribed by the management standards of this MEMP and regulatory and approval requirements.

All incidents and complaints will be reported and recorded under Carnegie's Continuous Improvement Register in alignment with Carnegie's Health, Safety and Environmental Plan and associated Incident Emergency Crisis Management Plan and Incident Reporting Procedure. Incidents and/or complaints are ranked from minor to major (raking of 1 to 3 respectively), using pre-defined criteria. Level one and level two incidents (emergencies) are reported as soon as practicable and dealt with through Carnegie's incident reporting process and the relevant internal procedures.

If an event is deemed by the Chief Executive Officer, or in their absence a relevant Senior Officer of Carnegie, to be a level three incident or crisis, the Carnegie Crisis Management Team (CMT) must be convened. The CMT will also notify Carnegie's Chairman and Board of Directors. Carnegie will seek the advice of the DotE, Department of Parks and Wildlife (DPaW) and/or DoD Regional Manager, as appropriate, as soon as possible in the case of all suspected level three (major) environmental incidents.

An incident and/or complaint record will be completed by Carnegie, including details of the incident or complaint, severity (minor, moderate or major), contributing factors, immediate and further corrective actions and notifications. Where required, a copy of the incident report will be provided to the DotE, DPaW and/or DoD. Management measures will be implemented as soon as practicable, and the incident or complaint recorded on Carnegie's Incident Report Log.



A CETO 6 Emergency Management Plan is proposed to be developed by Carnegie to minimise potential adverse environmental impacts relating to emergency situations (e.g. hazardous substances, failure of the closed hydraulic system, unplanned discharges/leaks). The Emergency Management Plan will outline the sources of environmental emergencies, measures to manage and mitigate environmental harm, and communication procedures. Emergency response training will be provided to all relevant Carnegie personnel and contractors, with appropriate equipment made available on site.

## 5.4 Contractor requirements

Carnegie will engage appropriately experienced and qualified contractor personnel to work on the Project. All contractors will adhere to the requirements outlined in this MEMP and agreed Health, Safety and Environmental procedures through bridging documents.

All contractors involved in the Project will be under contractual agreement to abide by Carnegie's environmental obligations. Carnegie will be responsible for the implementation, maintenance and evaluation of compliance with the MEMP. Key Carnegie personnel (Project Manager, Offshore Operations and Maintenance Manager, Environment and Approvals Manager) will be responsible for communicating environmental matters with contractors and ensuring management practices and procedures are implemented appropriately.

## 5.5 Management commitments

The commitments associated with the management of the CETO 6 Project, other than those associated with environmental impact management (refer to Sections 6-8 of this MEMP) are outlined in Table 5.2.

**Table 5.2 Management commitments for the CETO 6 Project**

Commitment	Responsibility
Preparation and delivery of marine and terrestrial environmental induction	Carnegie (Environment and Approvals Manager)
Record of any Environmental Incident in Carnegie's Continuous Improvement Register	All Contractors and Carnegie personnel will be responsible for ensuring incidents are reported and recorded in this Register
Preparation of a Construction Management Plan	Carnegie
Preparation of a Maritime Safety Plan	Carnegie
Preparation of a Decommissioning Management Plan	Carnegie
Preparation of an Emergency Management Plan	Carnegie

## **6. Environmental Management and Monitoring**

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The Environmental Impact Assessment (EIA, BMT Oceanica 2015, Appendix A) identified the following key environmental and socio-economic issues that require active monitoring and management during the construction, operation and decommissioning phases of the Project.

### **6.1 Construction**

#### **6.1.1 Cumulative impacts**

Although there is a risk an individual project may have potential impacts to the environment, other Project impacts can lead to increased deleterious effects on environmental values, if not monitored and/or managed appropriately (EPA 2015). Cumulative impacts for the CETO 6 Project were considered in the context of existing phases of the same development, as well as other developments in the surrounding area.

As described in BMT Oceanica (2015a) (Appendix A), the impacts of projects and infrastructure surrounding the CETO 6 Project are small or negligible and considered low risk. It is anticipated that, provided the CETO 6 Project environmental impacts are managed as outlined in the proceeding sections, there will be no significant cumulative impacts to marine ecosystem and as such, no further management is proposed.

#### **6.1.2 Benthic communities and habitat**

A benthic habitat survey was commissioned by Carnegie to determine where minimal impact would occur to the limestone reef and macroalgae communities associated with the installation of CETO 6 subsea infrastructure (BMT Oceanica 2015b). The substrate within the proposed Project exclusion zone is predominantly sandy (BMT Oceanica 2015b), and therefore it is unlikely that these activities will have an impact on sensitive benthic communities and habitats.

Risks to benthic communities and habitats are considered low as the total cumulative habitat loss of CETO 5 and CETO 6 is less than the 5% cumulative loss guideline for Category D non-designated areas (BMT Oceanica 2015a, Appendix A). This is due to utilizing pre-existing disturbance corridors and the shore-crossing conduit installed for CETO 5 where possible. The likelihood of turbid plumes indirectly impacting local Benthic Primary Producer Habitat (BPPH) is considered low as the site is located in a highly energetic environment.

Carnegie will undertake underwater visual assessment surveys post-construction to confirm the extent of any direct and indirect impacts, including habitat losses.

The spatial scale for post-construction benthic surveys will be designed to ensure an appropriate level of detail around the pipeline corridor is captured. Given the large degree of mobile shifting sand in this high wave energy environment, some considerations will also need to be made with respect to natural variation over time in benthic habitat.

Table 6.1 provides detail of the management commitments in relation to BPPH to be implemented during the Project construction phase.

**Table 6.1 Construction benthic primary producer habitat management commitments**

<b>Construction benthic primary producer habitat management commitments</b>	
<b>Application</b>	All marine based construction activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine based construction activities in relation to the protection of BPPH
<b>Key performance indicator</b>	<ul style="list-style-type: none"> <li>• Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP</li> <li>• Ensure direct and indirect loss to BPPH is within the WA EPA Cumulative Loss Guidelines (EPA 2009) from installation of CETO 6 infrastructure.</li> </ul>
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• The requirements for anchoring of vessels to ensure minimal impact to BPPH is to be addressed in the Construction Management Plan for contractors</li> <li>• Project design of the cable routes and CETO unit location to minimise direct loss and proximity to BPPH where possible</li> <li>• Minimise disturbance utilising existing disturbed corridors from PWEF where possible</li> <li>• Adherence to DER Native Vegetation Clearing Permit requirements</li> <li>• Logging of environmental incidents involving loss of BPPH, including spatial estimate of loss</li> <li>• Ensure CETO 6 meeting the EPAs objectives as described in EPA (2009)</li> </ul>	
<b>Monitoring and contingency measures</b>	
<ul style="list-style-type: none"> <li>• A post-construction seabed visual assessment survey shall be completed to ensure no impacts have occurred to BPPH outside of the cable route corridor and CETO 6 unit(s) footprint</li> </ul>	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring disturbance to BPPH is minimised</li> <li>• Carnegie will be responsible for preparing a Construction Management Plan</li> <li>• Carnegie will be responsible for undertaking a visual seabed survey to ensure no impacts to BPPH outside the cable route corridor and exclusion zone; to confirm the extent of any direct and indirect impacts, including habitat losses</li> <li>• Any additional significant impact to BPPH other than that outlined within the MEMP will be reported by Carnegie to applicable regulatory authorities as required</li> </ul>	

### 6.1.3 Coastal processes

#### ***Beach and dune stability***

As identified in the EIA (BMT Oceanica 2015a, Appendix A) the CETO 6 Project will use the same shoreline crossing conduit as for the PWEF cable and it is anticipated the potential impact to coastal processes near-shore will be negligible, which is supported by monitoring results of beach and dune stability associated with the PWEF pipeline installation (BMT Oceanica 2015c).

Clearing of vegetation across the fore dunes and the hind dunes associated with the trenching and burial of the cables could facilitate erosion and destabilisation of the dune system. Increased erosion of dune vegetation and the creation of dune blowouts in areas disturbed during cable installation could occur during high energy wind and wave conditions. The issue of dune vegetation disturbance will be updated for CETO 6 Project in the Terrestrial Environmental Management Plan.

Table 6.2 outlines the management commitments relating to beach and dune stability to be implemented during the Project construction phase. Monitoring requirements that will be implemented in the ongoing management of beach and dune stability for the duration of the Project are presented in Table 8.1 in Section 8.1.

**Table 6.2 Construction beach and dune stability management commitments**

<b>Beach and dune stability management commitments</b>	
<b>Application</b>	All marine based construction activities associated with the CETO 6 Project.
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine based construction activities in relation to the protection of beach and dune stability to the high water mark
<b>Key performance indicator</b>	<ul style="list-style-type: none"> <li>• Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP</li> <li>• No ongoing issues relating to beach and dune stability due to the installation and shore-crossing of subsea power cables for the CETO 6</li> </ul>
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• The Project design will minimise the direct disturbance to the seabed and shore-crossing for cable installation by using industry design standards and best practice</li> <li>• Where possible, the nearshore surface cable laying will follow the pre-existing PWEF pipeline route and utilise the existing shore-crossing conduit through to the substation on Garden Island</li> </ul>	
<b>Monitoring and contingency measures</b>	
<ul style="list-style-type: none"> <li>• Following the cable installation, visual assessments will be undertaken to examine the beach profile and coastal geomorphology along cable routes (see Table 8.1 in Section 8.1)</li> </ul>	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring that all management requirements associated with CETO 6 installation in terms of beach and dune stability are appropriately implemented</li> <li>• Carnegie will be responsible for undertaking a visual assessment from aerial photographs to examine the beach profile and coast geomorphology along proposed cable routes</li> <li>• Carnegie will be responsible for reporting any impacts or issues associated with beach and dune stability to appropriate regulatory authorities within agreed timeframes</li> </ul>	

#### **6.1.4 Marine environmental quality**

##### ***Water and sediment quality***

Potential impacts to marine water quality associated with CETO 6 construction are primarily associated with turbidity generation from installation of subsea infrastructure, spills and waste including accidental release of hydraulic fluid and drilling activities. Each of these was identified as being of low risk to water quality after consideration of Project risk and appropriate management (BMT Oceanica 2015a, Appendix A).

Potential impacts to sediment quality as a result of the CETO 6 Project construction were assessed as having low residual risk and are similar to those for water quality with primarily impacts associated with installation of subsea infrastructure, spills and waste including accidental release of hydraulic fluid and drilling activities. Potential impacts to sediment quality associated with installation of subsea infrastructure will differ depending on the type of foundation chosen as described in BMT Oceanica (2015a) (Appendix A).

Carnegie will conduct pre and post-construction sediment surveys to be completed dependent on the choice of drilling muds if drilling is the chosen method for pile installation

All management commitments associated with water and sediment quality during the construction phase of the Project are summarised in Table 6.3.

**Table 6.3 Construction water and sediment quality management commitments**

<b>Water quality management commitments</b>	
<b>Application</b>	All marine-based construction activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based construction activities in relation to the protection of marine water and sediment quality
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<p><b>1. Turbidity</b></p> <ul style="list-style-type: none"> <li>• Use of existing PWEF infrastructure where possible for cable installation including the shoreline crossing conduit to minimise disturbance</li> <li>• Project design in limited geographical area, temporary construction operations in high energy environment</li> </ul> <p><b>2. Spills and waste</b></p> <ul style="list-style-type: none"> <li>• Project design to reduce potential for hydraulic fluid release, majority of fluid contained within in a closed circuit and external seals to reduce leakage to negligible levels (see Section 2.2.2)</li> <li>• Project design of CETO unit(s) are secured with a secondary tether in the event of unit detachment as a result of catastrophic failure</li> <li>• Hydraulic fluid selected to avoid potential significant impacts in line with industry standards and with as low toxicity as possible (as per CEFAS ratings using least toxic possible, see Safety Data Sheet (SDS) Appendix B)</li> <li>• All hazardous materials to be handled, used and stored in accordance with the SDS and industry standards</li> <li>• SDS sheets to be made available for all hazardous products required throughout the construction phase</li> <li>• All vessel operators will ensure potentially hazardous materials and/or waste is secured appropriately on board in accordance with Dangerous Goods requirements, including storage in bunded drums for licensed on-shore disposal</li> <li>• Supplier contracts shall require adherence to national/international legislative requirements for oil spill prevention</li> <li>• All spills will be immediately contained, cleaned up and disposed of appropriately</li> <li>• Spill kits appropriate to the nature, type and amount of material(s) will be maintained on board each vessel, with personnel appropriately trained in spill kit use</li> <li>• Waste shall be disposed of and stored in secured, lidded bins for appropriate onshore disposal</li> <li>• Mechanical/hydraulic equipment, fuel pumps, tanks and storage areas will be regularly inspected</li> <li>• Lifting equipment shall be certified and crane operation shall be to Department of Commerce WorkSafe requirements to ensure safe operation and no loss of equipment/materials</li> </ul> <p><b>3. Drilling</b></p> <ul style="list-style-type: none"> <li>• The release of grouting fluids to the marine environment will be minimised for foundation installation (dependant on weather)</li> <li>• Low volume of drill cuttings released as Project is small and construction is temporary</li> <li>• Estimated time requirements for foundation installation (dependent on weather windows) <ul style="list-style-type: none"> <li>• Pile driving, approx 24 h pile driving over 1-5 days per pile with maximum of 3 piles</li> <li>• Drill and grout est.5-10 days per pile with maximum of 3 piles</li> <li>• Gravity base: 5-10 days tow and install per unit</li> </ul> </li> <li>• If required, drilling muds will be selected from biodegradable fluids with low environmental toxicity</li> </ul>	
<b>Monitoring and contingency measures</b>	
<ul style="list-style-type: none"> <li>• No monitoring requirements have been proposed in relation to water quality</li> <li>• Pre- and post-construction sediment surveys to be completed if drilling is the chosen method for pile installation</li> </ul>	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring that significant spills of hazardous materials that enter the marine environment will be reporting to regulatory authorities (i.e. the EPA and DoD) in accordance with prevailing legislation and any approval conditions</li> <li>• Carnegie will be responsible for undertaking a pre- and post-construction sediment survey if drilling is the chosen method for pile installation</li> <li>• Carnegie will prepare and implement a Construction Management Plan and Emergency Management Plan for the CETO 6 Project, which will contain information relating to spill, waste management and drilling procedures for contractors</li> </ul>	

## Introduced marine pests

The risk of introducing marine pests to the Project area via vessel movements and usage was assessed as low residual risk for the Project after implementation of appropriate management and mitigation measures (BMT Oceanica 2015a, Appendix A). Management commitments relating to introduced marine pests during the construction phase are outlined in Table 6.4.

**Table 6.4 Construction introduced marine pest management commitments**

Water and sediment quality management commitments	
<b>Application</b>	All marine-based construction activities associated with the CEOT 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management for introduced marine pests of all marine-based construction activities in relation to the protection of the marine ecosystem
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
Management commitments	
<ul style="list-style-type: none"> <li>• Vetting of vessels and suppliers (including vessel operational history, fouling control coating and ballast/trim water details)</li> <li>• Use domestic vessels where possible</li> <li>• Reference to regulations outlined within the <i>Biosecurity Act 2016</i></li> <li>• Reference to Department of Agriculture biofouling guidelines for commercial vessels</li> <li>• Reference to the WA Department of Fisheries state-wide vessel-tool checklist</li> <li>• Carnegie to arrange construction vessels for clearance of marine pests if suspected risk, as soon as possible</li> <li>• Subject to the perceived risk and/or uncertainties presented by the vessel an inspection may be undertaken by a suitable qualified marine pest surveyor prior to mobilisation</li> </ul>	
Monitoring and contingency measures	
No other monitoring requirements have been proposed in relation to introduced marine pests	
Responsibilities and reporting requirements	
<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring that all management requirements associated with introduced marine pests are appropriately implemented</li> <li>• Carnegie will be responsible for reporting any impacts or issues associated with introduced marine pests to appropriate regulatory authorities within agreed timeframes</li> </ul>	

### 6.1.5 Marine fauna

The primary source of potential impact to marine fauna during the CETO 6 Project construction phase is related to underwater noise during foundation installation which may potentially impact marina fauna auditory canals. Potential impacts to marine fauna for toxicity of grouting material and sediment deposition during the construction phase drilling works are managed indirectly through management commitments for water and sediment quality outlined in Table 6.3.

Table 6.5 outlines the management commitments relating to marine fauna to be implemented during the CETO 6 Project construction phase.



**Table 6.5 Construction management commitments for marine fauna**

<b>Marine fauna management commitments</b>	
<b>Application</b>	All marine-based construction activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based construction activities in relation to the protection of marine fauna
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Avoidance of species high migratory periods where possible</li> <li>• Desktop investigation of both marine MNES and local species usage of the area, e.g., seabirds and/or cetaceans migratory paths and periods, feeding areas, etc.</li> <li>• If pile-driving construction methods are used, a 500 m exclusion zone will be maintained through dedicated on-deck surveillance boat search for susceptible marine fauna prior to commencement and during pile driving each pile foundation</li> <li>• If required, night-time construction activities will only be undertaken if protected marine fauna have not been observed in the 500 m exclusion zone in the previous day</li> <li>• Use of a suitably qualified marine fauna observer (MFO) to undertake mammal observations if pile driving is the chosen method for foundation installation. A Marine Fauna Observation Log is provided in Appendix C.</li> <li>• System in place to record boat/deck searches and presence and location of protected marine fauna</li> <li>• If pile-driving, adherence to guidance under EPBC Act 1999 Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines</li> <li>• If foundation installations via pile driving, start up procedures shall commence with soft/'fairy taps' to warn proximal marine fauna</li> <li>• Estimated times for foundation installation, dependent on weather windows <ul style="list-style-type: none"> <li>• Pile driving, approx 24 h pile driving over 1-5 days per pile with maximum of 3 piles</li> <li>• Drill and grout est.5-10 days per pile with maximum of 3 piles</li> <li>• Gravity base: 5-10 days tow and install per unit</li> </ul> </li> <li>• Minimal lighting only will be used overnight for security and maritime safety purposes</li> <li>• Reduce potential interactions of marine fauna with subsea infrastructure through Project design, e.g., minimise loose anchoring/mooring lines, floating umbilical system from CETO 6 units (see Section 2.2.2)</li> <li>• Marine equipment and boats shall be operated by qualified personnel</li> <li>• Vessel movements during the construction works, particularly during the offshore construction components, will be limited to speeds appropriate for the nature of work being undertaken</li> <li>• There will be no interaction with marine fauna and/or fishing by Carnegie contractors</li> <li>• Onshore and coastal construction activities (i.e. pulling the cable through the shore-crossing conduit) will be managed to minimise risk to local fauna (penguins, pinnipeds etc.)</li> </ul>	
<b>Monitoring and contingency measures</b>	
Refer to the Marine Fauna Monitoring and Contingency Plan presented in Table 8.2 in Section 8.2	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie is responsible for ensuring that management commitments in relation to marine fauna during the construction phase are adhered to by all contractors</li> <li>• Carnegie is responsible for ensuring that any impacts to marine fauna during the construction phase of CETO 6 are reported in a timely manner to relevant regulatory authorities (such as DotE or DPaW)</li> </ul>	

## 6.1.6 Amenity

### ***Fisheries (commercial and recreational)***

The potential impact to recreational or commercial fisheries was assessed as low (BMT Oceanica 2015a, Appendix A). The western rock lobster fishery is the only commercial fishery that may be operating in the vicinity of Garden Island. Lobsters are usually only in the proposed area during the whites phase of their migration phase, when they are moving from onshore reefs to offshore spawning grounds (Phillips 1983). Given the short temporary construction activities and avoidance of high migratory periods where possible and depending on scheduled project timeframes, it is expected the impact to the western rock lobster to be minimal.

In terms of both commercial and recreational fisheries, the proposed exclusion zone of 400 m by 600 m (subject to Project approvals) area is comparatively very small, in open water and a predominantly sandy seabed, and given the exclusion zone will only remain in place for the life of the Project, it is not anticipated to have any impact upon fishing. Management for safety aspects associated with recreational and commercial fisheries during the construction phase of the Project is described below in Table 6.7

### ***Recreational activities***

Surfing is known to occur on the western side of Garden Island, further offshore north and away from CETO 6 proposed site. Snorkelling is popular along the shallow limestone reefs fringing Garden Island. Recreational SCUBA diving is also known to occur over the deeper reefs off Garden Island and Five Fathom Bank, and diving would be unlikely in the CETO 6 site given the depth and sandy nature of the offshore site (Carnegie 2010). As such, it is unlikely that recreational and tourism values and activities will be impacted upon during the construction phase of the CETO 6.

The proposed closure area for marine construction, as well as the subsea infrastructure for the CETO 6 (onshore and offshore, including the CETO units, cable and other Project infrastructure) may also have an impact on local tourism and recreational activities including surfing, diving and recreational boating.

Temporary disturbances to visual amenity may be caused during cable laying activities in the onshore area (i.e. up to ~500 m offshore of Garden Island). It is anticipated that cable laying would be likely to occur during calmer conditions in summer, and at this time recreational visitors to Garden Island (both land and boat users) are more prevalent.

Carnegie will continue to provide information to the wider community about the CETO 6 Project in accordance with the CCP, including details on the progress of construction.

The management commitments for recreational activities are outlined in Table 6.6. Terrestrial management requirements associated recreational activities on accessible beaches by both DoD personnel and the general public are addressed in the TEMP.



**Table 6.6 Construction management commitments for recreation**

<b>Recreation management commitments</b>	
<b>Application</b>	All marine-based construction activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based construction activities in relation to the protection of recreational values
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Project designed with in limited geographical area ~8-10 km offshore within a small Project exclusion zone</li> <li>• The offshore lease area (declared exclusion zone) around the CETO units will be clearly marked and defined by cardinal markers and subsea infrastructure marked on maritime charts (See Table 6.7)</li> <li>• Community consultation will continue to be undertaken by Carnegie, including with members of the general public as per the CETO 6 CCP (See Appendix A)</li> <li>• Management of local boating activities during construction will be an integral part of the, and will be developed by Carnegie in consultation with Rockingham Volunteer Sea Rescue Group (RVSRG) , Australian Safety Maritime Association (AMSA), the WA DoT and any other relevant stakeholder identified during the consultation process (see Table 6.7)</li> </ul>	
<b>Monitoring and contingency measures</b>	
No monitoring requirements have been proposed in relation to recreational activities	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring that management commitments relating to recreational values are implemented</li> <li>• Should any significant impacts to recreational values occur during the CETO 6 construction phase, Carnegie will be responsible for reporting these impacts to relevant authorities (e.g. the WA DoT)</li> </ul>	

### **Maritime Safety**

There is a medium residual risk relating to maritime safety associated with increased vessel activity and risk of collisions, installation of subsea infrastructure and CETO units, including the loss of materials from the CETO units and/or during transport on the barge(s), disturbance to the navigation of other vessels in the area and attraction of fisherman to subsea infrastructure.

Table 6.7 outlines the management commitments relating to maritime safety to be implemented during the CETO 6 Project construction phase.

**Table 6.7 Construction management commitments for marine safety**

<b>Maritime safety management commitments</b>	
<b>Application</b>	All marine-based construction activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based construction activities in relation to the protection of maritime safety
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Consultation with key stakeholders, including AMSA, AFMA, WA DoT, DoD, WA DoF, commercial and recreational fishing peak bodies</li> <li>• Project design placement of CETO 6 units in centre of Project exclusion zone to avoid interference with fisherman mooring to navigational aids delineating the exclusion zone</li> <li>• All materials and CETO unit components will be thoroughly secured during mobilisation</li> <li>• In the unlikely event that materials or components are lost during mobilisation, they will be retrieved in a timely and safe manner either by suitably qualified Carnegie personnel, or contractors under the direct supervision of Carnegie personnel</li> <li>• Issuing of TNTM (WA DoT, AMSA, Australian Hydrograph Office (AHO)) and chart notifications outlining location of Project infrastructure</li> <li>• Permanent exclusion zone implemented surrounding the CETO 6 units around any installation on which construction work is being undertaken will be in place through a TNTM as required by maritime safety</li> <li>• Consider legal exclusion zone to legally prevent vessel access and reporting procedure to AMSA should vessels be identified in exclusion area</li> <li>• Project designed to minimise potential for disturbance of existing sea users with small exclusion zone</li> <li>• Marine equipment and boats shall be operated by qualified personnel</li> <li>• Maintenance of construction activities to recommendations and standards of International Association of Lighthouse Authorities (IALA) Maritime Buoyage System, IALA Recommendation O-131-on the Marking of Offshore Wave and Tidal Energy Devices &amp; IALA Recommendation O-139-on the Marking of Man Made Offshore Structures for recommendations on lighting and marking for wave farms</li> <li>• Guidance relating to maritime safety will be detailed by Carnegie in the CETO 6 Construction Management Plan and Emergency Management Plan to be prepared</li> <li>• Carnegie has prepared a Maritime Safety Plan</li> </ul>	
<b>Monitoring and contingency measures</b>	
No monitoring requirements have been proposed in relation to marine safety impacts.	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie is responsible for ensuring that any maritime safety impact during the construction phase of the CETO 6 Project are reported in a timely manner to relevant regulatory authorities</li> <li>• Carnegie is responsible for ensuring that management commitments in relation to maritime safety during the construction phase are adhered to by all contractors though the implementation of the Construction and Emergency Management Plans</li> <li>• Carnegie is responsible for ensuring that management commitments in relation to maritime safety during the construction phase are adhered to by all contractors though the implementation of the Maritime Safety Plan</li> </ul>	

## Existing infrastructure

Within the CETO 6 Project area, there is a low residual risk (BMT Oceanica 2015b, Appendix A) of interference, disturbance or damage to existing infrastructure during the construction phase. Existing infrastructure includes the PWEF pipeline route and possible unexploded ordnances (UXO) within the Project area. Verification of possible UXO and existing PWEF infrastructure has been undertaken by geophysical surveys (MGS 2015) and there are no known UXO present in the Project Area. The DoD underwater tracking range (UWTR) has recently been decommissioned and there is no longer a risk of disturbance to this infrastructure. The management commitments for existing infrastructure are outlined in Table 6.8.

**Table 6.8 Construction management commitments for existing infrastructure**

<b>Existing infrastructure management commitments</b>	
<b>Application</b>	All marine-based construction activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based construction activities in relation to the protection of existing infrastructure
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Carnegie will continue to liaise with DoD regarding existing infrastructure throughout the deployment and installation of CETO unit(s)</li> <li>• Carnegie will ensure the precise locations of existing infrastructure are identified and marked up on all drawings and charts used for CETO 6 installation</li> <li>• Buffer of at least 50 m from all known location of existing infrastructure</li> <li>• Project design to avoid installed infrastructure and minimise potential for disturbance</li> </ul>	
<b>Monitoring and contingency measures</b>	
No monitoring requirements have been proposed in relation to existing infrastructure	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• All contractors will be responsible for ensuring there is no disturbance or damage to the existing infrastructure with the precise location of existing infrastructure provided to contractors by Carnegie</li> <li>• Carnegie will report any relevant damage in a timely manner to relevant regulatory authorities</li> </ul>	

### 6.1.7 Heritage

The potential risk of disturbance to Aboriginal and European Heritage values associated with the CETO 6 construction has been assessed as low (BMT Oceanica 2015a, Appendix A). Hydrographic surveys carried out by Carnegie (MGS 2015) have not identified evidence of shipwreck relics within the CETO 6 Project location. There are no known aboriginal heritage sites within the Project area (BMT Oceanica 2015a, Appendix A). Nevertheless, best practice and surveying will be undertaken during the construction phase to ensure protection of maritime heritage. The management commitments relating to maritime safety to be implemented during the CETO 6 Project construction phase are outlined in Table 6.7.

**Table 6.9 Construction management commitments for maritime heritage**

<b>Maritime Heritage commitments</b>	
<b>Application</b>	All marine-based construction activities associated with CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based construction activities in relation to the protection of maritime heritage
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Carnegie has access to DoD reports on known history and heritage sites for Garden Island</li> <li>• Aboriginal Heritage Inquiry Search undertaken and no known heritage areas within the Project area</li> <li>• The locations of all known shipwrecks within close proximity to the Project are will be clearly identified and marked on maps (including navigational maps) prior to the commencement of cable laying and installation of CETO 6 unit(s)</li> <li>• Project designed to avoid identified heritage values</li> <li>• Any previously unknown shipwrecks or historical relics encountered during the course of the Project will be immediately reported to DotE as required by, and in accordance with the <i>Historic Shipwrecks Act 1976</i></li> </ul>	
<b>Monitoring and contingency measures</b>	
No further monitoring requirements have been proposed in relation to maritime heritage impacts.	
<b>Responsibilities and reporting requirements</b>	
Carnegie is responsible for ensuring that any maritime heritage impact during the construction phase of the CETO 6 Project are reported in a timely manner to relevant regulatory authorities	

## 6.2 Operation

### 6.2.1 Benthic communities and habitat

During the operational phase of the CETO 6 Project, there is a low risk that the benthic habitat may be impacted upon by (1) the presence of the CETO unit (s), foundations, cable stabilisation and movement of cables across the seabed and; (2) accidental release of hydraulic fluid.

The existing offshore substrate consists of primarily coarse sandy sediments, limestone platforms with sparse macroalgae and seagrass habitat present. The substrate is not of a regionally significant scale and there is not a high abundance of sensitive benthic habitats (BMT Oceanica 2015b). Furthermore, the expected operational life of the Project is short-term ~12 months with a design life of ~4 years (see Section 2.2). Monitoring results from the presence of PWEF flexible pipelines and cables, which are slightly larger in diameter, has shown no issues to the BPPH to date (BMT Oceanica 2014a). The CETO 6 Project footprint is relatively small in limited geographical area with few units and a small cable diameter.

The potential for deteriorated water quality and subsequent flow on effects to BPPH as a result hydraulic fluid leaks has been assessed as a low residual risk. Carnegie proposes to reduce any leakage rates through careful Project design and selection of bearing materials outlined in Section 2.2.2. Given the high energy environment of the Project site, it is likely that any volumes of fluid accidentally released into the marine environment would be rapidly dispersed (RPS 2011). It is anticipated accidental discharge of hydraulic fluid will be localised and temporary, with effects on fauna and benthic habitat present at the Project site are expected to be minimal. Potential impacts to BPPH associated with deteriorated water quality during the operational phase are managed indirectly through management commitments for water and sediment quality outlined in Table 6.12.

Table 6.10 outlines the management commitments to ensure that the benthic habitat outside the CETO 6 unit(s) subsea infrastructure footprint is not impacted as result of the operational phase of the Project.

**Table 6.10 Operational benthic communities and habitat management**

<b>Benthic communities and habitat management commitments</b>	
<b>Application</b>	All marine-based operational activities associated with CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based operational activities in relation to the protection of benthic communities and habitat.
<b>Key performance indicator(s)</b>	<ul style="list-style-type: none"> <li>• Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP</li> <li>• Ensure direct and indirect loss to BPPH is within the WA EPA Cumulative Loss Guidelines (EPA 2009) from installation of CETO 6 infrastructure.</li> </ul>
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Design of cable installation and stabilisation to address cable movement and shore-crossing conduit, taking in account for reefs and BPPH and avoiding where possible</li> <li>• Project design of the cable routes and CETO unit location to minimise direct loss and proximity to BPPH where possible</li> <li>• Careful consideration of Project design and selection of bearing materials to reduce leakage rates (see Section 2.2.2)</li> <li>• Ensure CETO 6 Project is meeting the EPAs objectives as described in EPA (2009) during operational maintenance</li> </ul>	
<b>Monitoring and contingency measures</b>	
A post-construction seabed visual survey shall be completed to ensure no impacts have occurred to BPPH outside of the cable route corridor and CETO 6 unit(s) footprint	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring that all management requirements associated with cable installation are appropriately implemented</li> <li>• Carnegie will be responsible for ensuring a post-construction seabed visual survey is undertaken to ensure no impacts have occurred to BPPH outside the cable route corridor and CETO 6 unit(s) footprint</li> <li>• Carnegie will be responsible for reporting any impacts or issues associated with BPPH to appropriate regulatory authorities within agreed timeframes</li> </ul>	

## 6.2.2 Coastal processes

### ***Beach and dune stability***

The CETO 6 Project will utilise the existing shore-crossing conduit and associated buried infrastructure from the PWEF and, as such, the potential impacts to beach and dune stability during the operations phase are anticipated to be low. Monitoring results from both the knowledge-sharing project with UWA Oceans Institute and from PWEF show to impacts to nearshore coastal processes to sediment transport and coastal processes to date (BMT Oceanica 2014b).

Management options for the CETO 6 Project associated with beach and dune stability are limited to ensuring the structural design and installation of the cable minimises the potential for exposure and appropriate management is adhered to in the event of cable exposure.

Table 6.11 outlines the management commitments relating to beach and dune stability to be implemented during the CETO 6 operational phase.

**Table 6.11 Operational beach and dune stability management commitments**

<b>Beach and dune stability management commitments</b>	
<b>Application</b>	All marine-based operational activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based operational activities in relation to the protection of coastal geomorphology and processes.
<b>Key performance indicator</b>	<ul style="list-style-type: none"> <li>• Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP</li> <li>• No ongoing issues relating to beach and dune stability due to the presence of CETO 6 cables and buried infrastructure</li> </ul>
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Project design of cable installation and stabilisation to address cable movement and shore-crossing conduit taking account for currents and water movement</li> <li>• Project designed with small cable in limited geographical area of high sediment movement</li> <li>• If the buried shore-crossing conduit is found to be exposed along any section of the near-shore and/or onshore cable crossing, the site will be surveyed to determine whether the exposed conduit is having an effect on the coastal sediment transport, beach profile and dune stability</li> <li>• The implementation of additional stability measures could be required if there is a risk to the structural integrity of the conduit</li> </ul>	
<b>Monitoring and contingency measures</b>	
Following the cable installation, visual assessments will be undertaken to examine the beach profile and coastal geomorphology along cable routes (see Table 8.1 in Section 8.1)	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring that all management requirements associated beach and dune stability are appropriately implemented</li> <li>• Carnegie will be responsible for reporting any impacts or issues associated with beach and dune stability to appropriate regulatory authorities within agreed timeframes</li> </ul>	



## 6.2.3 Marine environmental quality

### **Water and Sediment Quality**

Risks to water and sediment quality as a result of the operational phase of the CETO 6 Project have been assessed as having a low residual risk, and relate primarily to operational leaks during normal use and/or catastrophic leak of hydraulic fluid from the pump (BMT Oceanica 2015a, Appendix A). The SDS for the hydraulic fluid product is provided in Appendix B and has been selected with as low as practicable environmental impact without compromising the output of CETO unit(s) operation. Monitoring results to date show the marine infrastructure associated with PWEF has not significantly impacted surrounding water quality (BMT Oceanica 2015d), and is not anticipated to significantly impact on sediment quality (note a post-decommissioning survey is planned for early-2016, as required by the PWEF Sediment Monitoring Plan; BMT Oceanica 2014b).

Table 6.12 outlines the management commitments in relation to water and sediment quality during the operational phase of the CETO 6 Project.

**Table 6.12 Operational water and sediment quality management commitments**

<b>Water and Sediment quality management commitments</b>	
<b>Application</b>	All marine-based operation activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based operational activities in relation to the protection of the water and sediment quality
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Project design to reduce potential for hydraulic fluid release, majority of fluid contained within in a closed circuit and external seals to reduce leakage to negligible levels (see Section 2.2.2)</li> <li>• Project design of CETO units are secured with a secondary tether in the event of unit detachment as a result of catastrophic failure</li> <li>• Hydraulic fluid selected to avoid potential significant impacts in line with industry standards and with as low toxicity as possible (as per CEFAS ratings using least toxic possible)</li> <li>• Ensure antifouling materials' storage, application methods, equipment and storage of equipment are in line with industry standards, to prevent excess material shedding in water during re-applications</li> <li>• Project design and equipment to limit use of antifouling coatings</li> <li>• All hazardous materials to be handled, used and stored in accordance with the SDS and industry standards</li> <li>• SDS sheets to be available for the hydraulic fluid/antifoulant products and all other hazardous materials required throughout the operational phase</li> <li>• All maintenance vessel operators will ensure potentially hazardous materials and/or waste is secured appropriately on board in accordance with Dangerous Goods requirements, including storage in bunded drums for licensed on-shore disposal</li> <li>• Supplier contracts shall require adherence to national/international legislative requirements for oil spill prevention</li> <li>• All spills will be immediately contained, cleaned up and disposed of appropriately</li> <li>• Spill kits appropriate to the nature, type and amount of material(s) will be maintained on board maintenance vessels, with personnel appropriately trained in spill kit use</li> <li>• Waste shall be disposed of and stored in secured, lidded bins for appropriate onshore disposal</li> <li>• Mechanical/hydraulic maintenance equipment, fuel pumps, tanks and storage areas on vessels will be regularly inspected if offshore prolonged maintenance is required</li> <li>• Lifting equipment shall be certified and crane operation shall be to WA Department of Commerce WorkSafe requirements to ensure safe operation and no loss of equipment/materials</li> </ul>	
<b>Monitoring and contingency measures</b>	
<ul style="list-style-type: none"> <li>• Emergency management commitments are provided in Table 7.1</li> </ul>	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring that significant spills of hazardous materials that enter the marine environment during the operational phase will be reported to relevant regulatory authorities in accordance with prevailing legislation and any approval conditions</li> <li>• Carnegie will prepare and implement a Construction Management Plan and Emergency Management Plan for the CETO 6 Project, which will contain information relating to spill, waste management and drilling procedures for contractors undertaking operational maintenance</li> </ul>	



## Biofouling

Biofouling can have adverse consequences for many marine structures through the promotion of corrosion, clogging up of intakes and grates, adding weight to structures or, in the case of vessels, lead to excessive drag and increased fuel costs. Carnegie proposes to coat all subsea infrastructure with a biofouling agent which meets current environmental standards. It is unlikely that the application of antifouling material will have any detrimental environmental impact to sediment quality, water quality or local marine fauna or flora and risks to the marine environment from the application of a biofouling agent are anticipated to be low.

Several samples of commercially available silicone antifouling release coatings have been previously tested by Carnegie at the CETO pilot plant in Fremantle during the CETO 3 deployment off Garden Island and PWEF. As a result of these investigations, it is likely that Carnegie will utilise Jotun SeaQuantum Ultra (or a similar product with low environmental impact) for the CETO 6 subsea infrastructure. The SDS for this product is provided in Appendix D.

Table 6.13 outlines the management commitments during the operational phase to minimise risk to the environment from biofouling.

**Table 6.13 Operational biofouling management commitments**

<b>Biofouling management commitments</b>	
<b>Application</b>	All marine-based operational activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based operational activities in relation to the protection of the marine ecosystem
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Project design and equipment to limit use of antifouling coatings</li> <li>• Selection antifouling product to avoid potential significant impacts in line with industry standards and regulations and with as low environmental toxicity as possible (see Appendix D)</li> <li>• SDS sheets to be made available for the antifouling applications/products (see Appendix D)</li> <li>• Antifouling materials' storage, application methods, and storage of equipment with antifouling materials applied will adhere with industry standards, to prevent excess material shedding in water during re-applications</li> <li>• Vetting of maintenance vessels and suppliers (including vessel operational history, fouling control coating and or ballast/trim water details)</li> <li>• Use domestic vessels where possible</li> <li>• Reference to regulations outlined within the <i>Biosecurity Act 2016</i></li> <li>• Reference to Department of Agriculture biofouling guidelines for commercial vessels</li> <li>• Reference to the WA Department of Fisheries state-wide vessel-tool checklist</li> <li>• Carnegie to arrange operational vessels for clearance of marine pests if suspected risk as soon as possible</li> </ul>	
<b>Monitoring and contingency measures</b>	
No monitoring requirements have been proposed at this phase in relation to application of biofouling	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring that all management requirements associated with biofouling application and management are appropriately implemented</li> <li>• Carnegie will be responsible for reporting any impacts or issues associated with biofouling to appropriate regulatory authorities within agreed timeframes</li> </ul>	

## **6.2.4 Marine fauna**

### ***Marine fauna interaction***

Through careful Project design specifications and selection of bearing materials, there is a low residual risk associated with marine fauna interactions and the CETO 6 subsea infrastructure. The CETO 6 cable design connecting to the BA unit is a catenary arrangement suspended in the water column by floatation modules as described in Section 2.2.2. The arrangement may be moored to the seabed via a single anchor point, which will always be taught due to the floatation modules on the cable. Therefore the risk of entanglement is considered low as there are no slack lines or mooring lines for subsea infrastructure.

The cable design itself is small (~80 mm diameter) in a limited geographical area. The cable will be surface laid on the seabed with movement restricted by the weight of the cable protection, grout bags and clump weights (see Section 2.2.2). There is a low risk of electromagnetic field emission (EMF) significantly impacting marine fauna, the cable protection armouring and shielding will limit exposure to EMF emissions.

During the operational phase, it is anticipated that fauna will be able to navigate around subsea infrastructure and therefore the presence of the CETO unit(s) are unlikely to impact on the marine fauna behaviour and migration periods. The presence of subsea infrastructure may act as a barrier to the 'white' larval phase of the western rock lobster, however; this is considered highly unlikely given naturally occurring objects of similar scale occur in the Project area, the small Project footprint and cable diameter. There is a risk of collision to shallow diving seabirds in south-west WA with the submerged BA units, however; considered unlikely as species of this geographic region are adapted to avoiding shallow reefs and sandbanks when shallow diving.

Carnegie is undertaking further research with the UWA ocean institute via the knowledge-sharing project for PWEF to investigate marine species interaction with submerged infrastructure, whether demersal or pelagic species and whether foraging/feeding behavioural changes.

### ***Underwater Noise***

The primary source of underwater noise is anticipated to be generated from the movement of CETO 6 units in water, which has been assessed as posing a low residual risk of causing disturbance or injury to sensitive marine fauna (BMT Oceanica 2015a, Appendix A).

Previous underwater noise studies have been undertaken as part of the CETO 3 single unit deployment off Garden Island and the PWEF. As per the advice provided in CMST (2011, 2015), Carnegie modified the CETO 5 & 6 design to ensure all moving parts are thoroughly secured and with CETO 6 the core technology is contained within the BA system and, as such, there is no longer pumps, accumulators and other hydraulic components attached to the seabed.

In relation to potential impacts to marine fauna as a result of underwater noise during operation, the previous CETO 5 study found the highest recorded peak pressure was well below thresholds for injury to marine mammals, however; calculations of noise were within the range of expected behavioural response thresholds for low frequency cetaceans (great whales) (CMST 2015).

Given that the primary elements responsible for generating underwater noise in previous designs are now contained within the BA of the CETO 6 units, it is not expected that noise generation will cause disturbance or behavioural changes to marine fauna and, as such, no further management commitments are proposed.

## 6.2.5 Amenity

### ***Fisheries (commercial and recreational)***

It is highly unlikely that recreational or commercial fisheries will be impacted upon as a result of the CETO 6 Project. The western rock lobster fishery is the only commercial fishery that may operate in the offshore vicinity of Garden Island, in particular Five Fathom Bank. Lobsters are usually only in the proposed Project area during the whites phase of their migration phase. Through careful Project design, the proposed exclusion zone of 400 m by 600 m (subject to Project approvals) is comparatively small, in open water and a predominantly sandy seabed. Given the closure area will only remain in place for the life of the Project (~12 months with a design life of ~4 years), it is not anticipated to have any impact upon fishing.

Extensive community consultation has already been undertaken for the CETO 6 Project (see Section 4) and will continue to for the life of the Project. Carnegie will ensure stakeholders and members of the general public are kept informed of the various Project phases and declared exclusion zone.

### ***Recreational activities***

Due to the presence of the CETO 6 subsea infrastructure, there is a low residual risk to recreational users of the western side of Garden Island, primarily associated with safety risks, rather than environmental impacts (see maritime safety below). The declared offshore exclusion zone and subsea infrastructure and may cause minor impacts to recreational activities including boating, fishing surfing and snorkelling due to temporary diminished access of a small area of water. Additionally, there is also a risk of the loss of public access and amenity.

Although not the intent of the Project, there is the possibility of the CETO 6 subsea infrastructure will create an artificial hard substrate, thereby attracting fish and other marine fauna to the area. This may be particularly relevant in the offshore area of the Project site, where the natural substrate is primarily sand (BMT Oceanica 2015b). An increase in fish and fauna numbers and diversity carries the potential for an increased recreational diving, snorkelling and fishing use of the area, thereby increasing the number of people attracted to the area and subsequently increasing safety risks should entry into the declared exclusion zone around the CETO 6 unit(s) occur. Management commitments for risks associated with public safety during the operational phase of the Project are outlined in Table 6.15.

Table 6.14 outlines the management commitments relating to recreation to be implemented during the CETO 6 operational phase.

**Table 6.14 Operational recreation management commitments**

<b>Recreation management commitments</b>	
<b>Application</b>	All marine-based operational activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based operational activities in relation to the protection of recreational values
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Project designed with in limited geographical area ~8-10 km offshore within a small declared exclusion zone</li> <li>• The offshore declared exclusion zone around the CETO units will be clearly marked and defined by cardinal markers and subsea infrastructure marked on maritime charts (See Table 6.15 )</li> <li>• Stakeholder and community consultation will continue to be undertaken by Carnegie, including with members of the general public as per the CETO 6 CCP (See Appendix A)</li> <li>• Management of local boating activities will be an integral part of the, and will be developed by Carnegie in consultation with RVSRG, AMSA, AHO, WA DoT and any other relevant stakeholder identified during the consultation process</li> </ul>	
<b>Monitoring and contingency measures</b>	
No monitoring requirements have been proposed in relation to maritime safety	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring that management commitments relating to recreational values are implemented</li> <li>• Should any significant impacts to recreational values occur during the CETO 6 operational phase, Carnegie will be responsible for reporting these impacts to relevant authorities (e.g. the WA DoT)</li> </ul>	

### **Maritime safety**

Maritime safety during the operational phase of the CETO 6 Project has been identified as having a medium residual risk rating, due to the presence of the CETO units close to the water surface, as well as the cardinal markers in place around the offshore exclusion zone (BMT Oceanica 2015a, Appendix A).

Table 6.15 outlines the management commitments relating to maritime safety to be implemented during the CETO 6 Project operational phase.

**Table 6.15 Operational maritime safety management commitments**

<b>Maritime safety management commitments</b>	
<b>Application</b>	All marine-based operation activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based operational activities in relation to the protection of maritime safety
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<ul style="list-style-type: none"> <li>• Consultation with key stakeholders, including AMSA, AHO, AFMA, DoD, DoF, commercial and recreational fishing peak bodies</li> <li>• Project designed to minimise potential for disturbance of existing sea users with small exclusion zone</li> <li>• Project design placement of CETO 6 units in centre of Project lease area to avoid interference with fisherman mooring to navigational aids delineating the lease/easement area</li> <li>• Carnegie to implement approval and permitting processes for declared exclusion zone and cable easement areas</li> <li>• Carnegie to consider legal exclusion zone to legally prevent vessel access and reporting procedure to AMSA should vessels be identified in exclusion area</li> <li>• Issuing of TNTM (WA DoT, AMSA,/AHO) and chart notifications outlining location of Project infrastructure</li> <li>• Implement maritime safety legislative requirements for observation and maintenance</li> <li>• Maintenance of operations to recommendations and standards of International Association of Lighthouse Authorities (IALA) Maritime Buoyage System, IALA Recommendation O-131-on the Marking of Offshore Wave and Tidal Energy Devices &amp; IALA Recommendation O-139-on the Marking of Man Made Offshore Structures for recommendations on lighting and marking for wave farms</li> <li>• The offshore lease area will be enforced as a strict closure area and exclusion zone for all non-Project related vessels, including commercial and recreational vessels as a requirement of the WA DoT</li> <li>• Cardinal markers will remain in place around the offshore declared exclusion zone for the duration of the CETO 6 Project</li> <li>• Carnegie will work in close association with the WA DoT, AMSA, AHO, WA Water Police and local sea rescue organisations to monitor and manage interaction between recreational boats and the CETO 6 infrastructure</li> <li>• Through Project design, cable mooring lines designed out to reduce risk of anchor entanglement, ensure CETO units are fully secured and consider installation of secondary connection to the foundation connection</li> <li>• Carnegie will prepare an Emergency Management Plan, Contingency Safety Plan and associated Communications Plan outlining the procedures and communication protocols in relation to achieving ongoing maritime safety</li> <li>• Carnegie has prepared a Maritime Safety Plan</li> <li>• Carnegie will continue to implement effective community consultation with all key stakeholders and the wider community</li> </ul>	
<b>Monitoring and contingency measures</b>	
No monitoring requirements have been proposed in relation to maritime safety	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>• All contractors and Carnegie personnel are responsible for ensuring maritime safety measures associated with their own work are implemented</li> <li>• Carnegie is responsible for ensuring that maritime safety notices are provided</li> <li>• Should a maritime safety impact occur, Carnegie will be responsible for reporting the incident to relevant authorities such as the WA DoT</li> <li>• Should a maritime safety impact occur, Carnegie will be responsible for reporting the incident to relevant authorities such as the WA DoT</li> </ul>	

## 6.3 Decommissioning

At the completion of the CETO 6 Project, it has been proposed the site and infrastructure will be decommissioned. Carnegie will prepare a Decommissioning Management Plan in accordance with prevailing legislation and approval requirements, which will address all decommissioning issues and provide in depth management actions to be implemented to minimise risk of impacts occurring. This section provides a general overview of the potential risks associated with the marine aspects of decommissioning.

Potential environmental risks associated with the decommissioning phase of the CETO 6 have been given a low residual risk level during the preliminary risk assessment (BMT Oceanica 2015a, Appendix A). Potential environmental risks that were identified associated with the decommissioning phase of work include:

- Environmental disruption due to either removing infrastructure or leaving it *in-situ*
- Introduction of waste and/or hydrocarbon spills and leaks
- Deterioration of infrastructure over time remaining in place causing localised contamination and Impacts to fauna and benthic habitat
- Erosion of dune stability
- Introduction of vessels with biofouling
- Increased risk with maritime safety during subsea infrastructure decommissioning.

Table 6.16 outlines the management commitments relating to decommissioning to be implemented during the CETO 6 Project decommissioning phase.

**Table 6.16 Decommissioning management commitments**

Decommissioning management commitments	
<b>Application</b>	All marine-based decommissioning activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate environmental management of all marine-based decommissioning activities in relation to the protection of the marine and coastal environment
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
Management commitments	
<p><b>1. Buried and non-buried infrastructure</b></p> <ul style="list-style-type: none"> <li>• Project design in limited geographical area</li> <li>• All non-buried infrastructure, including substation, will be removed during the decommissioning phase</li> <li>• All buried infrastructure, as well as offshore foundations, will remain in place to avoid re-disturbance of surrounding vegetation, dune and beach areas</li> <li>• Management and mitigation to ensure implementation of HSE standards for waste, pollution and hazardous substances during decommissioning activities</li> </ul> <p><b>2. Existing infrastructure</b></p> <ul style="list-style-type: none"> <li>• Carnegie will continue to liaise with DoD regarding the placement of existing infrastructure throughout the decommissioning phase</li> <li>• Carnegie will ensure the precise locations of existing infrastructure are identified and marked up on all drawings and charts used for CETO 6 installation</li> <li>• Buffer of at least 50 m from all known location of existing infrastructure</li> <li>• Project design decommissioning to avoid installed infrastructure and minimise potential for disturbance</li> </ul> <p><b>3. Maritime navigational safety</b></p> <ul style="list-style-type: none"> <li>• Consultation with key stakeholders, including AMSA, AHO, AFMA, DoD, DoF, commercial and recreational fishing peak bodies</li> <li>• Design decommissioning to minimise disturbance of existing sea users</li> <li>• Consider legal exclusion zone to legally prevent vessel access and reporting procedure to AMSA should vessels be identified in exclusion area</li> <li>• Implement permanent exclusion areas/safety zones to reduce the potential for vessel collision</li> </ul>	



- The safety zone will exclude all vessels, other than those undertaking decommissioning activities
  - A guard vessel will be engaged by Carnegie to assist with providing warnings to approaching vessels of the decommissioning activities and requirement for all vessels to remain clear of the safety zone
  - Issuing of TNTM and chart notifications, as required for maritime safety
- 4. Marine Pests/biofouling**
- Vetting of decommissioning vessels and suppliers (including vessel operational history, fouling control coating and or and ballast/trim water details)
  - Use domestic vessels where possible
  - Reference to Department of Agriculture biofouling guidelines for commercial vessels
  - Reference to the WA Department of Fisheries state wide vessel-tool checklist
  - Adherence to regulations outlined in *Biosecurity Act 2016*
  - Carnegie to arrange decommissioning vessels for clearance of marine pests if suspected risk as soon as possible
- 5. Beach and dune stabilisation**
- Disturbed dune areas and/or erodible areas will be stabilised via revegetation or other appropriate means during the decommissioning phase of the CETO 6 to minimise further disturbance or erosion as a result of either removing infrastructure or leaving it *in-situ*
- 6. Hydraulic fluid**
- The hydraulic fluid contained within the CETO 6 Units will not be discharged into the marine environment, nor will it be discharged onto terrestrial vegetation or other areas. The fluid will be discharged into appropriate containers and relocated off to a suitable licensed facility in accordance with prevailing legislation
- 7. Post-decommissioning surveys**
- Post-decommissioning surveys on infrastructure that is left *in-situ* will be undertaken by Carnegie in consultation with the DoD, and approved by other regulatory authorities as appropriate

**Monitoring and contingency measures**

Monitoring of dune and near-shore areas in terms of stabilisation and post-decommissioning surveys will be undertaken by Carnegie or a suitably experienced nominated representative of Carnegie (see Table 8.1 in Section 8.1)

**Responsibilities and reporting requirements**

Carnegie will be responsible for ensuring that all reporting requirements are provided to the appropriate regulatory and/or stakeholder agencies relevant to the CETO 6 decommissioning phase, e.g. the DoD , AMSA, AHO, WA DoT



## **7. Emergency Response Management**

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### **7.1 Introduction**

Although unlikely, there is a risk that abnormal or emergency conditions may be experienced during any phase of the CETO 6 Project, requiring the implementation of emergency management responses and/or contingency plans. As outlined in the PWEF MEMP (Oceanica 2012), these could include (but may not be limited to) a short-notice requirement to move drilling vessels, minor spill of fluid such as fuel from the drilling or service vessels, CETO BA(s) breaking from moorings and becoming shipping hazards, or vessel collision.

The measures to be undertaken in the unlikely event of environmental hazards occurring as a result of abnormal operations were included Oceanica (2012). These measures have been deemed appropriate to employ for the Project, and have been described in the sections below.

### **7.2 Loss of Buoyant Actuator**

Each CETO unit BA is a large (~21 m diameter) floating subsurface structure that is attached to a pile foundation designed to withstand the expected loads generated from the incident wave climate of Garden Island. In the unlikely event that a BA should break free of its tether, it would float to the surface and potentially be hazardous to vessels operating in the area. Through Project design, it is proposed a secondary connection will remain in place should the primary tether be compromised.

### **7.3 Drilling vessels**

During periods of adverse weather conditions or sea states, the drilling vessels (JUP, moored barge, dynamically positioned vessels) may be required to leave the offshore Project site and move to a sheltered area until conditions improve. This standby location will be determined prior to the commencement of operations, but is likely to be in shallow water east of Garden Island. Multiple sources of metocean observation and forecasting will be used to inform operations and provide adequate notice of any requirements to relocate.

### **7.4 Release of hydraulic fluid**

As outlined in the EIA (BMT Oceanica 2015a, Appendix A) and Section 6.1.4 given the selection of hydraulic fluid to be as low toxicity as practicable and volume of fluid to be contained a closed circuit within the CETO unit(s) with external seals, as well as the high energy environment in which the infrastructure is within, it is highly unlikely that an accidental release of fluid will have a large impact upon marine flora and fauna, sediment quality or water quality.

### **7.5 Emergency management**

Table 7.1 outlines the management commitments relating to emergency response and management to be implemented during all phases of the Project.

**Table 7.1 Emergency management commitments**

<b>Emergency management commitments</b>	
<b>Application</b>	All marine-based operation activities associated with the CETO 6 Project
<b>Performance objectives</b>	To ensure appropriate emergency management of all marine-based activities in relation to the protection of the marine and coastal environment
<b>Key performance indicator</b>	Conformance with all management measures, environmental monitoring and contingency plans, and environmental quality criteria specified within this MEMP
<b>Management commitments</b>	
<p><b>1. Loss of equipment</b></p> <ul style="list-style-type: none"> <li>In the event that any equipment is lost overboard from vessels, a GPS position of the lost equipment will be logged immediately to facilitate recovery at the first opportunity</li> <li>If any floating materials/equipment are lost, they will be recovered as soon as a suitable vessel can be mobilised</li> <li>Each BA will be fitted with a beacon that, upon surfacing, will activate both a visible light and a GPS transponder that will transmit its position to a shore-based receiver</li> <li>The requirements of Carnegie's Emergency Management Plan will be immediately activated to monitoring the BA position</li> <li>Carnegie will ensure that the relevant maritime authorities are informed in accordance with the protocols within the Communication Plan requirements of the Emergency Management Plan and the BA is retrieved at the earliest opportunity</li> <li>Carnegie will routinely inspect and service the components of CETO units according to their service requirements, minimising the risk of a structural failure</li> </ul> <p><b>2. Accidental discharges</b></p> <ul style="list-style-type: none"> <li>Should an accidental oil spill or other discharge of hazardous material into the marine environment occur, the contractor personnel onboard work vessels and/or the JUP (if commissioned) will respond in accordance with the Emergency Response Plans for each vessel</li> <li>Emergency Response Plans for each vessel will assign responsibilities, specify response procedures and identify available resources in the event of an oil spill or other discharge</li> <li>All emergency incidents and any spills of hazardous materials to the marine environment will be reported by the responsible contractor(s) directly to Carnegie. Carnegie will then ensure that all reporting procedures to relevant authorities are undertaken as soon as practicable</li> <li>If drilling muds are required biodegradable drilling muds with low environmental toxicity will be sourced for drilling and maintenance programs</li> <li>Any minor spills of additives or other routinely used materials onboard work vessels or the JUP (if commissioned) will be immediately captured, cleaned up, containerised and sent back to shore for recycling or disposal as appropriate</li> <li>Spills of any material will not be disposed of to the ocean</li> <li>Spill kits appropriate to the nature of work and type/volume of materials used onboard all work vessels will be adequately stocked, routinely checked and replenished as necessary prior to the commencement of work programs</li> <li>Control and performance of the CETO 6 units and cables will be monitored remotely by Carnegie, and any faults investigated accordingly</li> <li>An Emergency Management Plan will be prepared by Carnegie in accordance with prevailing legislation and regulatory requirements</li> </ul> <p><b>3. Emergency management and spill response</b></p> <ul style="list-style-type: none"> <li>Carnegie will prepare emergency response management and safety procedures in consultation with the DoD, DER, DoE WA DoT, AHO, AMSA and DPaW, outlining emergency response management actions to be undertaken during the operational phase of the Project.</li> <li>The emergency response procedures will include a spill response plan for the unlikely event of a catastrophic failure of unit(s) and subsequent loss/release of the hydraulic fluid</li> </ul>	
<b>Monitoring and contingency measures</b>	
<ul style="list-style-type: none"> <li>Carnegie will be responsible for ensuring remote monitoring of CETO units and subsea infrastructure is undertaken routinely to minimise the risk of emergency situations arising</li> <li>Monitoring and contingency requirements associated with emergency response in relation to hydrocarbon and hazardous materials management is provided in Table 8.3</li> </ul>	
<b>Responsibilities and reporting requirements</b>	
<ul style="list-style-type: none"> <li>Contractors will be responsible for ensuring emergency situations are reported to Carnegie</li> <li>Carnegie will be responsible for ensuring that emergency situations, including loss of equipment and/or components and accidental discharges or spills are reported to the relevant regulatory authority as required by prevailing legislation</li> </ul>	

## 8. Monitoring and Contingencies

Environmental monitoring and contingency plans have been developed for each of the applicable potential environmental risks associated with the CETO 6 Project, as detailed in Sections 6 and 7 of this MEMP. The monitoring and contingency plans provide details relating to:

- environmental values and objectives
- environmental quality criteria
- monitoring processes and contingency management measures
- reporting and auditing requirements

The environmental values, quality objectives and quality criteria detailed in this MEMP have been aligned with the State Environmental (Cockburn Sound) Policy 2005 (Cockburn Sound SEP), which establishes the Environmental Quality Management Framework (EQMF) for Cockburn Sound, and defines the environmental values, quality objectives and quality criteria for the region. Given the close proximity of Garden Island to Cockburn Sound, it is feasible that the Cockburn Sound SEP be similarly applied to the CETO 6.

### 8.1 Beach and dune stability monitoring

There is a potential for impacts to beach and dune stability to occur as a result of the CETO Project, in particular relating to exposure of buried infrastructure. Beach and dune stability monitoring requirements are outlined in Table 8.1.

**Table 8.1 Beach and dune stability monitoring plan**

<b>Beach and dune stability monitoring and contingency plan</b>	
Environmental Values and Objectives	<p>This Beach and Dune Stability Monitoring and Contingency Plan aims to achieve the following environmental values and objectives:</p> <ul style="list-style-type: none"> <li>• to maintain natural longshore sediment transport pathways</li> <li>• to maintain natural dune stability, including morphology and vegetation</li> </ul>
Environmental Quality Criteria	<p>There will be no significant ongoing impacts to beach and dune stability as a result of the CETO 6, or the exposure of the buried infrastructure</p>
Monitoring Process and Contingency Management Measures	<ul style="list-style-type: none"> <li>• Following cable installation, available aerial photography should be reviewed to identify any significant changes to the position of the shorelines and the established vegetation line along the south-west coast of Garden Island, and in particular at the shore-crossing site. These visual assessments should also examine any significant changes to the coastal geomorphic features identified in this report during the operational phases of the CETO 6 Project</li> <li>• Site visits to Quarry Road Beach will be conducted on a regular basis to ensure the buried infrastructure across the dune system has not become exposed and its integrity compromised. This is particularly important after storm events or periods of high water levels and swells, as the beach profile could potentially erode in these situations. During these site visits, any significant changes to the beach morphology should be noted. The rehabilitation of the dunes should be monitored to ensure they regain their natural morphology and stability (refer TEMP)</li> </ul>
Reporting and Auditing Requirements	<ul style="list-style-type: none"> <li>• Carnegie will be responsible for ensuring that monitoring requirements associated with beach and dune stability are undertaken</li> <li>• These requirements will also be addressed in the Construction Management Plan and Decommissioning Management Plan to be prepared by Carnegie</li> </ul>

## 8.2 Marine fauna monitoring

As outlined in Section 6.1.5, marine fauna monitoring will be undertaken during the CETO 6 Project construction phase, if pile driving is the chosen method for foundation installation. Table 8.2 outlines the monitoring plan and requirements for marine mammals and will be implemented during the specified construction activities.

A suitably experienced MFO is required to be on location during drilling works if pile driving is the chosen method for foundation installation. The MFO must be located within the most effective observation position for the duration of works and must be trained in marine fauna observation, behaviour, distance estimation and reporting.

The suitably trained MFO is required to complete the Marine Fauna Observation Log provided Appendix C and maintain these records for the duration of the Project. All observation logs will be submitted to Carnegie for further reporting to regulatory authorities as required

**Table 8.2 Marine fauna monitoring plan**

Marine fauna monitoring and contingency plan	
Environmental Values and Objectives	<p>This Marine Fauna Monitoring and Contingency Plan aims to protect Ecosystem Health values by:</p> <ul style="list-style-type: none"> <li>Maintaining ecosystem integrity, in terms of structure (biota diversity and abundance) and function (food chains and nutrient cycles), by avoiding impacts on marine mammals</li> </ul>
Environmental Quality Criteria	<p>The performance indicators/environmental quality criteria developed to assess compliance with the above environmental values and objectives are:</p> <ul style="list-style-type: none"> <li>No injury or death of marine mammals (including whales, dolphins and sea lions) as a result of the CETO 6 Project</li> <li>Completion of the Marine Fauna Observation Forms, as provided in Appendix C</li> </ul>
Monitoring Process and Contingency Management Measures	<ul style="list-style-type: none"> <li>Prior to the commencement of pile driving, vessel operators will be required to undergo an induction to minimise the risk of marine fauna interactions during mobilisation and construction activities. The induction would also include training in marine fauna behaviour and actions, and reporting requirements in the event of marine fauna injury or mortality</li> <li>During relevant construction activities, a visual lookout will be maintained for marine mammals by the MFO</li> <li>If marine mammals are sighted within 500 m of the exclusion zone, potentially harmful construction activities must not commence within the monitoring zone until after the last marine fauna is observed to leave the monitoring zone</li> <li>If required, night-time construction activities will only be undertaken if protected marine fauna have not been observed in the 500 m exclusion zone in the previous day</li> <li>If marine fauna are sighted, the behaviour and direction of their movement will continue to be monitored and recorded on the Marine Fauna Observation Logs (Appendix C)</li> <li>Any disturbance or impacts to marine mammals will be documented to record date, time, location, tide and weather conditions, number of individuals involved, corrective action(s) undertaken, proposed preventative action(s) to be implemented</li> <li>Proposed preventative action(s) to minimise further risk of impact are to be implemented</li> </ul>
Reporting and Auditing Requirements	<ul style="list-style-type: none"> <li>All marine fauna sightings, including detection of injured or dead mammals, will be recorded, including the date, time and location of sighting, and the name and qualifications of the MFO (Appendix C)</li> <li>In the event of detection of injured or dead marine mammals, a report will be provided by Carnegie to DoE in writing within 24 hours of the sighting, including details of the incident or risk, and proposed additional management measures undertaken</li> <li>All records relating to marine fauna observations, weather conditions and details pertaining to the construction area are to be kept and maintained by the MFO, with copies provided to Carnegie for compliance reporting (where applicable) and auditing purposes</li> </ul>

### 8.3 Hydrocarbon and hazardous materials monitoring

The required monitoring and contingency measures to be implemented by all relevant contractors and/or Carnegie personnel in relating to hydrocarbon and hazardous materials management and monitoring is presented in Table 8.3

**Table 8.3 Hydrocarbon and hazardous materials monitoring plan**

Hydrocarbon and hazardous materials monitoring and contingency plan	
Environmental Values and Objectives	<p>This Hydrocarbon and Hazardous Materials Monitoring and Contingency Plan aims to achieve the following environmental values and objectives:</p> <p>To protect Ecosystem Health values by:</p> <ul style="list-style-type: none"> <li>• Maintaining ecosystem integrity, in terms of structure (biota diversity and abundance) and function (food chains and nutrient cycles), by maintaining water quality and avoiding impacts on BPPH</li> </ul> <p>To protect Fishing values by:</p> <ul style="list-style-type: none"> <li>• Maintenance of seafood safe for human consumption when collected or grown</li> </ul> <p>To protect Recreation and Aesthetic values by:</p> <ul style="list-style-type: none"> <li>• Maintenance of primary contact recreation values, such that primary contact recreation (e.g. swimming) is safe</li> <li>• Maintenance of secondary contact and recreation values, such that secondary recreation (e.g. boating) is safe</li> <li>• Maintenance of aesthetic values</li> </ul> <p>To protect Industrial Water Supply values by:</p> <ul style="list-style-type: none"> <li>• Maintenance of water quality for industrial water supply</li> </ul>
Environmental Quality Criteria	<p>To assess compliance with the above-defined objectives, should a hydrocarbon or hazardous material spill occur, this monitoring plan indirectly adopts the following environmental quality criteria:</p> <ul style="list-style-type: none"> <li>• Toxicants in water, for maintenance of ecosystem integrity</li> <li>• Toxicants in sediments, for maintenance of ecosystem integrity</li> <li>• Toxicants in seafood, for maintenance of seafood consumption</li> <li>• Toxicants in water, for maintenance of primary contact recreation</li> <li>• Toxicants in water, for maintenance of secondary contact recreation</li> <li>• Aesthetic indicators, for maintenance of aesthetic values</li> <li>• Toxicants in water, for maintenance of industrial water supply</li> </ul>
Monitoring Process and Contingency Management Measures	<p>Visual monitoring will be undertaken for spills of hydrocarbons and other hazardous materials to the marine environment during all phases of the CETO 6 Project. The following management and monitoring procedures will be implemented by all relevant construction contractors and Carnegie personnel:</p> <ul style="list-style-type: none"> <li>• Where practicable, storage areas for hydrocarbons and hazardous materials will be designed to accommodate the volumes and operating conditions (both normal and abnormal conditions) specifically required for each substance – including product identification, transportation, storage, control and loss prevention</li> <li>• Industry standards for hydrocarbons and hazardous materials will be adhered to at all times during the CETO 6 Project</li> <li>• All materials will be appropriately stored in correctly labelled and suitable containers</li> <li>• A current and appropriate SDS for each material shall remain on site at all times while the material is in use</li> <li>• There will be sufficient and appropriate equipment, materials and resources readily available and accessible at all times which shall be used to prevent and respond to spills to the marine environment</li> <li>• Contractors will comply with and align spill response preparedness with the relevant requirements of Carnegie</li> <li>• All relevant personnel will be adequately trained in spill prevention, response and reporting</li> </ul>

<b>Hydrocarbon and hazardous materials monitoring and contingency plan</b>	
Reporting and Auditing Requirements	<ul style="list-style-type: none"> <li>• Any spill or incident associated with hydrocarbons or hazardous materials will be responded to in accordance with the Emergency Management Plan to be developed by Carnegie</li> <li>• All spills shall be documented and reported in accordance with Carnegie's Incident Reporting Procedure</li> <li>• All spills of hazardous materials, including oil, to the marine environment will be reported to the relevant regulatory authorities (including the AMSA, AHO, WA DoT, and DPaW) as appropriate</li> <li>• Reporting to regulatory authorities will be the responsibility of Carnegie</li> </ul>

## 9. Review, Reporting, Records and Auditing

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### 9.1 Revision

This MEMP will be revised as required to: (i) reflect updates or changes to applicable legislative requirements and/or any future approval or permit conditions; and (ii) incorporate any changes to work requirements, practices and/or procedures.

### 9.2 Reporting and records

Reporting associated with this MEMP will be undertaken in accordance with any Project approvals and/or conditions, as well as prevailing legislation. Reporting to regulatory authorities will be undertaken directly by Carnegie, or by a nominated representative of Carnegie.

Reports relating to the CETO 6 development areas will be provided by Carnegie to DoL and DoE in accordance with their approval requirements. At the discretion of DoL and DoE these reports will be forwarded to other agencies at their discretion.

Records relating to the environmental management of the Project will be kept in accordance with Project approvals and/or conditions as appropriate. Records will be maintained by Carnegie.

### 9.3 Auditing

An audit table template (Table 9.1) has been prepared to facilitate assessment of compliance with this MEMP, in accordance with *Post Assessment Guideline for Preparing an Audit Table* (EPA 2012).

The audit table will contain each condition, procedure or commitment separated into elements for auditing purposes, and includes the following attributes:

- Audit code - the main theme of the implementation condition, procedure or commitment;
- Subject - the environmental subject/issue;
- Requirement - copy of the wording of the relevant implementation condition, procedure or commitment;
- How - the way the requirement must be undertaken as outlined in the Statement. Where the Statement is not prescriptive, the proponent should indicate how they intend to achieve the requirement;
- Evidence - information or data required to be collected to verify compliance as outlined in the Statement. Where the Statement is not prescriptive, the proponent should indicate how they intend to achieve the requirement (e.g. report, letter, site inspection requirements etc);
- Phase - Project phase applicable to the audit element;
- Timeframe - specific timing and/or location;
- Status - this column will be left blank until populated for Compliance Assessment Reports or Statements of Compliance; and
- Further information - this column will be left blank until populated for Compliance Assessment Reports.

The following terms may be used within the audit report to indicate the conformance with environmental management requirements associated with the CETO 6 Project:

- Compliant - implementation of the proposal has been carried out in accordance with the requirements of the audit element;



- Completed - a requirement with a finite period of application has been satisfactorily completed;
- Not required at this stage - the requirements of the audit element were not triggered during the reporting period;
- Potentially non-compliance - possible or likely failure to meet the requirements of the audit element;
- Non-compliant - implementation of the proposal has not been carried out in accordance with the requirements of the audit element; and
- In process - where an audit element requires a management or monitoring plan to be submitted to the Office of Environmental Protection Authority (OEPA) or another government agency for approval, that submission has been made and no further information or changes have been requested by the OEPA or other government agency and assessment by the OEPA or other government agency for approval is still pending.

The audit table will be revised to reflect any changes made to implementation conditions. Specific auditing elements will be reported to the competent authority as required. Carnegie will, in accordance with its auditing and monitoring procedure, review the audit table and action accordingly.

All audits shall be carried out in accordance with AS/NZS ISO 19011: 2014 *Guidelines for Quality and/or Environmental Management Systems Auditing* (SASNZ 2014).

**Table 9.1 Project Marine Environmental Management Plan Audit Template**

Audit code	Subject	Requirement	How	Evidence	Phase	Timeframe	Status	Further information

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---

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## **Appendix A**

### **Perth Wave Energy Project CETO 6 Environmental Impact Assessment**



# **CETO 6 Garden Island Environmental Impact Assessment**

1253\_002/1\_Rev1

December 2015







## **CETO 6 Garden Island Environmental Impact Assessment**

*Prepared for*

**Carnegie Wave Energy Limited**

*Prepared by*

**BMT Oceanica Pty Ltd**

**December 2015**

*Report No. 1253\_002/1\_Rev1*



## Client: Carnegie Wave Energy Limited

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### Quality Assurance



BMT Oceanica Pty Ltd has prepared this report in accordance with our Health Safety Environment Quality Management System, certified to OHSAS 18001, AS/NZS 4801, ISO 14004 and ISO 9001: 2008.

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Date: 22/12/2015

**Director (or delegate)**

Date: 22/12/2015

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Appendix D	Environmental Risk Assessment
Appendix E	CETO 6 Community Consultation Plan
Appendix F	CETO 6 Community Consultation Unresponsive Stakeholders
Appendix G	CETO 6 Community Consultation Summary

## Acronyms

AHD	Above Height Datum
AHO	Australian Hydrographic Office
ARENA	Australian Renewable Energy Agency
AS	Australian Standard
BA	Buoyancy Actuator
BPPH	Benthic Primary Producer Habitat
CCP	Community Consultation Plan
CETO	The name (not an acronym) and trademark of a wave energy technology developed by Carnegie Wave Energy Ltd
DEC	WA Department of Conservation (now DPaW)
DER	Department of Environment Regulation
DoA	Australian Government Department of Agriculture
DoD	Australian Government Department of Defence
DoF	WA Department of Fisheries
DotE	Australian Government Department of the Environment
DoL	WA Department of Lands
DPaW	WA Department of Parks and Wildlife
DoT	WA Department of Transport
DSG	Defence Support Group
EAG	Environmental Assessment Guidelines
ECC	Environmental Clearance certificate
EMP	Environmental Management Plan
EP Act	<i>Environmental Protection Act 1986</i>
EPA	WA Environmental Protection Authority
EPBC	Environmental Protection and Biodiversity Conservation
HMAS	Her Majesties Australian Ship (the Australian Navy follows the British tradition of referring to naval establishments as ships)
HSE	Health, Safety and Environment
HSF	Helicopter support facility
HV	High Voltage
IMP	Introduced Marine Pest
ISO	International Organisation of Standardisation
JUP	Jack Up Platform
km	kilometres
kW/m	Kilowatt per metre
LAA	<i>Land Administration Act 1997</i>
LFC	Lower foundation connection
MEMP	Marine Environmental Management Plan
m	metre
MW	MegaWatt
NE	North-east
MNES	Matters of National Environmental Significance
OEPA	Office of the Environmental Protection Authority
OPC	Ordinary Portland Cement
POI	Point of Interconnection
PTO	Power Take Off
PWEP	Perth wave energy project
SCADA	Supervisory Control and Data Acquisition

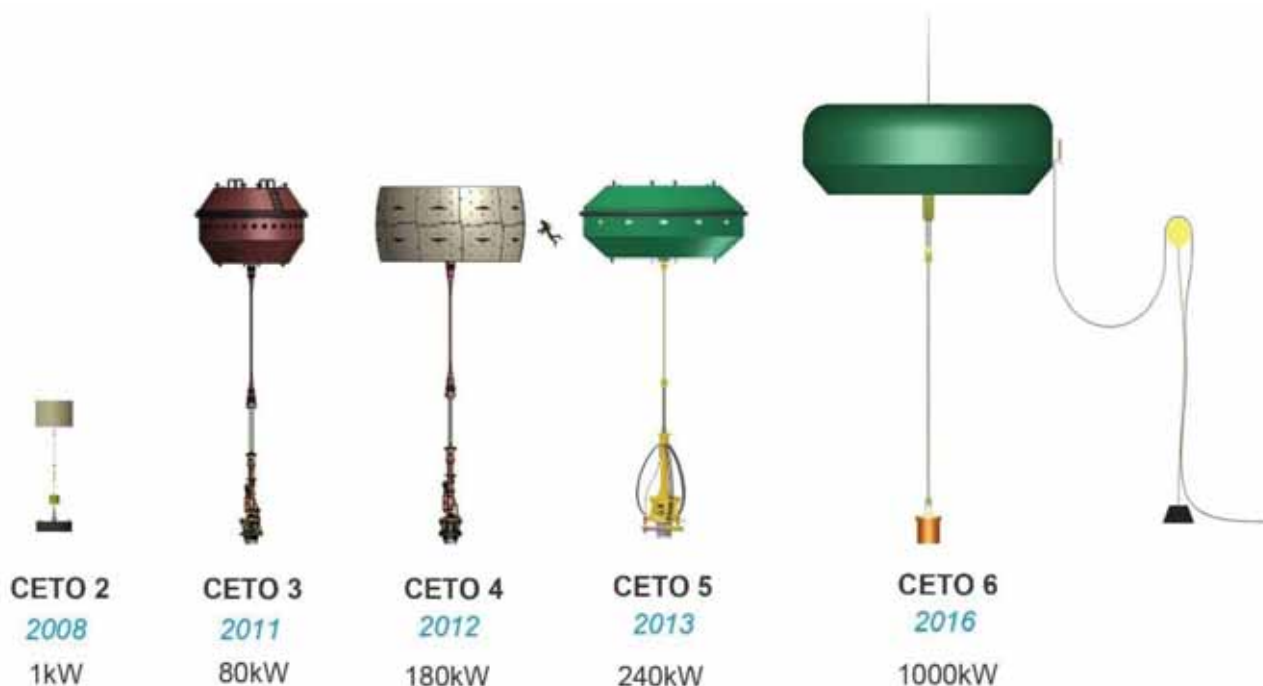
SCUBA	Self Contained Underwater Breathing Apparatus
SDS	Safety Data Sheet (previously known as MSDS)
SW	South-west
TNTM	Temporary Notice to Mariners
TEMP	Terrestrial Environmental Management Plan
UCS	Unit control system
UFC	Upper foundation connection
UWTR	Underwater tracking range
UXO	Unexploded ordnances
WA	Western Australia

# 1. Introduction

## 1.1 The proposal

Carnegie Wave Energy Limited (Carnegie), the developer and owner of the CETO wave energy technology, has built the world's first grid-connected wave energy array, the Perth Wave Energy Project (PWEP). The PWEP was built offshore of Garden Island in the Perth metropolitan region of Western Australia (WA) utilising its 5th generation CETO technology with the support of the Federal and State Government.

Carnegie has been granted funding for their next stage of CETO development, the CETO 6 Project (the 'Project'), which will design and demonstrate the next generation of CETO technology (Figure 1.1). Carnegie (2015a) has prepared a technical note describing the Project components and installation requirements which has been included as Appendix A. Each CETO 6 unit will generate up to 1 MW of electricity. Carnegie proposes to deploy an array of up to 3 units (totalling 3 MW) south west of Garden Island, in ~30–35 m of water (Appendix A).



Source: Carnegie (2015a)

Figure 1.1 CETO unit development pathway

## 1.2 Project justification and benefits

The Project will be located further offshore from Garden Island than the existing PWEP, at a site that has a higher wave energy resource, and allows for the operation of CETO technology in higher sea states. Additionally, the Project will demonstrate a number of technical and commercial innovations that will significantly advance the CETO technology towards commercialisation and expand its potential market (Appendix A).

The Project builds on prior learnings from the PWEP and CETO concept studies. The CETO 6 Unit will have significantly larger capacity and will produce significantly more power than the current CETO 5 units (Figure 1.1). Additionally, the design will leverage initial offshore power generation trialled for CETO 3, i.e., locating the electrical generation subsea. This will expand the market for the CETO technology by providing the only wave power technology capable of operating both near-shore (using the CETO hydraulic system) and distant-to-shore locations

(using the CETO subsea system). The combination of these factors will deliver a significant reduction in the levelised cost of energy when built in large projects (Appendix A).

Financially, the CETO 6 Project will be funded via a \$13 million grant from the Australian Renewable Energy Agency (ARENA) and a \$20 million loan facility from the Commonwealth Bank of Australia. This financial backing exemplifies the market's increasing comfort with Carnegie and advancement of the CETO technology (Carnegie 2015a).

### 1.3 Proponent details

The Project proponent is Carnegie Wave Energy Limited. The name and legal address of the proponent and key project contacts are given in Table 1.1.

**Table 1.1 Name and contact details of the project proponent and other key contacts**

Role	Name and contact details
Proponent	<b>Carnegie Wave Energy Limited</b> Unit 1, 124 Stirling Highway North Fremantle 6159 Western Australia
Principal	<b>Angus Nichols</b> Project Manager, Carnegie Wave Energy Limited Tel: (08) 9486 4466 Email: anichols@carnegiewave.com
Environmental Consultants	BMT Oceanica Pty Ltd 1/353 Cambridge Street, Wembley, WA, 6014 Tel:(08) 6272 0000 Email: ben.davis@bmtoceanica.com.au

### 1.4 This document

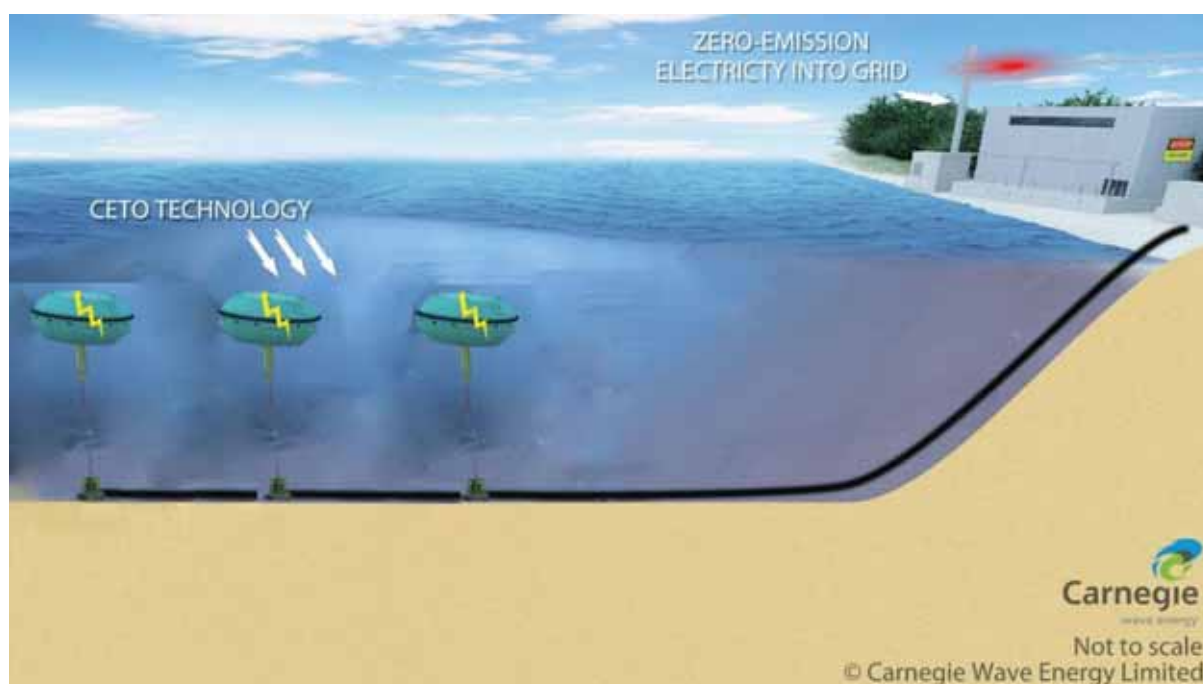
This document presents an environmental impact assessment (EIA) of the Project, providing detailed information on the Project proposal, its potential environmental impacts and the proposed management of these impacts. This document may be used to support regulatory assessment of the Project (see Section 3).

## 2. Project Description

The Project description provided in the following Sections is a summary of Carnegie's (2015a) technical note on Project components and installation (see Appendix A for further detail).

### 2.1 Proposed activity

Carnegie proposes to design, build and operate a wave energy array using up to three CETO 6 units for power production southwest of Garden Island. This new generation of the CETO technology will provide a step-change in CETO development by introducing subsea generation and further increasing power capacity. The units will be connected to a shore-based substation, from where the power generated by the CETO 6 array would be distributed to the HMAS Stirling Defence Base on Garden Island.

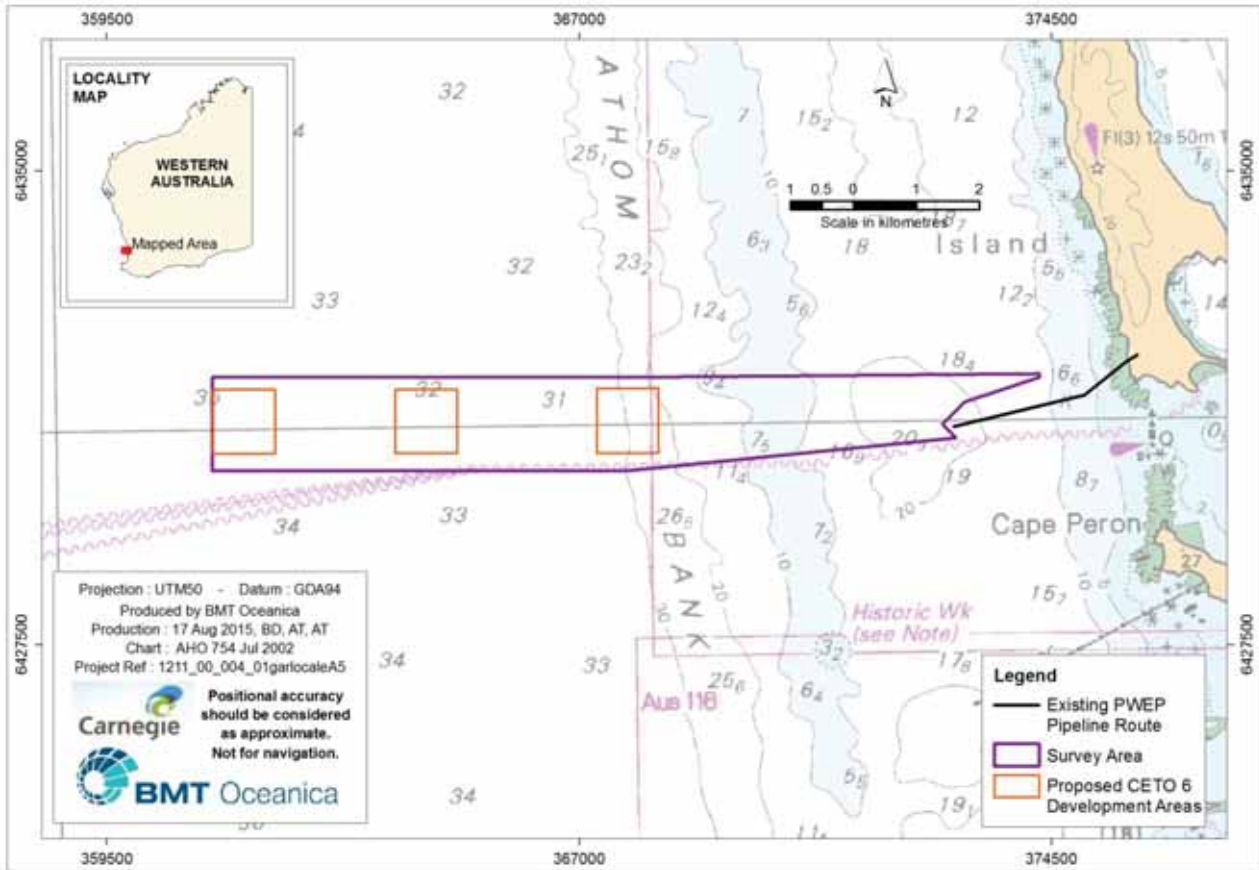


Source: Carnegie (2015a)

**Figure 2.1 CETO 6 Project schematic**

#### 2.1.1 Offshore site description

The Project will be located at a medium to high wave energy site that offers the potential for further commercial expansion, in the waters adjacent to the current PWEF off the Perth metropolitan coast (Figure 2.2). Wave energy flows in the direction of wave propagation and is measured as the amount of power (in kW) contained in each linear metre of wave front. Typically energy above 20 kW/m may be suitable for CETO wave farm projects. The chosen site will have a wave resource of approximately 30 kW/m in comparison to approximately 10 kW/m at the current PWEF site. This allows the CETO 6 generation to be operated in significantly higher sea states and extreme design waves.



**Figure 2.2 CETO 6 Project geophysical survey area**

### 2.1.2 Shore-based infrastructure

A substation will be located on the west coast of Garden Island. The Project will connect back to a substation on Garden Island via a subsea, high-voltage cable and provide power to the Department of Defence (DoD). It is expected that shore-based infrastructure for the CETO 6 Project will utilise pre-existing buildings and cleared spaces. If the equipment cannot be housed inside existing infrastructure, a small building may be constructed to house CETO 6 equipment.

Garden Island is the site of DoD's HMAS Stirling Base and was the site of the CETO 3 Unit deployment and the current PWEP (with the CETO 5 technology). As such, Carnegie has extensively studied the area and has well-developed understanding of site physical, ecological and social conditions.

## 2.2 Construction and decommissioning methods

A description of key Project phases and anticipated start and finish timing of works for the Project is provided in Table 2.1.



**Table 2.1 Timing of Project key phases**

Project phase	Key characteristics	Completion date
Design	Requirements and concept design completed	31 October 2015
	Preliminary design completed	31 December 2015
	Critical/detailed design completed	30 June 2016
	Approvals, consents and permits completed	30 June 2016
Construction and Operation	Foundations installed	31 December 2016
	Project commissioned (operation commenced)	31 December 2017
	Completion of 12 months operation	31 December 2018
	Decommissioning complete	31 December 2019

Source: Carnegie (2015a)

### 2.2.1 Proposed foundation installation

Foundation installation is scheduled to be completed by December 2016 (Table 2.1). The Project is currently in the Preliminary Design Phase and, as such, design specifications have not been finalised. The following methods have been proposed for foundation installation:

- Pile installation either by pile driving or drilling and grouting: the proposed pile installation will have maximum dimensions of 2.5 m with penetration of ~25 m into the seabed and protrude ~700 mm. The estimated timeframe for pile driving is ~24 hours over ~1-5 days for each pile installation with a maximum of up to three piles. Each foundation installation, involving drilling and grouting of the pile, has an anticipated timeframe of 5–10 days.
- Gravity base installation will have proposed maximum foundation dimensions of 70 x 25 x 4 m. The foundations will be towed to site and de-ballasted to sink to the seabed with an approximate weight of ~3500 t and constructed from steel and reinforced concrete. Carnegie estimate 5–10 days for gravity base foundation installation per unit.

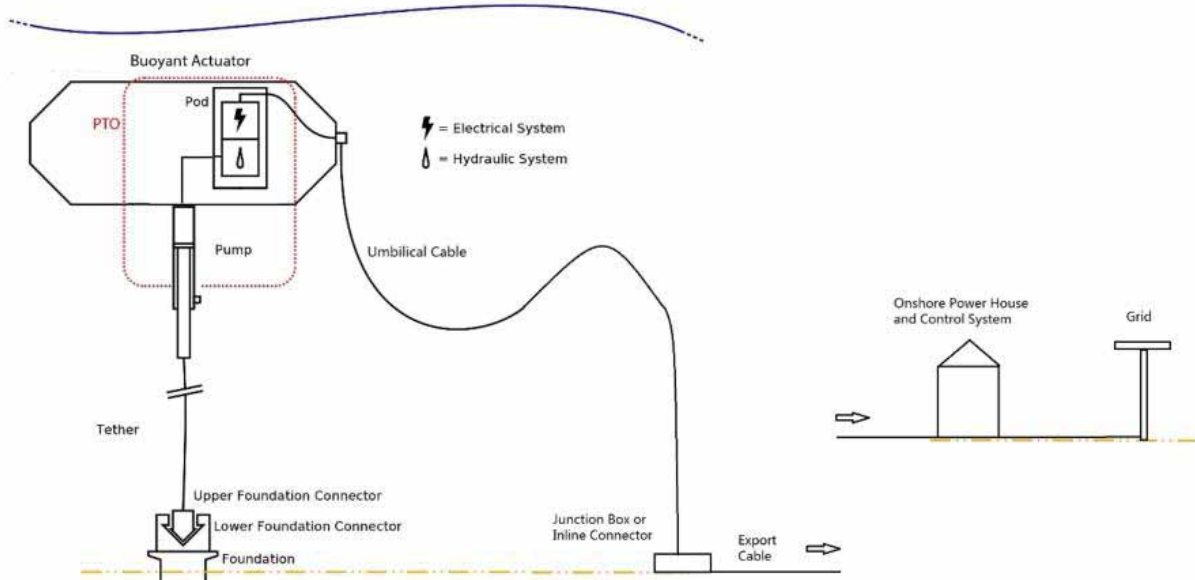
Additionally, on-site positioning and demobilisation of equipment required for foundation installation are each expected to take ~1 day and all installation methods are subject to suitable weather conditions. During installation a Temporary Notice to Mariners (TNTM) will be issued and all relevant personnel notified.

For purposes of this document, worst-case environmental impacts for each proposed foundation installation method have been considered.

### 2.2.2 CETO unit and cable installations

Installation of moorings and CETO 6 units will be undertaken in stages utilising offshore installation engineers supported by commercial vessels and divers as required. The main components of each CETO unit are outlined below and shown in Figure 2.3:

- CETO buoyant actuator (BA): subsurface energy-collection unit
- Mooring system: including the tether, foundation connector and foundation
- Power take off (PTO): includes the pump, pod and interconnection
- Subsea electrical system: connects each CETO 6 unit to a junction box, and transfers electricity back to the substation
- Substation and grid connection.



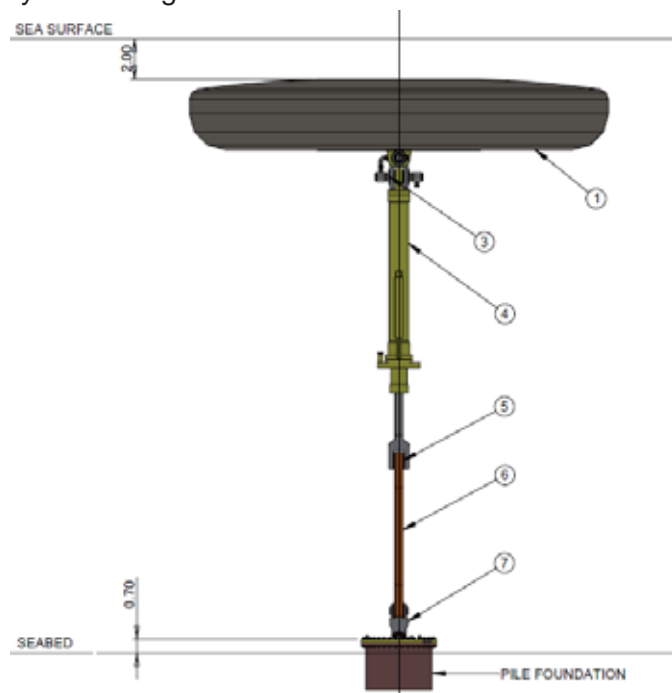
Source: Carnegie (2015a)

**Figure 2.3 CETO 6 system architecture**

The Project involves the installation of up to three submerged CETO 6 units in an array, southwest of Garden Island. Carnegie propose to coat all subsea infrastructure with the biofouling agent Jotun SeaQuantum Ultra. The fundamental aspects of the Project are outlined below.

### ***CETO buoyant actuator (BA)***

The CETO 6 generator consists of a large BA (~20 m diameter; item 1 in Figure 2.4), connected to the power take off (PTO) housing (also shown as item 1 in Figure 2.4) via a gimbal (item 3 in Figure 2.4). A hydraulic pump (Item 4 in Figure 2.4) generates electricity through the BA moving vertically through the water column. The tether connector and tether (items 6 and 7 in Figure 2.4) are then connected to an upper foundation (item 7 in Figure 2.4). This connector is mounted inside of the pile foundation. The BA unit will be towed out to site and connected to the mooring system using commercial divers.



Source: Carnegie (2015)

**Figure 2.4 CETO 6 Buoyancy actuator assembly**

## **Mooring system**

The mooring system consists of the following:

- Tether: this connects the Pump to the Foundation Connector and consists of a synthetic rope with terminations at either end.
- Foundation Connector: this consists of the upper and lower parts that automatically mate to form the connection between the Unit and the Foundation
- Foundation: this provides the restraint at seabed level of the Unit and could be in the form of a pile or a gravity base (to be decided)
- Secondary Connection: a short rope or chain has been proposed between the Upper Foundation Connection (UFC) and Lower Foundation Connection (LFC) which functions as a secondary tether should the CETO Unit be released from the foundation.

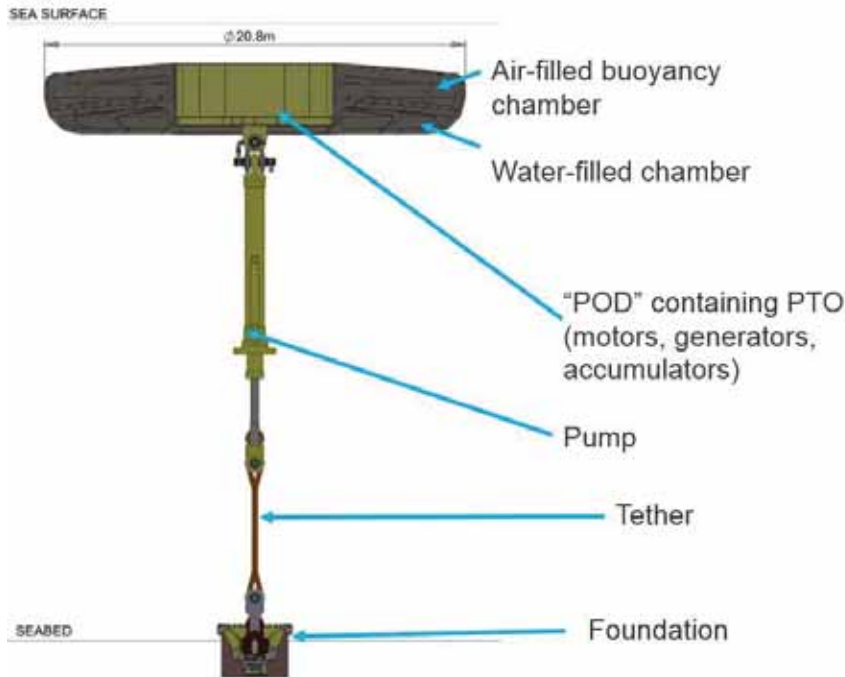
The Foundation Connector consists of an upper and lower connector. The foundation will have a release mechanism that is triggered under load to release the BA Unit from the foundation. The BA, Pump and Tether will remain connected to the foundation via the proposed secondary tether which will be a chain and have a length of approximately 20 m connected to the UFC at the other end. The release mechanism may take the form of a pyrotechnic device; similar to those used the oil and gas industry for cutting of slicklines during downhole operations.

The Foundation installation method is yet to be determined, but will be either via pile-driving or gravity-based (see Section 2.2.1 for more detail).

## **Power take off (PTO)**

The PTO consists of the following items:

- Pump: the main hydraulic cylinder that pumps fluid to and from the Pod.
- Pod: the system that converts the hydraulic energy from the Pump into electricity. It includes the large vessel that contains all the equipment, the hydraulic system, the electrical system and the Unit Control System (UCS)
- Hoses/Fluid Connection: a means to communicate fluid between the Pump and the Pod is required. There are a number of means by which this could happen
- The PTO Layout is shown in Figure 2.5.



Source: Carnegie Wave Energy (2015)

### Figure 2.5 Power take off arrangement

The PTO is expected to have a stored hydraulic fluid volume of 4000–5000 litres, with a maximum of 6000 litres. The expected fluid will be a mineral-based fluid, such as Shell Tellus. This is based on component supplier recommendations. This fluid will be contained in a sealed closed circuit hydraulic circuit. As there is no connection and flushing offshore there will be no potential for release during installation.

Through careful design and selection of bearing materials Carnegie plans to reduce any operational leakage rates through external seals to negligible levels. The Pod has a waterproof enclosure so any external leaks coming from hydraulic equipment inside the Pod will be contained within the Pod. It is acknowledged that during normal operation planned leakage per CETO 6 Unit may reach 10 litres per month as an estimate. This is considerably less than typical marine vessel stern tube lubricant loss and will be contained within the Pod, i.e. not released to the marine environment under typical operation.

If there were a catastrophic failure of the Pump, it is likely that all fluid in the cylinder volume will be lost (the Pump will extend fully) and the fluid in accumulators, as the system becomes depressurised. The rest of the fluid will probably remain in the hydraulic system. This loss would be reduced as far as possible through valve logic within the Pod.

The fluid connection between Pod and BA may be accomplished via hoses or fixed pipe and a rotary hydraulic connection at the joint between the BA and pump. If hoses are used they will be approximately 14 m long. The hose gap will vary from between 2 m and 6 m as the BA and pump cycles through its range of motion when operating. The pump is basically a hydraulic cylinder. It will have a diameter of approximately 1 m.

### ***Subsea electrical system***

The umbilical cable will be connected to the BA and to a subsea junction box. The subsea junction box will be built on a skid with lifting points to allow for deployment and retrieval. The subsea skid will have approximate maximum dimensions of 2 x 2 x 1 m. This dynamic cable will have a catenary arrangement suspended in the water by floatation modules (Figure 2.3). The modules will be approximately 1 m long and 1 m in diameter. The catenary arrangement may be moored to the sea floor via a single anchor point if required. This mooring line (should it be required) for the catenary arrangement will always be taught due to the floatation modules on the cable. Outline cable installation is expected to be conducted as follows:

- Pull export cable through shore-crossing conduit and allow enough cable to be installed through to HV substation.
- Barge (propelled by tugs) equipped with the necessary laying gear, such as turntables or drums, anchoring systems, cranes, chutes and winches will be used to lay the cable from shore out to CETO site. The cable will not be trenched and will lay on the seabed. Any movement will be restricted via clump weights and grout bags. The cable will have external protection attached should it be laid adjacent to exposed rock or reef.
- Onshore cable will be installed as per AS3000, AS2067 and any Defence requirements. The cable will require a trench and to be buried to a minimum depth of 750 mm. If buried to a depth of less than 900 mm it will be within a conduit. Nearshore, the cable will follow the same route as existing PWEF CETO 5 cables to the Carnegie onshore facility.

### ***Substation and grid connection***

The onshore power generation substation will be located at the current PWEF site. This substation will include transformers, high voltage (HV) switch gear, power smoothing gear and supervisory control and data acquisition (SCADA) system. It is intended to utilise existing infrastructure to house this equipment. If the equipment cannot be housed inside existing infrastructure, a building with maximum dimension of 4 x 5 x 2 m may be constructed. The grid connection includes the following items:

- Onshore Power Conditioning: could include a transformer and filtering
- Grid Protection System: would include metering, monitoring equipment and breakers for the connection between Carnegie and DoD and the existing connection between DoD and the utility if required
- Grid Connection Cabling: includes cables (probably buried) from the equipment building to the point of interconnection (POI)
- POI Equipment: could include breakers and telemetry (if required) for compliance. An HV substation will be located at the current PWEF site. This substation will include transformers, HV switch gear, power smoothing gear and SCADA system.

Once installed, the CETO 6 units will be unmanned, controlled remotely and accessed only during inspection and maintenance activities. Further details relating to the CETO units' operation and maintenance are provided in Appendix A.

## 3. Regulatory Approvals

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### 3.1 Decision-making authorities

The following key decision-making authorities have been identified for the Project:

- Western Australian Environmental Protection Authority
- Australian Government Department of the Environment
- Australian Government Department of Defence
- Australian Fisheries Management Authority
- Australian Hydrographic Service, R.A.N
- Australian Maritime Safety Authority
- Western Australian Department of Environment Regulation
- Western Australian Department of Parks and Wildlife
- Western Australian Department of Fisheries
- Western Australian Department of Aboriginal Affairs
- Western Australian Department of Transport

### 3.2 Relevant legislation and guidance material

#### 3.2.1 Environmental Protection Act 1986

The EP Act is the principle legislation governing environmental protection and approvals in Western Australia, and is applied to State land and waters. Part IV of the EP Act relates to environmental impact assessment of a Project, including its referral to, and assessment by, the Environmental Protection Authority (EPA). Part V of the EP Act relates to the control and licensing of potentially polluting activities. The Department of Environment Regulation (DER) is currently seeking feedback for draft guidance statements under Part V of the EP Act. Carnegie will consider the following guidance statements should they come into effect.

- Regulatory Assessment Framework,
- Environmental Risk Assessment Framework
- Regulatory controls

Carnegie may seek approval from the Environmental Protection Authority (EPA) for Project under the EP Act. This document has been prepared to satisfy the requirements of an Environmental Referral to the EPA under the provisions of Part IV of the *Environmental Protection Act 1986* (EP Act) and in accordance with the *Administrative Procedures 2012* (EPA 2012).

Should the Project not be formally assessed by the EPA under Part IV of the EP Act, however; managed under Part V of the EP Act, a Native Vegetation Clearing Permit will be required, in accordance with Part V of the EP Act. A clearing permit will be required to clear indigenous aquatic species for the subsea cable crossing onto Garden Island.

#### ***EPA Environmental Assessment Guideline No. 3: Protection of Benthic Primary Producer Habitats in Western Australia's Marine Environment***

The EPA's (2009) Environmental Assessment Guideline No. 3 (EAG3) was developed in recognition of the fundamental ecological importance of Benthic Primary Producer Habitats (BPPH) and the potential consequences of their loss for marine ecological integrity, and also the fact that almost all marine development proposals will result in some loss of these important habitats. For the purposes of this Environmental Assessment Guideline, Benthic Primary Producer Habitats are defined as seabed communities within which algae, e.g., macroalgae, turf and benthic microalgae, seagrass, mangroves, corals or mixtures of these groups, are prominent components. As the Project will impact on BPPH, this EAG will be considered.



### ***EPA Environmental Assessment Guideline No. 5: Environmental Assessment Guidelines for Protecting Marine Turtles from Light Sources***

This EAG specifically addresses approaches to proposal design and implementation to protect marine turtles from the adverse impacts of light. As the construction will only occur during daylight hours, and the operations will be unmanned and unlit, this EAG is not triggered for the Project (see Section 2.2 for construction methods).

### ***EPA Environmental Assessment Guideline No. 7: Environmental Assessment Guidelines for Marine Dredging Proposals***

The EPA's (2011) Environmental Assessment Guideline No. 7 (EAG7) is not triggered for this Project, as no dredging is required for the Project (see Section 2.2 for construction methods).

### ***EPA Environmental Assessment Guideline No. 15: Protecting the Quality of Western Australia's Marine Environment***

The overarching objective of this EAG is to provide an environmental quality management framework to protect the environmental values of Western Australia's marine environment from waste discharges and contamination. As the Project will occur in the marine environment, and there is the potential for small leakages of hydraulic fluid during construction and operation, this EAG will be considered.

## **3.2.2 Environmental Protection and Biodiversity Conservation Act 1999**

The *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* is the Australian Government's central piece of environmental legislation, which is administered by the Commonwealth Department of the Environment (DotE). The EPBC Act provides a legal framework for the protection and management of nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the Act as matters of national environmental significance (MNES). The Act applies to seven matters of national environmental significance, which are:

- world heritage sites
- national heritage places
- wetlands of international importance
- nationally threatened species and ecological communities
- migratory species
- commonwealth marine areas
- nuclear actions.

Carnegie may refer the proposed works (as described in this document) to the Commonwealth DotE as there may potentially be impacts to MNES including Commonwealth Marine Areas, Nationally Threatened Species and Migratory Species (see Appendix B for EPBC protected matters report).

## **3.2.3 Biosecurity Act 2016**

The *Biosecurity Act 2016* is scheduled to come into effect on 16 June 2016 to provide a regulatory framework (which reflects and replaces the Quarantine Act 1908) for management of biosecurity risks including pests, disease and contaminants. This is managed under the Australian Government Department of Agriculture and Water Resources (DoA) Decisions made under the Act will depend on the likelihood and consequences of the risk presented resulting in the management of risks more appropriately. The Act will include regulations for ballast water, biofouling and biosecurity risks associated with marine pests and will be considered by Carnegie for management for these risks.



### **3.2.4 Control of Naval Waters Act 1918**

An area of the coastal waters around Garden Island are designated controlled naval waters out to 500 m under the *Control of Naval Waters Act 1918*. The purpose of this Act is to ensure suitable control over declared Naval Waters to facilitate their ongoing utility for naval operations. Carnegie has signed a formal licence for the Project that provides approval to work within naval waters.

The Commonwealth of Australia is the freehold landowner of Garden Island down to the low water mark, having been acquired in 1915 pursuant to the provisions of the Lands Acquisition Act 1989. Overall responsibility for Garden Island management, including various aspects of public access on the Island rests with the Commanding Officer, Royal Australian Navy. However land and facilities management, including environmental management support, is provided by the Defence Support Group (DSG), a division of the DoD.

The DoD's Environmental Management System requires that an environmental impacts analysis be undertaken prior to any project or activity taking place on its estate by Defence and other parties. The DoD manages the assessment and approvals through issue of an Environmental Certificate of Approval called Environmental Clearance Certificate (ECC). An ECC is an internal mechanism for proving due diligence by means of a proponent providing sufficient evidence that an Environmental Officer or equivalent can recommend that the proposed action be approved by a higher authority within the DoD. By signing the ECC, the Proponent, whether internal or external to the DoD, is committing to all of the risk management measures addressed in the ECC. The DoD must be confident from what is presented in the ECC, and where appropriate through additional documents and approvals, that all risks have been reduced to an insignificant level, particularly with respect to the EPBC Act.

### **3.2.5 Aboriginal Heritage Act 1972**

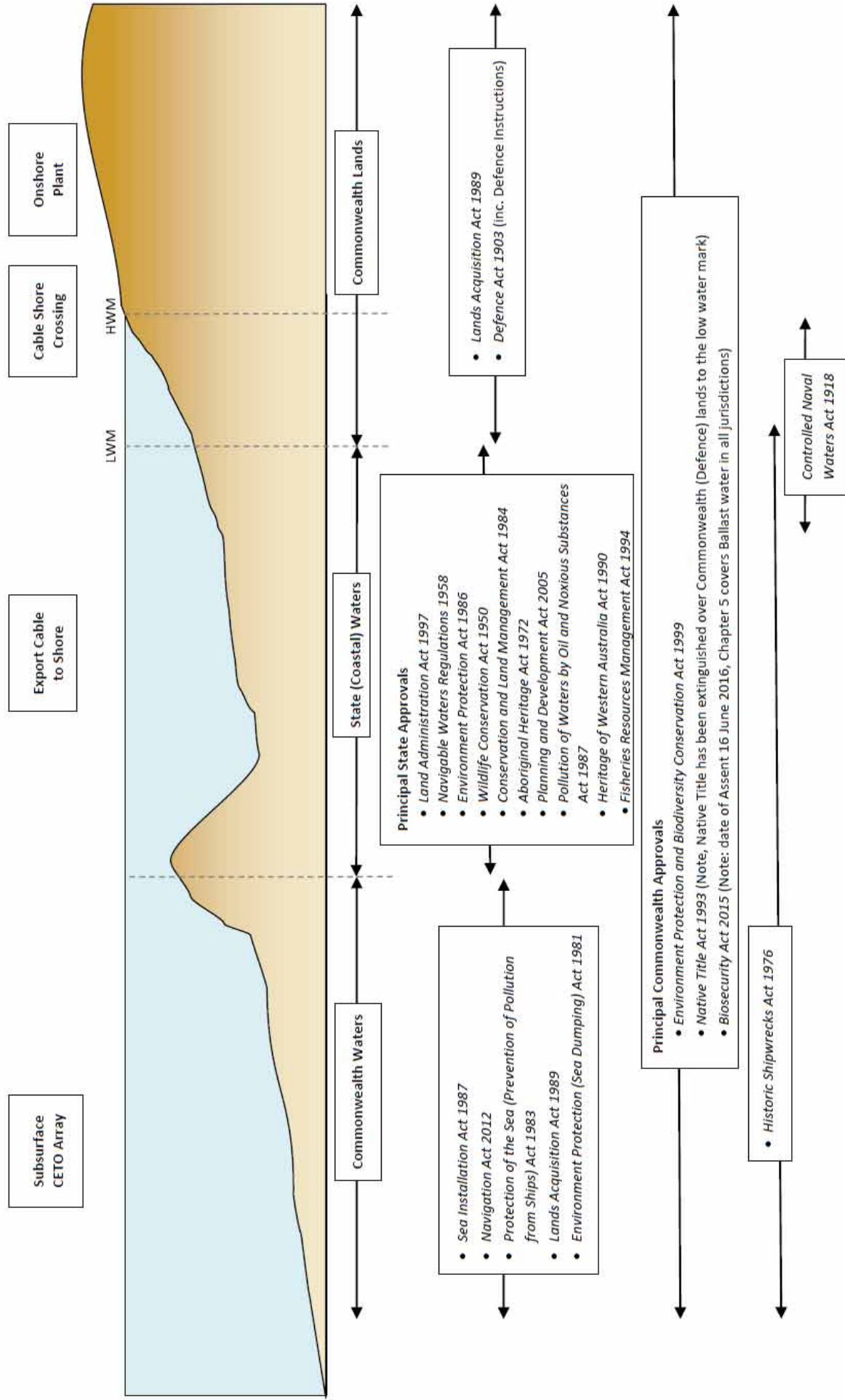
A search of the Aboriginal Heritage Enquiry System (Appendix C) showed no registered Aboriginal sites within the Project footprint. Therefore, a Notice under Section 18 of the *Aboriginal Heritage Act 1972* will not be required.

### **3.2.6 Other state legislation**

The *Navigable Waters Regulations 1958* (referring to the *Shipping and Pilotage Act 1967*, *Jetties Act 1926* and *Western Australian Marine Act 1982*) manage maritime activities in Western Australian navigable waters, including the territorial sea adjacent to the State. As a portion of the proposed Project lies within State Waters, permission is required from the WA Department of Transport (DoT) under Regulation 8 of the *Navigable Waters Regulations 1958* to install cables to shore.

The principal legislation governing land use of the seabed within Western Australian State Waters (Crown Lands) is the *Land Administration Act 1997*. Approval is required under Section 91 of the LAA 1997, in the form of an easement as appropriate to the development being proposed, i.e., the offshore components of the Project. The LAA 1997 is administered by the WA Department of Lands (DoL).

Additional State and Commonwealth legislation that may be applicable to the CETO 6 units is presented in Figure 3.1.



Source: Carnegie Wave Energy Limited

Figure 3.1 State and Commonwealth legislation relevant to the Project



## 4. Environmental Setting

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### 4.1 Background environmental studies

The environment of the CETO 6 Project site has been extensively described (Hatch 2010, Carnegie 2012, Oceanica 2012). Habitats of the CETO 6 Project area were mapped in August 2015 (BMT Oceanica 2015a) during preliminary environmental studies. To support this habitat mapping, a geophysical survey was also completed (MGS 2015), which captured side-scan sonar, multi-beam echo sounder and magnetometer data for the Project footprint.

### 4.2 Marine and coastal environment

The CETO 6 units will be deployed west of the Sepia Depression, ~8 km off the western side of Garden Island at a water depth range of ~30-35 m. The marine environment of the Project area was described in Oceanica (2012), and is summarised below.

The Project location is situated in the Leeuwin-Naturaliste bioregion that extends from Perth to Augusta. The marine flora and fauna of this region are typically comprised of a mixture of temperate and tropical species. Temperate marine species are carried north by the Capes Current from cool southern temperate waters, and tropical marine species are carried south by the Leeuwin Current from tropical northern waters (Hatch 2010).

The Shoalwater Islands Marine Park is located to the south of the Project area. The Marine Park covers an area of ~6658 ha, adjacent to the City of Rockingham, within the Perth metropolitan area (DEC 2007). The diversity of habitats in such close proximity to the Perth area makes the Shoalwater Islands Marine Park a valuable and important ecological and social resource (DEC 2007). The northern boundary of the Shoalwater Islands Marine Park is south of Garden Island, with the CETO 6 Project location and cable corridor well outside the Marine Park boundaries.

#### 4.2.1 Wind and wave climate

The dominant wind patterns in the Perth region over the summer period are typically easterly to south-easterly during the morning, and south to south-westerly in the afternoon (Bureau of Meteorology 2012). This daily pattern is due to a combination of high pressure cells and the land-sea breeze system (Gentilli 1972).

During winter, the predominant wind direction in the morning is north-easterly, and in the afternoon is predominantly westerly (Bureau of Meteorology 2012). Cold fronts associated with low pressure systems frequently pass over the Perth region during the winter periods. These cold fronts can also induce storm conditions with wind directions occurring from the north-west, west and south-west (Bureau of Meteorology 2012).

The tides on the west coast of Garden Island are diurnal with a mean tidal range of 0.4 m and a spring tidal range of 1.1 m (Prickett 2010). The offshore wave climate is characterised by a moderate energy swell from the south to south-west driven by the south-westerly sea breezes in summer, and high-energy, short-period storm events in the winter mainly from the north-west (DoT 2009; Prickett 2010). Offshore annual mean significant wave heights are from 2.0–2.2 m and have a period of 8.8 seconds (Masselink & Pattiaratchi 2001). Waves are expected to attenuate by ~40% as they propagate over Five Fathom Bank into Sepia Depression (Prickett 2010).

The south-west coast of Garden Island is exposed to moderate energy swell from the south-west, and high energy storms from the north-west. The offshore bathymetry suggests that wave

refraction over Five Fathom Bank causes long-period swell waves to arrive in Sepia Depression from the west-south-westerly direction.

#### 4.2.2 Fauna

There are a number of endangered, vulnerable and migratory species that may use or transit the CETO 6 Project area (Appendix B). Results of an EPBC Act Protected matters search tool show of these endangered species, only marine mammals, reptiles and shark species are likely to interact with the CETO 6 Project, as others (such as bird species) will not be influenced by the Project (Table 4.1). Other notable marine fauna that may occupy the Project area are recreationally caught fish, Western Rock Lobster, and seabirds such as ospreys, and terns (Oceanica 2012).

**Table 4.1 Threatened marine fauna species found in the CETO 6 Project site**

Species <sup>1</sup>	Common name	Status	Interaction with Project likely?	Reasoning
<b>Birds</b>				
<i>Anous tenuirostris melanops</i>	Australian Lesser Noddy	Vulnerable	No	<p>Mobile avifauna such as bird species, are not expected to be dependent on the project area for breeding or foraging.</p> <p>Albatross species typically inhabit waters further offshore, returning to land only for breeding. The Project area does not contain any known breeding sites for threatened bird species (Appendix B).</p>
<i>Diomedea epomophora epomophora</i>	Southern Royal Albatross	Vulnerable	No	
<i>Diomedea epomophora sanford</i>	Northern Royal Albatross	Endangered	No	
<i>Diomedea exulans amsterdamensis</i>	Amsterdam Albatross	Endangered	No	
<i>Diomedea exulans exulans</i>	Tristan Albatross	Endangered	No	
<i>Diomedea exulans (sensu lato)</i>	Wandering Albatross	Vulnerable	No	
<i>Halobaena caerulea</i>	Blue Petrel	Vulnerable	No	
<i>Macronectes giganteus</i>	Southern Giant Petrel	Endangered	No	
<i>Macronectes halli</i>	Northern Giant Petrel	Vulnerable	No	
<i>Pachyptila turtur subantarctica</i>	Fairy Prion (southern)	Vulnerable	No	
<i>Phoebastria fusca</i>	Sooty Albatross	Vulnerable	No	
<i>Pterodroma mollis</i>	Soft-plumaged Petrel	Vulnerable	No	
<i>Sternula nereis nereis</i>	Australian Fairy Tern	Vulnerable	No	
<i>Thalassarche carteri</i>	Indian Yellow-nosed Albatross	Vulnerable	No	
<i>Thalassarche cauta cauta</i>	Shy Albatross, Tasmanian Shy Albatross	Vulnerable	No	
<i>Thalassarche cauta stadi</i>	White-capped Albatross	Vulnerable	No	

Species <sup>1</sup>	Common name	Status	Interaction with Project likely?	Reasoning
<i>Thalassarche melanophris</i>	Black-browed Albatross	Vulnerable	No	
<i>Thalassarche melanophris impavida</i>	Campbell Albatross	Vulnerable	No	
<b>Mammals</b>				
<i>Balaenoptera musculus</i>	Blue Whale	Endangered	Yes	The CETO 6 Project occurs in a known migration route for Blue, Southern Right and Humpback Whales (DEH 2005a, Jenner et al 2001, McCauley and Jenner 2010)
<i>Eubalaena australis</i>	Southern Right Whale	Endangered	Yes	
<i>Megaptera novaeangliae</i>	Humpback Whale	Vulnerable	Yes	
<i>Neophoca cinerea</i>	Australian Sea-lion	Vulnerable	Yes	Islands along the Western Australian coastline are known to support Australian Sea-lion populations (Campbell 2005)
<i>Setonix brachyurus</i>	Quokka	Vulnerable	No	Quokkas are not found on Garden Island (Hayward et al 2003)
<b>Reptiles</b>				
<i>Caretta caretta</i>	Loggerhead Turtle	Endangered	Yes	The area is a known foraging area for marine turtle species, however; no breeding locations have been recorded within the Project area (Appendix B).
<i>Chelonia mydas</i>	Green Turtle	Vulnerable	Yes	
<i>Dermochelys coriacea</i>	Leatherback Turtle, Leathery Turtle	Endangered	Yes	
<i>Natator depressus</i>	Flatback Turtle	Vulnerable	Yes	
<b>Sharks</b>				
<i>Carcharias taurus</i> (west coast population)	Grey Nurse Shark (west coast population)	Vulnerable	Yes	Grey nurse sharks are found along the Western Australian coastline, in limestone reef systems and islands. They typically inhabit rocky caves and gravel filled gutters (DotE 2014). The most likely location that the project area will influence Grey Nurse Sharks is the five fathom bank reef area.
<i>Carcharodon carcharias</i>	Great White Shark	Vulnerable	Yes	White sharks can be found close inshore along the Western Australian Coastline, around rocky reefs, shallow coastal bays (DSEWPac 2013).
<i>Rhincodon typus</i>	Whale Shark	Vulnerable	No	Whale sharks are primarily located further north, along the Ningaloo Reef coastline (DEH 2005b). It is highly unlikely that whale sharks will occur in the Project area.

Note:

1. A full species list can be found in Appendix B

#### 4.2.3 Existing BPPH

Inshore marine habitats were dominated by bare sandy areas and limestone reefs dominated by macroalgae species (Figure 4.1, BMT Oceanica 2015a). The Five Fathom Bank area is clearly delineated by higher-relief limestone reef, and has a high percentage covering of *Ecklonia radiata* and *Sargassum* spp.

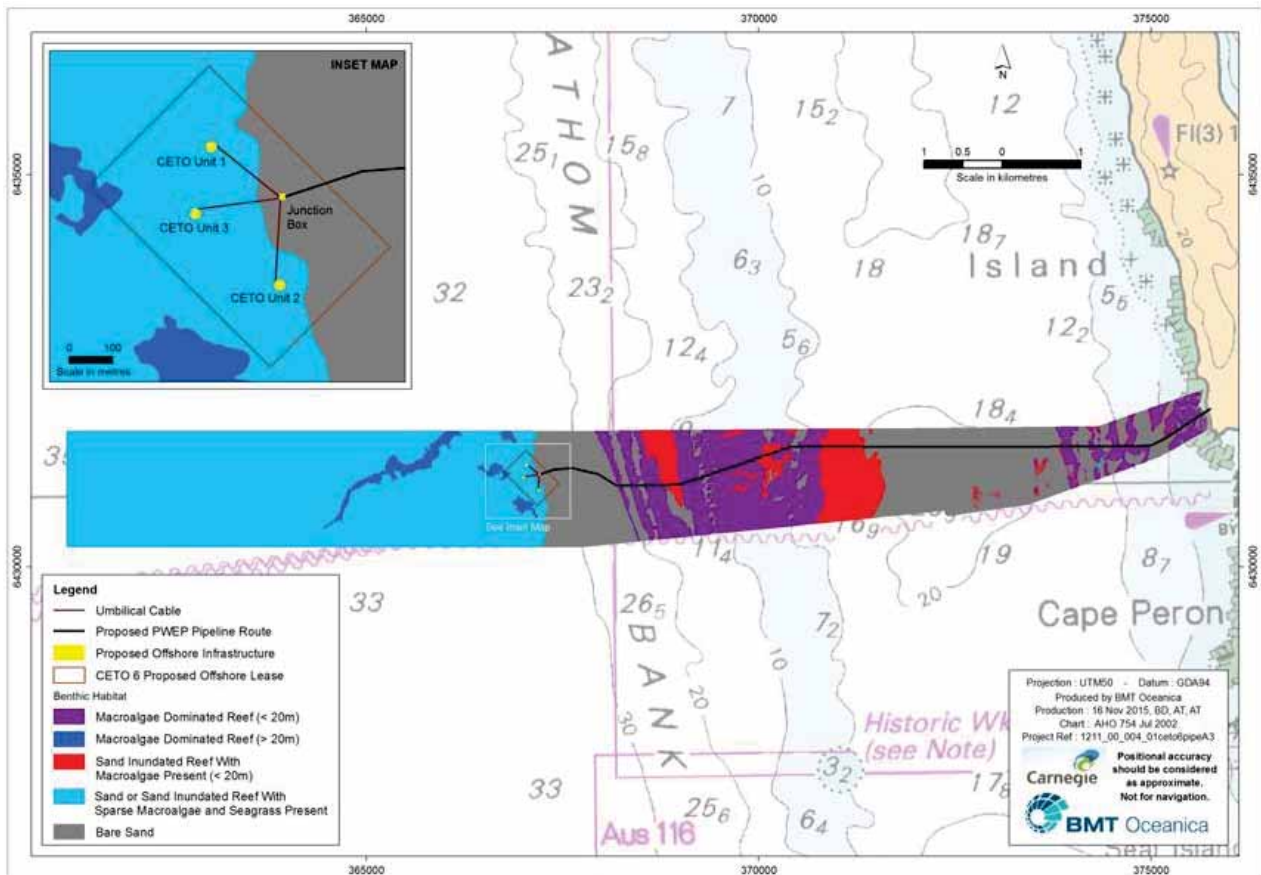


Offshore from Five Fathom Bank, the seabed slopes to a maximum depth of ~35 m. Habitats offshore consisted of bare sandy areas or limestone reef covered by a sand veneer (BMT Oceanica 2015a). Patches of turfing algae and invertebrate (i.e. sponge) assemblages were noted (BMT Oceanica 2015a) and some sparse patches of the seagrass *Amphibolus* sp. were found.

A macroalgae dominated limestone reef was noted running in a south-west to north-east direction just offshore of Five Fathom Bank, together with some other small patches of reef (Figure 4.1). These reefs were deeper and contained slightly different macroalgae species assemblages than the inshore, higher energy reefs along five fathom bank, and so were given a different habitat category (BMT Oceanica 2015a).

The mapped habitats are typical of those found on the western side of Garden Island (DEP 1996, Oceanica 2012) and in the Shoalwater Islands Marine Park (DEC 2007). In a regional setting, the habitats found in the CETO 6 Project area were similar to those found further north or south (DEP 1996, BMT Oceanica 2015a). Habitat assemblages along the Perth metropolitan coastline are typically dominated by macroalgae limestone reefs, offshore sand inundated reefs, inshore shallow water seagrass beds and large areas of bare sandy substrate (DEP 1996, BMT Oceanica 2015a).

Five Fathom Bank, which extends from south of Becher Point to Rottnest Island, represents the most complex reef system mapped in the Project area (Figure 4.1). The area is represented by the macroalgae dominated reef (<20 m) and sand inundated reef with macroalgae habitat categories (<20 m) present (BMT Oceanica 2015a). Similar complex benthic habitat assemblages do exist in the region, such as those surrounding Rottnest Island (mapped by Harvey 2009 and Davis 2011).





#### 4.2.4 Coastal geomorphology

The coastal geomorphology of the south-west coast of Garden Island is characterised by sandy shorelines, embayments separated by rocky headlands and near-shore reef outcrops. The headlands and reef outcrops strongly influence the direction and degree of hydrodynamic forcing on the shorelines and therefore the shoreline orientation.

The CETO 6 Project is proposed to follow the same shoreline crossing and conduit as the existing PWEF cable route. The area of crossing is characterised by a sandy shoreline on the south-west coast of Garden Island (Figure 4.2). The shoreline is bordered by a high-relief rocky headland to the south (Baudin Point) and is backed by a steep dune ridge. At the top of the dune ridge, the topography flattens and extends inland before dropping into a quarry that is the site of Carnegie's proposed onshore facility (Figure 4.3).

The main coastal geomorphic components of the cable crossing site (Figure 4.2) are:

1. Limestone headland
2. Beach
3. Vegetated dune
4. Sub tidal reef
5. Intertidal reef
6. Cuspate shore projection



**Figure 4.2 Coastal geomorphic components of the cable crossing site on Quarry Road Beach, Garden Island**

## Perth Wave Energy Project, Onshore Development Areas

Database: GDA94 MGA, Water depths: 2011 Australian Height Datum (+10.7m on IGM F-encastles). Content included in this product reproduced under license by permission of The Australian Hydrographic Service. © Commonwealth of Australia 2012. All rights reserved. Licence No. 280395. Not to be used for navigation.



Source: Carnegie Wave Energy Pty Ltd

**Figure 4.3 Topographic detail of the CETO 6 Project onshore area on the south-west coast of Garden Island**

Baudin Point is a Tamala Limestone headland located at the southern end of the proposed cable crossing beach (Figure 4.4), has an elevation of ~13 m AHD and limits the sediment exchange between the cable crossing beach and adjacent beaches to the south. Further information relating to the sediment cells<sup>1</sup> along the coast is provided in Oceanica (2012).

The cable crossing beach is bordered to the south by Baudin Point and to the north by a cusped shore projection formed in the lee of an intertidal reef outcrop. The beach is oriented north-north-west to south-south-west and is reasonably exposed to incoming wave energy from the south-west (Figure 4.4). The beach sediments are well-sorted coarse grained sands with a mean grain size of ~0.55 mm (Hegge 1994). The predominance of coarse-grained sediments has created a relatively steep beach profile that is steeper at the southern end and flattens towards the northern end of the beach (Hegge 1994; Figure 4.4). The steep beach profile at the southern end of the beach creates a narrow, high-elevation swash zone (Hegge 1994).

The beach is backed by a dune system consisting of a narrow, steep vegetated foredune at an elevation of ~4 m AHD and a high-relief backdune ridge with an elevation of ~8 m AHD (Figure 4.2, Figure 4.4, Figure 4.5). The dune ridge flattens and extends inland for ~100 m before dropping into the existing substation site (~1–4 m AHD) (Ecologia 2012; Figure 4.5). The dunes are generally well vegetated and a desktop assessment of terrestrial flora at the PWEP onshore site and surrounding areas on Garden Island identified the vegetation as "Low forest; cypress pine" (Ecologia 2012; Figure 4.5).

<sup>1</sup> Sediment cells are sections of the coast within which sediment transport processes are strongly related (Damara 2012).





Source: Carnegie Wave Energy Limited

**Figure 4.4** Quarry Road beach and foredunes, looking north towards the tombolo



Note:

1. Photo taken prior to the existing substation being constructed

Source: Carnegie Wave Energy Limited

**Figure 4.5** Vegetation on the foredunes and hind dunes behind Quarry Road Beach north of Baudin Point

The near-shore zone off the south-west coast of Garden Island has subtidal and intertidal reef. The near-shore profile of the proposed cable crossing beach has a gentle slope with bare sand interspersed with subtidal and intertidal reef outcrops (Figure 4.2). The subtidal reef outcrops are submerged and rarely exposed. The intertidal reef outcrops directly offshore of Baudin Point and the northern end of the cable crossing beach are periodically exposed and wave breaking occurs over these features.

The near-shore bathymetry of the cable crossing beach is complex as a result of these numerous subtidal and intertidal reef outcrops. These varying water depths increase the dissipation of incoming wave energy in the near-shore zone. The dissipation of wave energy over the intertidal reef at the northern end of the cable crossing beach has caused a cusped shore projection to form (Figure 4.2, Figure 4.4). As a result of the reduced sediment transport capacity of the waves, sand has been deposited in the lee of the intertidal reef. Over time, this sand has accumulated and the shoreline has built seawards to form a small shore projection that effectively borders the northern end of the cable crossing beach.

#### **4.2.5 Coastal processes**

The dominant coastal processes occurring along the south-west coastline of Garden Island and at the cable crossing beach can be inferred from historical shoreline information, aerial photography, and the general dynamics of the near-shore and offshore bathymetry, coastal geomorphology, and wave climate information.

##### ***Long-term changes***

Long-term changes relating to the visible coastal processes on Garden Island are described in detail in Oceanica (2012). The general coastal geomorphology identified in the 1916 historic map is still prominent in recent aerial imagery; therefore the south-west coastline of Garden Island is considered to be relatively stable. Visual assessment of imagery from 1967–2008 indicates that there have been no significant morphological changes along the south-west coast of Garden Island (or in the vicinity of Quarry Road Beach) in the last 45 years (Oceanica 2012)

### **4.3 Social environment**

Recreational activities occur on all accessible beaches in the area, by both DoD personnel and the general public. Public access to Garden Island is only allowed via private vessel during daylight hours, and is prohibited around naval installations including the Helicopter Support Facility (HSF) adjacent to the quarry area. Department of Defence personnel are granted access to the beach immediately north of the quarry along the access road that runs along the northern boundary of the HSF

Surfing is known to occur on the western side of Garden Island, away from the Project location. Snorkelling is popular along the shallow limestone reefs fringing Garden Island. Recreational SCUBA diving is also known to occur over the deeper reefs off Garden Island and Five Fathom Bank.

There are 13 wrecks greater than 75 years old and hence protected as Historic Wrecks that are unaccounted for around the broader Garden Island area (Oceanica 2012). Hydrographic surveys carried out by Carnegie (MGS 2015) have not identified evidence of shipwreck relics within the Project location.

## 5. Environmental Impact Assessment and Significance

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### 5.1 Causes of environmental impact

Environmental impacts of the CETO 6 Project may potentially occur during the construction, operation and decommissioning phases.

#### 5.1.1 Construction

During the construction phase, potential environmental impacts may occur as a result of:

- Anchoring and cable laying operations
- Construction of the CETO foundations (including drilling and piling)
- Placement of the gravity base
- Introduction of vessels with biofouling
- Hydrocarbon spills and leakage
- Creation of waste material (marine and terrestrial)
- Trenching the onshore cable to the substation
- Construction of any additional land-based infrastructure
- Increased bush fire risk
- Towing and placement of the CETO 6 BA units

#### 5.1.2 Operation

During the operational phase, potential environmental impacts primarily involve hydrocarbon spills occurring as a result of failure of CETO unit/s arising from:

- Bad weather
- Public interaction
- Boating accidents
- Other emergency situations (i.e. detachment of the BA unit, catastrophic pump failure )

#### 5.1.3 Decommissioning

During the construction phase, potential environmental impacts may occur as a result of:

- Anchoring operations
- Removal of the CETO foundations
- Removal of the gravity base
- Introduction of vessels with biofouling
- Hydrocarbon spills and leakage
- Removal of the pipe over the dune system and surface laid cables from the marine environment
- Removal of any land-based infrastructure
- Removal and towing of the CETO 6 BA units

### 5.2 Relevant environmental factors and risk assessment

An environmental risk assessment (Appendix D) was undertaken for the CETO 6 Project, incorporating a stakeholder consultation process (see Section 7). All risk assessments were based on the combined likelihood and consequence of each potential residual risk occurring; that is, the potential likelihood and consequence of the potential impact or risk occurring following management and/or mitigation actions being implemented. As a result of the risk assessment process, nine environmental factors (as defined by EAG 8; EPA 2013) were identified as being potentially impacted by the project (on either a low or medium level). These factors are outlined

in Table 5.1 together with the relevant Project phase. With implementation of mitigation methods and management measures, risks for all environmental factors were reduced to low or medium (Appendix D).

**Table 5.1 Identified environmental factors and EPA objectives**

Theme <sup>1</sup>	Environmental Factor <sup>1</sup>	EPA Objective <sup>1</sup>
Sea	Benthic communities and habitat	To maintain the structure, function, diversity, distribution and viability of benthic communities and habitats at local and regional scales.
	Coastal processes	To maintain the morphology of the subtidal, intertidal and supratidal zones and the local geophysical processes that shape them.
	Marine environmental quality	To maintain the quality of water, sediment and biota so that the environmental values, both ecological and social, are protected.
	Marine fauna	To maintain the diversity, geographic distribution and viability of fauna at the species and population levels.
Land	Terrestrial environmental quality	To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.
	Flora and vegetation	To maintain representation, diversity, viability and ecological function at the species, population and community level.
Water	Hydrological processes	To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.
People	Amenity	To ensure that impacts to amenity are reduced as low as reasonably practicable.
	Heritage	To ensure that historical and cultural associations are not adversely affected.

Source: EPA (2013)

### 5.2.1 Cumulative impact assessment

Although there is a risk an individual project may have potential impacts to the environment, other Project impacts can lead to increased deleterious effects on environmental values, if not monitored and/or managed appropriately (EPA 2015). As such, it is important to consider the cumulative impacts of a project for each environmental factor (Table 5.1), in the context of existing phases of the same development, as well as other developments in the surrounding area. The following projects or infrastructure have been identified as potentially contributing to a cumulative impact in the vicinity of the Project:

- The PWEF CETO 5 project (Carnegie Wave Energy Limited)
- The Sepia Depression Ocean Outlet Landline (SDOOL; Water Corporation of Western Australia)
- Garden Island submarine cable (DoD).

Cumulative impacts on the BPPH of the area are discussed in Section 5.3.1.

Construction and operation of the CETO 5 Project has not resulted in significant lasting impacts on the environment. Monitoring results indicate that there has been no significant impact on beach and dune stability due to the presence of the buried pipeline at the Quarry Road Beach (BMT Oceanica 2015b). CETO 6 terrestrial infrastructure will utilise existing CETO 5 infrastructure and cleared areas, therefore no further impacts are anticipated. Monitoring results indicate that there has been no significant impact on terrestrial fauna and flora. The CETO 5 marine infrastructure has not significantly impacted surrounding water quality (BMT Oceanica 2015c), and is not anticipated to significantly impact on sediment quality (note a post-decommissioning survey is planned for early 2016, as required by the PWEF Sediment Monitoring Plan; BMT Oceanica 2014a).



The SDOOL is situated ~4 km south of the CETO 5 installation, and terminates in the Sepia Depression. The environmental impacts of the SDOOL have been intensively managed, and the environmental compliance reports are made publicly available (BMT Oceanica 2015d). Hydrocarbons are anticipated to be the only contaminant potentially released from the CETO 6 Project. Annual monitoring in 2014 indicated that SDOOL contaminants were below the ANZECC/ARMCANZ (2000) 99 % species protection levels following initial dilution, and hydrocarbons were undetectable in the water column (BMT Oceanica 2015d).

The DoD operate an underwater tracking range submarine cable that extends offshore from the southern end of Garden Island (evident in Figure 2.2). The cable does not have any ongoing environmental impacts, other than the initial impact of BPPH clearance (see Section 5.3.1). The submarine cable has recently been decommissioned, with parts of the cable removed, and other parts made safe and left *in situ*. No further marine cumulative impacts are considered for the submarine cable. A new underwater tracking cable is to be constructed in the future. Should Project timeframes occur concurrently the cumulative impacts will be considered through consultation between Carnegie and the DoD.

Since the impacts of projects and infrastructure surrounding the CETO 6 Project are small or negligible, it is anticipated that, provided the CETO 6 Project environmental impacts are managed to meet the EPA (2013) objectives for each factor, there will be no significant cumulative impacts.

### **5.3 Potential impacts on environmental factors**

Environmental impacts for each factor across each phase of the Project are discussed below.

#### **5.3.1 Benthic communities and habitat**

Impacts to BPPH are likely to occur during construction of the CETO 6 Project, from anchoring, and placement of subsea infrastructure. Impacts may also occur in the decommissioning phase of the Project; however; these will be limited to the same extent and areas as any construction impacts.

Impacts to BPPH must be assessed in the context of *Environmental Assessment Guideline (EAG) No. 3 Protection of Benthic Primary Producer Habitats in Western Australia's Marine Environment* (EPA 2009). BPPH is defined as seabed communities within which algae (e.g. macroalgae, turf and benthic microalgae), seagrass, mangroves, corals or mixtures of these groups are prominent components, and also include areas of seabed that support these communities EPA (2009). It is important to note that bare sand habitats are not included in loss calculations, as bare sand neither contains, or supports, benthic primary producers.

BPPHs of the CETO 5 and CETO 6 Project areas were mapped prior to construction (BMT Oceanica 2012, 2015a). These habitats will be used to determine the BPPH loss (direct and indirect) in the context of EPA (2009). As per the definitions provided in EPA (2009), the area within which the Project is located is *Category D Non-designated area* (Table 5.2).



**Table 5.2 Cumulative loss guidelines for benthic primary producer habitats within local assessment units**

Category	Description	Cumulative loss guideline*
A	Extremely special areas	0%
B	High protection areas other than above	1%
C	Other designated areas	2%
<b>D</b>	<b>Non-designated area</b>	<b>5%</b>
E	Development areas	10%
F	Areas where cumulative loss guidelines have been significantly exceeded	No net damage/loss

Notes:

- \*- Cumulative loss guideline is defined as a percentage of the original area of BPPH within a defined local assessment unit (LAU)

Source: EPA (2009)

The term 'loss' refers to direct removal or destruction of BPPH, commonly associated with activities such as excavation or burial, and most often when this damage to impacted BPPH is considered to be irreversible. 'Serious damage' is defined as damage to BPPH that is effectively irreversible or where recovery may occur would be unlikely to do so for at least five years following impact (EPA 2009). It is noted within EPA (2009) that there is currently no specific EPA guidance for considering short-term reversible impacts upon BPPH. To ensure a conservative approach and to demonstrate the minor and temporary impact to BPPH as a result of the Project, the guidance in EPA (2009) has been adopted.

There will be a small amount of direct loss to BPPH as a result of the installation and presence of CETO 6 subsea infrastructure. A 1 m wide corridor around the CETO 6 subsea power cable and other subsea infrastructure has been established for the purposes of calculating BPPH loss. This is considered a conservative approach, since the installation of the pipelines for the PWEF CETO 5 offshore from Garden Island did not show a detectable negative impact on the BPPH within the corridor of the cable or surrounding subsea infrastructure of the surveyed area (BMT Oceanica 2014b).

Assessment of direct and indirect BPPH loss against the EPA (2009) guidelines follows four main steps:

1. Calculation of the area of each habitat type in the Project area
2. Calculation of direct and indirect habitat loss areas from the Project, for each habitat type
3. Calculation of the cumulative loss for each habitat type mapped within the broader habitat management unit prescribed by the EPA (2009) guidelines
4. Comparison of likely cumulative habitat loss against the threshold targets specified by the EPA (2009) guidelines (Table 5.2)

### **Calculation of the area of each habitat type in the Project area**

The area of each habitat type mapped for the CETO 5 Project (BMT Oceanica 2012) and CETO 6 Project (BMT Oceanica 2015a) is shown in Table 5.3.

**Table 5.3 Area of mapped benthic primary producer habitat (Ha) for the CETO 5 and 6 Projects**

Habitat Category <sup>1</sup>	Area (Ha)
Macroalgae Dominated Reef (< 20m)	307.62
Sand or Sand Inundated Reef With Sparse Macroalgae and Seagrass Present	862.99
Sand inundated reef with Macroalgae Present (< 20m)	125.82
Macroalgae Dominated Reef (> 20m)	32.77
Bare Sand	556.04
<b>Total</b>	<b>1885.24</b>

Note

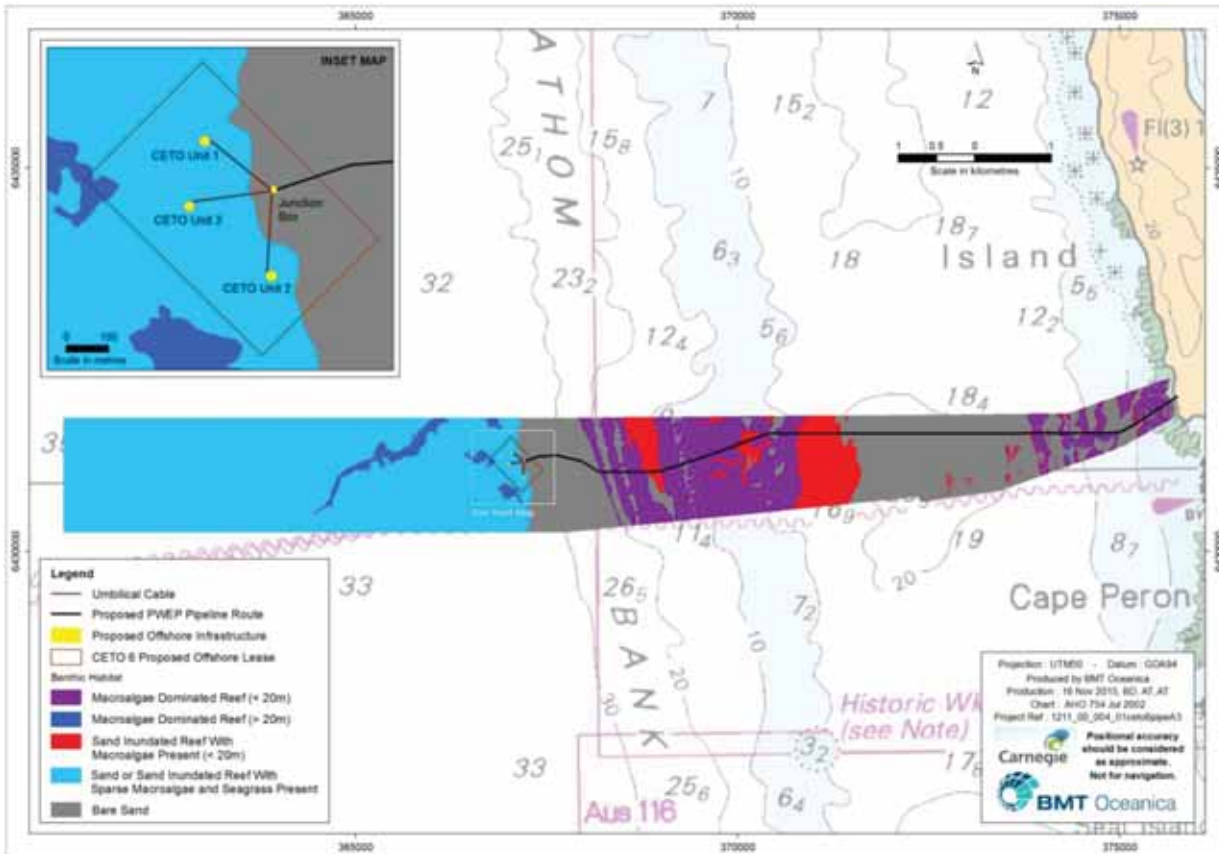
1. Habitat categories from BMT Oceanica (2012) were combined with BMT Oceanica (2015a)

***Calculation of direct and indirect habitat loss areas for each habitat type***

**Direct loss**

The proposed cable routes shown in Figure 5.1, were chosen to minimise potential impact to the limestone reefs and macroalgal communities. In addition, the existing shoreline crossing conduit installed for CETO 5 will be used for the CETO 6 power cable, which will negate onshore and shoreline disturbance.

The installation of the cable involves a potential direct loss of (primarily) macroalgal-dominated reef (Figure 5.1). This potential impact has been assessed as a low risk rating, due to the fact existing cable disturbance corridors for CETO 5 will be used, nevertheless, it is acknowledged that it will be unavoidable to cause some damage to these existing BPPHs as a result of surface laid cables during installation. However, since macroalgae are fast-growing, likely to colonise disturbed areas, and are not threatened, it is likely there will be no long-term consequence to this habitat type — previously demonstrated for the CETO 5 Project (BMT Oceanica 2014b).



**Figure 5.1 Benthic primary producer habitats mapped for the CETO 5 and CETO 6 Projects, and CETO 6 subsea infrastructure**

Areas of direct habitat loss for each habitat type are shown in Table 5.4.

**Table 5.4 Areas of direct loss of mapped benthic primary producer habitat (Ha) from CETO 6 subsea components**

Component <sup>1</sup>	Habitat Category <sup>2</sup>			
	Bare Sand	Macroalgae Dominated Reef (< 20 m)	Sand inundated Reef with Macroalgae present (< 20 m)	Sand or Sand Inundated Reef With Sparse Macroalgae and Seagrass Present
CETO Unit gravity base Foundations <sup>3</sup>	0.00	0.00	0.00	0.56
Junction Box	0.01	0.00	0.00	0.00
CETO Unit Umbilical Cables <sup>4</sup>	0.02	0.00	0.00	0.04
CETO Subsea Power Cable	0.51	0.26	0.12	0.00
<b>Total</b>	<b>0.54</b>	<b>0.26</b>	<b>0.12</b>	<b>0.6</b>

Notes:

1. A buffer zone of 0.5 m around cables and 1.0 m around gravity base foundation and the junction box has been included to allow for scouring
2. As per BMT Oceanica (2012) and BMT Oceanica (2015a)
3. Assumes gravity base as the most conservative option. If pile foundations are used the loss will only be 0.13 Ha
4. Although it is intended that the umbilical cables are buoyant (Figure 2.3), they have been included to account for any loss of buoyancy that may cause them to damage BPPH

## **Indirect loss**

There is a potential for turbid plumes to be created as a result of foundation installation and cable laying activities, which may have indirect effects on local BPPH. Given the high energy environment at this site, and the localised, temporary construction activities, it is unlikely that turbid plumes would be present for long periods of time.

The offshore cable sections (i.e. between 500 m and 8 km offshore) will be surface laid directly onto the seabed. There may be some localised scouring or 'halo' effects due to possible changes to currents and the capture of sand and/or wrack against the unburied cable. The cable will be armoured and secured with gout bags to negate movement across the seafloor. Halo effects from the CETO 5 pipeline installation have been shown to be very localised from recent habitat mapping (BMT Oceanica 2014b).

These potential indirect losses of BPPH have been estimated within the direct loss calculations described above (i.e. a conservative and nominal 1 m cable width, and 1 m buffer around foundations and the junction box was assumed to encompass both direct and indirect losses from instalment).

### ***Calculation of the proportion of each habitat type mapped that is likely to be lost as a result of the Project, and historical loss***

In accordance with EPA (2009) guidelines, the CETO 5 and anticipated CETO 6 loss areas were combined to produce a cumulative loss figure (Table 5.5). While the calculations did not take into account historical loss from other projects (i.e. SDOOL or the DoD submarine cable), it is important to note that the mapped area is ~50% smaller than the 50 km<sup>2</sup> local assessment unit (LAU) prescribed by the EPA (2009).

**Table 5.5 Cumulative benthic primary producer habitat loss calculations for the CETO 5 and 6 Projects**

<b>Habitat<sup>1</sup></b>	<b>Mapped Area</b>	<b>CETO 5 Loss (Ha)</b>	<b>CETO 6 Loss (Ha)</b>	<b>Cumulative Loss (Ha)</b>
Macroalgae Dominated Reef (< 20m)	307.62	0.07	0.26	0.33
Sand or Sand Inundated Reef With Sparse Macroalgae and Seagrass Present	862.99	0.01	0.6	0.61
Sand inundated reef with Macroalgae Present (< 20m)	125.82	0.01	0.12	0.13
Macroalgae Dominated Reef (> 20m)	32.77	0.00	0.00	0.00
<b>Total</b>	<b>1329.2</b>	<b>0.09</b>	<b>0.98</b>	<b>1.07</b>

Note:

1. Bare sand habitat is not included, as per EPA (2009)

### ***Comparison of likely cumulative habitat loss against the EPA (2009) guidelines***

Within the mapped area the total predicted loss of each habitat category listed in Table 5.6 is less than the 5% cumulative loss guideline for Category D Non-designated areas (refer to Table 5.2). Therefore, it is highly likely that total direct and indirect losses of BPPH associated with the CETO 6 Project will not contribute substantially to regional cumulative loss, and are well within the guidelines prescribed by the EPA (2009).

**Table 5.6 Cumulative benthic primary producer habitat loss represented as a proportion of the mapped area**

Habitat <sup>1</sup>	Cumulative Loss (Ha)	Proportion of Mapped Area
Macroalgae Dominated Reef (< 20 m)	0.33	0.11%
Sand or Sand Inundated Reef With Sparse Macroalgae and Seagrass Present	0.61	0.07%
Sand inundated reef with Macroalgae Present (< 20 m)	0.13	0.10%
Macroalgae Dominated Reef (> 20 m)	0.00	0.00%
<b>Total loss</b>	<b>1.07</b>	<b>0.08%</b>

Note:

1. Bare sand habitat is not included, as per EPA (2009)

### 5.3.2 Coastal processes

It is anticipated the potential impact of the CETO 6 Project on coastal processes will be negligible to those discussed in Oceanica (2012) for the CETO 5 Project as the same shoreline crossing conduit for PWEF cable will be used for the CETO 6 with enough cable to be installed through to the substation on Garden Island. It is important to note that monitoring results indicate that there has been no significant impact on beach and dune stability due to the presence of the buried conduit at the Quarry Road Beach (BMT Oceanica 2015b).

The onshore installation of the ~80 mm diameter cable will be via trenching and burial. The cable installation will follow the same PWEF graded route from within the quarry starting at a height of ~5 m AHD and then extend through the dune system and across the PWEF shore-crossing beach north of Baudin Point on the south-west of Garden Island. It is anticipated that trenching and burial of the cables at the onshore area will be ~750 mm AHD. If buried to a depth of less than 900 mm then the cable will be housed within a conduit.

#### **Construction**

The cable trench is expected to be ~1 m wide and ~750-900 mm deep and will be installed as per Western Power Standards AS 3000, AS 2067 and DoD requirements. The depth of the trench will vary through the dune system and across the shoreline of Quarry Road Beach. The trench will be deeper in some sections if the excavator needs to bench itself down at the deeper points. The cable will follow the same route as existing PWEF CETO 5 cable route to the Carnegie onshore facility.

Clearing of vegetation across the fore dunes and the hind dunes associated with the trenching and burial of the cables could facilitate erosion and destabilisation of the dune system. Increased erosion of dune vegetation and the creation of dune blowouts in areas disturbed during cable installation could occur during high energy wind and wave conditions. This erosion will increase the risk of the cables through the dune system becoming exposed. The issue of dune vegetation disturbance will be updated for CETO 6 in the Terrestrial Environmental Management Plan.

#### **Operation**

It is anticipated that the potential impacts to beach and dune stability during the operations phase of the CETO 6 Project will be low, provided that the structural design and installation of the cables minimises the potential for exposure and that management measures are adhered to in the event of cable exposure.

It is unlikely that natural longshore sediment transport will be interrupted from the surface laid cable along the seafloor. The cable is relatively thin ~80mm diameter and will be secured by

clump weights and grout bags. Given the small size of the cable and the high energy environment the cable will be within, it is unlikely that there will be an accumulation of sand or downdrift erosion in the vicinity of the cable, furthermore; surface laid pipelines with larger diameter from the CETO 5 Project have shown no known effects to sediment processes in the Project vicinity (BMT Oceanica 2014b)

The beach profile at the proposed cable shore-crossing undergoes significant seasonal erosion and accretion (Oceanica 2012). These seasonal beach profile changes could potentially expose the cable depending on burial depth. The cable could also become exposed during storm events where the shoreline experiences high energy wave conditions, elevated water levels and increased erosion.

If the conduit became exposed across the beach or in the near-shore area there could be localised changes to the beach profile and interruption of longshore sediment transport. This could result in changes to the near-shore currents and wave regime and also may affect the structural integrity of the cable.

### ***Decommissioning***

All buried infrastructure, including buried cable/conduits in near shore and shore-crossing areas and offshore foundations will remain in place and made safe to avoid re-disturbance of sea bed, shore-crossing and beach areas. Thus, the impacts to coastal processes during the decommissioning phase are expected to be negligible.

## **5.3.3 Marine environmental quality**

### ***Introduced marine pests***

The risk of introducing marine pests (IMP) to the Project area via vessel movements and usage has been assessed as low residual risk (Appendix D). Carnegie propose to source all vessels locally.

Carnegie will verify each vessel's operational history, fouling control coating and ballast water details are accurate and reliable before contracting the vessel. Subject to the perceived risk and/or uncertainties presented by the vessel an inspection may be undertaken by a suitable qualified marine surveyor prior to mobilisation.

Carnegie will ensure that vessel management will be undertaken as per Department of Fisheries (2012) guidelines, Department of Agriculture (DoA) guidelines. The *Biosecurity Act 2016* requirements will also be adhered to when the Act comes into effect on 16 June 2016 with the following information to be provided to the relevant government authorities:

- Evidence that sediment and ballast water has, or will be, managed to prevent IMPs entering and moving within Western Australia. Alternatively, a maintained ballast water management plan and record book should be provided
- Vessel's log entries showing operational history since last antifouling coating application or IMP inspection, or a maintained biofouling management plan and record book
- The most recent in-water cleaning or dry dock/slip report, and IMP inspection report
- Evidence of either an active marine growth prevention system or a suitable manual treatment regime for internal seawater pipeworks
- The most recent antifouling coating application certificate or original receipts or invoices stating the coating type, volume purchased, vessel name (if possible) and date of application
- Type of vessel.



## **Biofouling**

Biofouling can have adverse consequences for many marine structures through the promotion of corrosion, clogging up of intakes and grates, adding weight to structures or, in the case of vessels, lead to excessive drag and increased fuel costs.

Risks to the environment from biofouling have been assessed as low residual risk (Appendix D). It is unlikely that the application of antifouling material will have any detrimental environmental impact to sediment quality, water quality or local marine fauna or flora. Only a product which meets current environmental standards will be used, and the Safety Data Sheet (SDS) will be on site at all times during application. The CETO 6 units only have a short-term operational life (i.e. 1–5 years) prior to being decommissioned; as such the amount of antifouling product used will be minimal.

## **Sediment quality**

Impacts to sediment quality as a result of the CETO 6 Project construction, operation and decommissioning phases have been assessed as having a low residual risk.

Impacts to sediment quality will differ depending on the type of foundation chosen. If a gravity base method or a pile driving method is chosen, sediment quality impacts are unlikely. If a pile drilling and grouting method is chosen, minor impacts might be expected as described below.

During the installation of the CETO 6 units' foundations, there may be small amounts of grouting fluids that are unavoidably released to the seabed (Section 2.2.1). Grouting fluids consist of cement, seawater and various additives including surfactants, defoamers, lignins, inorganic salts and bentonite. Given the small amount, and the high wave energy environment in which the CETO 6 unit foundations are being installed, it is unlikely that these will be impacts to sediment quality.

If drilling is required, drill fluids may be used to reduce friction between the drill and substrate. Drilling fluids may consist of seawater and/or drilling muds. Drilling muds are typically comprised of hydrocarbons, which have potential to contaminate the sediments. Where possible, biodegradable drilling muds with low environmental toxicity will be sourced for foundation installation.

## **Water quality**

Potential impacts to marine water quality associated with CETO 6 Project construction are primarily associated with turbidity generation from cable installation, spills and waste, and drilling activities.

Where possible, the cable will follow the same route as the PWEF pipelines and cable to the Carnegie onshore facility. There may be the potential for turbid sediment plumes to be created when the CETO 6 cable is pulled through the existing shore-crossing conduit. The near-shore area of Garden Island is a high wave energy environment, and as such it is anticipated that turbidity generation as a result of foundation installation and surface cable laying activities will be rapidly dissipated with minimal impact to the water quality expected.

The potential for deteriorated water quality as a result of spills and waste (e.g. generated from vessel movement and use) has also been assessed as a low residual risk. Each CETO 6 unit is expected to have a stored hydraulic fluid volume of 4000–5000 litres, maximum of 6000 litres. Carnegie proposes to reduce any leakage rates through careful Project design and selection of bearing materials outlined in Section 2.2.2.



As there is no connection and flushing offshore, there will be no potential for release during installation. Given the high energy environment of the Project site, it is likely that any volumes of fluid accidentally released into the marine environment would be rapidly dispersed (RPS 2011). Any decrease in water quality resulting from accidental discharge of hydraulic fluid will be localised and temporary, with effects on fauna and benthic habitat present at the Project site expected to be minimal.

It is unlikely that drill cuttings will remain in suspension for prolonged periods of time due to the high wave energy climate of the offshore Project area (Section 4.2.1). Furthermore, it is unlikely that drill cuttings or particles that do remain in suspension will have any impact to the water quality of the area, as the drill cuttings will be comprised of the habitat substrate (i.e. either sand or limestone bedrock). If pile installation is the chosen methods for foundation installation, it is anticipated ~125 m<sup>3</sup> of cuttings are expected to be generated during drilling of each proposed pile installation.

There may be some release of grouting fluids and/or drilling muds, dependant on the chosen installation method, to the overlying water during installation of CETO 6 unit foundations. The potential for negative impacts to water quality as a result of small amount of grouting fluids or drilling muds being released have been assessed as posing a low residual risk. Wherever possible, the release of grouting fluid or drilling muds will be minimised and this will be reiterated to contractors by Carnegie. If required, drilling muds will be selected from biodegradable fluids with low environmental toxicity. The high energy environment of the offshore area will also act to dilute and circulate any grouting material released to the environment rapidly.

#### **5.3.4 Marine fauna**

Section 4.2.2 lists the marine fauna species that may potentially interact with the CETO 6 Project. The major potential impact to marine fauna as a result of the Project is considered to be from noise as a result of piling operations (see *Underwater Noise* below). Further potential impacts to marine fauna associated with drilling works during the construction phase were identified as toxicity of grouting material and sediment deposition

Although not directly a suitable habitat for the western rock lobster, the Sepia Depression is commonly traversed by the western rock lobster during their annual migration between ~November and January (Phillips 1983 cited in MacArthur et al. 2007) from inshore nursery grounds to the reefs of Five Fathom Bank and beyond (Oceanica 2009). As a result, there is potential for lobsters to be impacted upon during the construction phase of the CETO 6 Project via drilling operations and/or foundation installation as a result of: grouting fluid and/or sediment deposition from drilling; and/or disturbance from surface laid cables.

The probability that toxicants from grouting fluid will affect demersal fin-fish and/or migrating western rock lobster will be dependent on the concentration of individual chemicals, dilution rates following release into the water column and length of exposure time (Oceanica 2009). Given that the presence of chemical toxicants will be restricted to the grouting phase of construction, and be rapidly diluted in the high energy environment, it is unlikely these chemicals will impart acute and/or sub-lethal toxicity effects to marine benthic organisms (Oceanica 2009). Additionally, grouting works are anticipated to occur over a very short term period, likely spanning several days as per the CETO 5 installation.

The CETO 6 site experiences highly variable turbidity due to changes in surge activity so it is likely that resident demersal fauna (including crustaceans and fin-fish) are accustomed to turbidity, including when levels are naturally elevated such as during storm events (Oceanica 2009). There is a low risk of sediment deposition in the vicinity of the offshore drilling

site impacting upon local demersal fin-fish or upon the annual migration of the western rock lobster.

Given that demersal fin-fish are highly mobile and able to move away from affected areas, it is unlikely that short-term increases in sedimentation will have any impact upon these species. It is unlikely that temporary and short-term increases in sedimentation surrounding the offshore drilling area will have any significant impact upon western rock lobster migration or survivorship.

There is a low risk that the presence of cables may disrupt the migration of the western rock lobster whites phase by acting as a boundary to the lobsters. However, the presence of the CETO 6 units themselves is unlikely to have any impact upon these lobsters, particularly given their small Project footprint (See Figure 5.1 ). The cable is relatively small (~80 mm diameter) and it is anticipated that lobsters would likely be able to negotiate directly or navigate around, as similar scale objects are also naturally occurring in the vicinity.

The small footprint of the Project infrastructure means that mobile fauna (such as fish, sharks, mammals, reptiles and birds) will likely not be impacted during any phase of the Project. However, during the construction, efforts should be made to avoid vessel strikes with slow-moving mammals and reptiles (whales and turtles). During operations, it is anticipated that all fauna will be able to navigate around infrastructure. The potential for impact to marine fauna as a result of entanglement or entrapment within mooring lines or CETO 6 unit components is highly unlikely. There are no slack lines or components on the CETO 6 units that will pose risk of entanglement, and there will be no mooring lines that may result in entanglement left in place.

It is likely that the presence of the subsea infrastructure will act as an artificial reef, leading to increases in marine flora and fauna. Artificial reefs have been demonstrated to successfully increase fish abundances above that of surrounding bare sand habitat (Nielsen & Wells 1997).

Garden Island is a known breeding area for Osprey, Caspian tern and Fairy Tern bird species (Appendix B). However, considering that Carnegie intend to use existing infrastructure and the existing CETO 5 pipeline route in the onshore and nearshore areas, it is highly unlikely that the Project will impact on these species.

## ***Underwater noise***

### **Construction and decommissioning phases**

Underwater noise is likely to be generated during the construction phase of the Project primarily during drilling activities, CETO unit installation (potentially including pile-driven foundations), and support vessel movements. Underwater noise has the potential to impact upon sensitive marine fauna (mammals, fish and turtles) by interfering with communication, causing changes in behaviour or in extreme cases causing physiological damage to auditory organs (Carnegie 2009). The potential for impacts from noise-generating activities is dependent on a range of factors, including the intensity and frequency of the noise, prevailing ambient noise levels and proximity of noise to sensitive species (Carnegie 2009).

Underwater noise generated through routine drilling operations, including support vessel movements, does not have the intensity or characteristics likely to cause physiological damage to sensitive marine fauna and has been assessed as low residual risk (Appendix D). As per the CETO 5 unit installation Carnegie (2009), it is expected that the noise generated by the drill rig during pile installation will be predominantly dissipated through the air due to the elevation of the work platform above the sea surface. If pile-driven foundations are utilised for construction (rather than gravity-based foundations; see Section 2.2.1), then standard marine fauna and noise management measures will be adopted, including establishment of a fauna exclusion zone and

soft start-up procedures. Noise generated by vessels during the construction phase is likely to be of short duration and similar to that of other vessels passing through the Garden Island area (Carnegie 2009).

### **Operation phase**

The potential impact resulting from underwater noise during the operational phase of the CETO 6 Project has been assessed as low. The primary source of underwater noise is anticipated to be generated from the movement of CETO 6 units in the water, which has been assessed as posing a low risk of causing disturbance or injury to sensitive marine fauna (CSMT 2015).

An underwater noise assessment was undertaken during the operation phase of the CETO 5 Project (CMST 2015), the findings of which have been considered and applied to the CETO 6 Project. The assessment found that noise generated by the CETO 5 units consisted of a variety of impulses of varying amplitude, occurring at intervals likely related to the wave period (CMST 2015) and include:

- Tonal sounds (with harmonics) with a fundamental frequency of 200 Hz
- High-frequency transient sounds between 3 and 4 kHz from chains rattling
- Low-frequency transient sounds at frequencies less than 100 Hz most likely from moorings
- Broadband clunks, thumps and bangs from the movement of the CETO units in the ocean

All sounds, except for the 200 Hz tonal sound, were present and comparable in previous noise monitoring assessment undertaken for the CETO 3 unit in April–May 2011 (CMST 2011). The source of the 200 Hz was unknown, but could be from the subsea pipes or a pump.

The CETO 5 noise monitoring found that sound levels produced by the CETO array are much lower than most industrial offshore activities. With regard to underwater noise impacts, the underwater sound levels produced by the CETO array are considered unlikely to cause serious physiological damage to marine fauna. The main underwater noise impact likely from the CETO array is a behavioural response.

As per the advice provided in CMST (2011, 2015), Carnegie has modified the CETO 6 design of to ensure all moving parts are thoroughly secured and the core technology is contained within the BA system and as such, there is no longer pipelines, accumulators and other hydraulic components attached to the seabed. In relation to potential impacts to marine fauna as a result of underwater noise during operation, the previous CETO 5 study found the highest recorded peak pressure was well below thresholds for injury to marine mammals, however; calculations of noise were within the range of expected behavioural response thresholds for low frequency cetaceans (great whales) (CMST 2015).

Given that the primary elements responsible for generating underwater noise in previous designs are now contained within the BA of the CETO 6 units, it is not expected that noise generation will cause disturbance or behavioural changes to marine fauna.

### **5.3.5 Terrestrial environmental quality**

Terrestrial environmental quality is not expected to be impacted as a result of the Project, and therefore has been assessed as low and medium residual risk (Appendix D). Carnegie proposes to utilise PWEF pre-existing infrastructure to house the substation on Garden Island. The site was originally a disused quarry and already disturbed (Oceanica 2012), therefore it is unlikely that the terrestrial environmental quality will be degraded further as a result of the Project. There is a potential risk to flora and fauna from bushfire risk and appropriate bushfire management plans, regulations, contractor training and reduction in hot works though Project design have been considered to mitigate any bushfire risk (Appendix D).

### **5.3.6 Flora and vegetation**

Clearing of native vegetation will be required to install the subsea power cable, and a native vegetation clearing permit will be required to clear indigenous aquatic species such as seagrasses and macroalgae. The cable route will follow the previously approved PWEF CETO 5 pipeline route, where possible. Clearing of native vegetation for onshore trenching and burial to the substation will be required in accordance with Western Power Standards and ECC approval processes by DoD.

### **5.3.7 Hydrological processes**

It is highly unlikely that hydrological processes will be impacted on as a result of the Project. The Project will utilise pre-existing infrastructure on Garden Island, in an abandoned quarry. The Project does not involve major excavation outside of the pre-approved cable corridor (Section 5.3.6). Furthermore, there is no requirement for hydraulic fluids to be stored on the island as hydraulic fluid for the CETO 6 Project design is stored within the buoy, and therefore the risks to hydrological processes are considered low residual risk (Appendix D).

### **5.3.8 Amenity**

#### ***Fisheries (commercial and recreational)***

It is highly unlikely that recreational or commercial fisheries will be negatively impacted upon as a result of the Project.

The western rock lobster fishery is the only commercial fishery that may operate in the vicinity of Garden Island and the offshore development area. Lobsters are usually only in the proposed area during the whites phase of their migration phase, when they are moving from onshore reefs to offshore spawning grounds (Phillips 1983).

In terms of both commercial and recreational fisheries, the proposed declared closure area/exclusion zone of a 400 m by 600 m (subject to Project approvals) area is comparatively very small, in open water and a predominantly sandy seabed, and given the closure area will only remain in place for the life of the Project, it is not anticipated to have any impact upon fishing.

There may be a minor risk of anchoring and/or fishing hazards associated with the presence of cable. In terms of anchoring, there is little shelter along the region of coast within which the Project sits, other than in very calm conditions and in close proximity to shore. No commercial fishing (i.e. that would require anchors to be deployed from vessels) occurs specifically within the proposed Project area, and only light recreational fishing equipment would be used. The cable route will be marked on navigational charts and provided as a TNTM. The 80 mm diameter cable constructed from armoured steel with a heavy weighing capacity and is likely to be too heavy to be picked up by small- to medium-sized vessels. Furthermore, the cables will be installed within

a conduit already in place across the shoreline to ~5 m water depth, and then surface laid directly onto the seabed, sitting ~80 mm proud of the seabed.

Extensive community and stakeholder consultation has already been undertaken for the PWEF and will continue to for the life of the Project. Stakeholders and members of the general public will be thoroughly informed of the CETO 6 declared closure areas.

### **Maritime safety**

There is a potential risk relating to maritime safety associated with installation and removal of the cables, foundations and CETO 6 units, including the loss of materials from the CETO units and/or from the barge(s) carrying them and disturbance to the navigation of other vessels in the area. The loss of materials during CETO 6 construction and decommissioning has been assessed as a low residual risk to the surrounding marine environment.

Maritime safety during the operational phase of the Project has been identified as having a medium residual risk rating, due to the presence of the three CETO 6 units close to the water surface, as well as the cardinal markers in place around the Project offshore development area (Appendix D). The CETO units will remain in place at ~2 m below the water surface during normal operation for the duration of the operational phase, with cardinal markers to remain in place for the duration of the Project. The presence of both the CETO 6 units and cardinal markers in and around the offshore development area may cause safety issues for unauthorised boats entering the development area (either accidentally or deliberately).

Carnegie proposes to encompass the CETO 6 units within an offshore exclusion zone development area of 400 m by 600 m (subject to Project approvals). This will provide a further buffer zone around the CETO units, as agreed with the WA DoT and Australian Hydrographic Office (AHO), further minimising the potential safety risks from vessels coming into close proximity to the offshore site.

### **5.3.9 Heritage**

There are 13 wrecks greater than 75 years old — and hence protected as Historic Wrecks — that are unaccounted for around the broader Garden Island area (Oceanica 2012). Hydrographic surveys carried out by Carnegie (MGS 2015) have not identified evidence of shipwreck relics within the Project location. There are no known aboriginal heritage sites within the Project area (Appendix C).

During the mobilisation and construction of CETO 6 units, there is a low residual risk of disturbance or damage being caused to historic shipwrecks in proximity to the offshore development area. To minimise any risk of disturbance or damage, the locations of all known shipwrecks within close proximity to the Project site will be clearly identified and marked on maps (including navigational maps) prior to the commencement of installation of the cable and CETO 6 units. Additionally, any previously unknown shipwrecks or historical relics encountered during the course of the Project will be immediately reported to DotE as required by, and in accordance with the *Historic Shipwrecks Act 1976*.

## **6. Environmental Objectives and Commitments**

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The EPA (2013a) lists an objective for each environmental factor that, if met, will indicate that the proposal is not expected to have a significant impact on the environment. The environmental objectives, performance objectives, standards/guidelines/policies and measurement criteria for the Project are summarised in Table 6.1.

An Environmental Commitments Register to manage the potential environmental impacts associated with the overall Project is listed in Table 6.2. The environmental commitments are largely derived from Table 6.1. All commitments listed in the register are measurable and/or auditable. The responsibility for each commitment is ultimately assigned to Carnegie Wave Energy's Project Manager, but Project Managers from the contractors also have designated responsibility for various key commitments, as per Table 6.1.



**Table 6.1 Environmental objectives, standards and measurement criteria**

Environmental Factor	EPA Environmental Objectives <sup>1</sup>	Performance Objectives <sup>2</sup>	Standards <sup>3</sup>	Measurement Criteria <sup>4</sup>
1	To maintain the structure, function, diversity, distribution and viability of benthic communities and habitats at local and regional scales.	Ensure that the benthic habitat outside of the cable corridor and CETO unit footprints are not impacted as a result of the Project	<p>Marine Environmental Management Plan (MEMP) detailing procedures for:</p> <ul style="list-style-type: none"> <li>Barge anchor and pile placement, so to avoid disturbance BPPH</li> <li>Preventing accidental loss of equipment and materials, to avoid disturbance to BPPH</li> <li>Monitoring of BPPH to ensure no impacts outside of the cable corridor and CETO unit footprints</li> </ul>	<ul style="list-style-type: none"> <li>System in place for logging of environmental incidents involving loss of BPPH, including spatial estimate of loss</li> <li>System in place to ensure Native Vegetation Clearing permit required for removal of 'aquatic vegetation' is adhered to</li> </ul>
2	To maintain the morphology of the subtidal, intertidal and supratidal zones and the local geophysical processes that shape them.	No long term impacts on coastal morphology at the shoreline crossing site on Garden Island	<p>Terrestrial EMP (TEMP) detailing procedures for:</p> <ul style="list-style-type: none"> <li>Vegetation clearing as per DoD ECC</li> <li>Where possible, follow the existing corridor for cable crossing</li> <li>Rehabilitation of the crossing site post-construction</li> <li>Monitoring of the crossing site until the area returns to its natural state</li> </ul>	<ul style="list-style-type: none"> <li>System in place to ensure compliance with the TEMP</li> </ul>
3	To maintain the quality of water, sediment and biota so that the environmental values, both ecological and social, are protected.	No impacts to marine environmental quality as a result of the Project	<p>MEMP detailing procedures for:</p> <ul style="list-style-type: none"> <li>No impacts sediment quality as a result of the Project</li> <li>Reference to the WA Department of Fisheries state-wide vessel-tool checklist for vessels and infrastructure prior to mobilisation to site</li> <li>Anti-fouling of subsea infrastructure to prevent biofouling</li> <li>Waste management and disposal (including oil spill)</li> </ul>	<ul style="list-style-type: none"> <li>Pre and post-construction sediment surveys to be completed if drilling is the chosen method for pile installation</li> <li>System in place to ensure vessel checks are completed</li> <li>System in place to ensure anti-fouling is completed</li> <li>System in place to ensure waste management procedures adhered to</li> </ul>
4	To maintain the diversity, geographic distribution and viability of fauna at the species and population levels.	Ensure the risk of harm to susceptible marine fauna from Project construction and operational noise emissions is acceptably low	<p>MEMP detailing procedures for the management of works including:</p> <ul style="list-style-type: none"> <li>Definition and maintenance of susceptible marine fauna exclusion zone (based on appropriate literature)</li> <li>If pile-driven foundations are used, utilise pile-driver soft start-up procedures and exclusion zone (to help facilitate avoidance by susceptible marine fauna)</li> <li>Night-time lighting requirements to reduce potential impacts</li> <li>If required, night-time construction activities will only be undertaken if protected marine fauna have not been observed in the 500 m exclusion zone in the previous day.</li> </ul>	<ul style="list-style-type: none"> <li>If pile-driving, implementation and maintenance of marine fauna exclusion zone of 500 m during drilling operations by on-deck surveillance and/or dedicated boat search prior to the commencement of driving each pile</li> <li>System in place to record boat/deck searches and presence and location of protected marine fauna</li> </ul>
5	To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.	No impact on terrestrial environment and groundwater outside of the Project footprint	<p>TEMP detailing procedures for:</p> <ul style="list-style-type: none"> <li>Vegetation clearing as per DoD of an ECC for all terrestrial construction, operation and decommissioning activities</li> </ul>	<ul style="list-style-type: none"> <li>System in place to ensure compliance with the TEMP</li> </ul>
6	To maintain representation, diversity, viability and ecological function at the species, population and community level.	No impact to terrestrial flora as a result of the Project	<p>TEMP detailing procedures for:</p> <ul style="list-style-type: none"> <li>Vegetation clearing as per DoD approval of an ECC</li> <li>Ensuring the cable crossing area does not extend beyond the existing corridor</li> <li>Rehabilitation of the crossing site post-construction</li> <li>Monitoring of the crossing site until the area returns to its natural state</li> </ul>	<ul style="list-style-type: none"> <li>System in place to ensure compliance with the TEMP</li> </ul>
7	To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.	No impact to groundwater as a result of the Project	<p>TEMP detailing procedures for:</p> <ul style="list-style-type: none"> <li>Management of ground and surface water during all terrestrial construction, operation and decommissioning activities</li> </ul>	<ul style="list-style-type: none"> <li>System in place to ensure compliance with the TEMP</li> </ul>
8	To ensure that impacts to amenity are reduced as low as reasonably practicable.	Public access to the area is restricted as little as possible during the works	<p>MEMP to outline procedure for</p> <ul style="list-style-type: none"> <li>Reducing the impact of the works on public access to the area.</li> <li>Obtaining a TNTM for the CETO Unit restricted access site</li> </ul>	<ul style="list-style-type: none"> <li>Systems in place to ensure EMPs are followed.</li> <li>Adherence to EMP methods and timetables</li> <li>TNTM to be obtained prior to works commencing</li> </ul>
9	To ensure that historical and cultural associations are not adversely affected.	No impact to known heritage sites (shipwrecks)	<p>MEMP to outline procedures to be followed in the event that a shipwreck or potential heritage site is identified</p>	<ul style="list-style-type: none"> <li>System in place to ensure EMP is followed</li> </ul>

Notes:

- EPA (2013a)
- 'Performance Objectives' relates to the overall environmental goal (consistent with environmental policy) that an organisation sets itself to achieve
- 'Standards' include, company standards, regulatory requirements, and recognised Australian and International standards
- 'Measurement criteria' are measurable/auditable outcomes that ensure that the company's environmental performance objectives meet and/or surpass the standards





**Table 6.2 Environmental commitments register**

Environmental Factor	Key Environmental Commitments	Management Document
1	A post-construction seabed visual survey shall be completed to ensure no impacts have occurred to BPPH outside of the cable corridor and CETO unit footprint	MEMP
2, 5, 6, 7	Vegetation clearing as per DoD approval of an ECC Waste shall be disposed of and stored in secured, lidded bins for appropriate disposal Ground excavation will not occur deeper than 900 mm (as detailed in Section 2.2) The boundary of the approved DoD ECC area will be clearly marked	TEMP
3	Pre and post-construction sediment surveys to be completed if drilling is the chosen method for pile installation Reference to DoA Guidelines for ballast water exchange (when required) as documented in the MEMP Barges and works vessels will be clean of biofouling before arrival at the Project site and the WA Department of Fisheries state-wide vessel-tool checklist and Department of Agriculture biofouling guidelines for commercial vessels will be referred to for management Any on-deck or on-shore spills and leaks of hydrocarbons or other contaminants (including during fuel transfer) shall be recovered promptly with spill-kits Lifting equipment shall be certified and crane operation shall be to WA Department of Commerce WorkSafe requirements to ensure safe operation and no loss of equipment/materials (refer to MEMP) Mechanical/hydraulic equipment and oil/fuel/lubricant storage areas will be regularly inspected (refer to MEMP) Fuels and lubricants, including waste-oil, shall be stored in accordance with Dangerous Goods requirements, including storage in bunded drums for licensed on-shore disposal Supplier contracts shall require adherence to national/international legislative requirements for oil spill prevention (as per the MEMP) Waste shall be disposed of and stored in secured, lidded bins for appropriate onshore disposal Fuel pumps, tanks and storage areas will be regularly inspected.	MEMP
4	If pile-driving construction methods are used, a 500 m exclusion zone will be maintained through dedicated on-deck surveillance or boat search for susceptible marine fauna prior to commencement and during pile driving each pile foundation Pile driving shall commence with soft/'fairy taps' to warn proximal marine fauna Minimal lighting only will be used overnight for security and safety purposes Marine equipment and boats shall be operated by qualified personnel. Mooring lighting will be utilized on barges and moorings	MEMP
8	Obtain and adhere to TNTM Clearly mark the CETO unit development area as per the NTM Public access to the foreshore area and Project site to be restricted during construction works and from Project site at all times other than for organised visitors	MEMP
9	Stop work and report any suspected heritage sites (including shipwrecks)	MEMP and TEMP

## 6.1 Further studies required

As per Table 6.1 and Table 6.2 some additional environmental studies may be required. These studies and their objectives are listed in Table 6.3.

**Table 6.3 Further environmental studies required**

Study	Objective
Post-construction BPPH impact assessment via a visual survey	To determine if there is any impact on BPPH as a result of construction of the CETO 6 Project infrastructure, particularly around five fathom bank.
Construction sediment quality survey	To ensure there has been no change in sediment quality as a result of CETO 6 Project construction activities dependant on chosen installation method
Decommissioning sediment survey	To ensure there has been no change in sediment quality as a result of CETO 6 Project decommissioning activities
Terrestrial environment rehabilitation survey	To ensure that the coastal vegetation cleared for the cable trenching is rehabilitated

## 6.2 Implementation strategy

A Marine Environmental Management Plan (MEMP) and Terrestrial Environmental Management Plan (TEMP) will be written for the project, to ensure that the environmental commitments listed in Table 6.2 are met.

### 6.2.1 Systems, management and review

Management systems, practices and procedures will be described in detail in the EMPs. Workplace inspections and audits during construction and decommissioning shall include a daily site inspection by a supervisor to control any hazards to an acceptable level and a detailed inspection of all current work areas conducted every month. In addition, Health, Safety and Environment (HSE) audits will be carried out at regular intervals, as documented in the EMPs.

### 6.2.2 Contingencies

All employees have a responsibility to report incidents and accidents to the Site Supervisor as soon as practicable after the incident occurs. All incident reporting and investigation procedures, including emergency response procedures, will be documented in detail in the EMPs. For reporting purposes, environmental incident reports will be rolled up into the Carnegie existing Health, Safety and Environment (HSE) system.

### 6.2.3 Records

Carnegie documentation and environmental records will be maintained and controlled in order to:

- leave an auditable trail for regulatory authorities
- demonstrate compliance with environmental legislation and works approval documentation
- record policies
- record and communicate employee roles and responsibilities
- record standards, procedures and work instructions
- document the results of any environmental monitoring, audits and reviews.

Carnegie documents are either controlled<sup>2</sup> or uncontrolled<sup>3</sup>, with controlled documents generated by Carnegie registered with a formal document number, revision date and signed off by the responsible person.

<sup>2</sup> *Controlled documents must be the same at any point and cannot be changed without authorisation.*

<sup>3</sup> *Uncontrolled documents refer to completed records, annual reports, monitoring results etc.*

#### **6.2.4 Management responsibilities**

The Project Manager at Carnegie has the overarching responsibility for management of the Project. The roles and responsibilities for all personnel (including contract personnel) working on the Project are obligated to demonstrate a duty of care to ensure that their actions and work practices do not have a detrimental effect on the environment.

The EMPs shall detail the specific responsibilities of Contractor personnel in relation to environmental management for the following positions during the construction and decommissioning phases of the Project:

- Managing Director
- Operations Manager
- Contracts Manager
- Project Manager
- Environment & Approvals Manager
- Health & Safety Adviser
- Supervisors
- Employees and Subcontractors.

#### **6.2.5 Competence, training and awareness**

In accordance with their roles and responsibilities, all personnel working on the Project shall be trained in the management of environmental risks and impacts.

The Project Manager is responsible for ensuring adequate training is provided for personnel involved in the Project. All training completed shall be documented in the Induction/Training Register on site and copies of competencies shall be filed. Records will also be maintained in a central register at Head Office and copies of certificates, competencies and licences will be made available. Training shall include environmental training and competency and site inductions.

#### **6.2.6 Communication**

Communication and consultation on environmental issues is to be established and maintained with all parties involved in the Project. The EMPs will detail the means of communication in relation to environmental management, including the following:

- kick-off meetings for contractors, clients and sub-contractors
- daily pre-start meetings
- toolbox meetings
- leadership visits
- statistical reporting.

All personnel are to have access to the information resulting from these processes.

## 7. Stakeholder Consultation

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Carnegie strongly values stakeholder input to ensure stakeholder views are understood and issues addressed early through project design and environmental management. Carnegie views community consultation as an important component of the CETO 6 Project, providing an opportunity for good working relationships to be established and continued with those parties whose attitudes and values towards the Project could define its success.

To ensure continued best practice, a Community Consultation Plan (Carnegie 2015b, Appendix E) has been prepared for the CETO 6 Project, providing a strategic approach and detailed engagement plan with clear objectives, activities and process evaluation specific to the CETO 6 Project. The Community Consultation Plan (Carnegie 2015b, Appendix E) identifies the engagement and feedback process for stakeholder consultation, integrating social and community components in line with key planning phases and Project milestones. The Community Consultation Plan has been reviewed and certified by Umwelt (Australia) Pty Limited as in accordance with relevant industry standards and will be reviewed and updated as required on an ongoing basis (Carnegie 2015b, Appendix E).

This plan has been developed in accordance with relevant industry standards and best practice reflecting the type of Project and community consultation to be undertaken, for example:

- AA1000 Stakeholder Engagement Standard (Accountability): a principles-based, open-source framework for the design, implementation, assessment and communication of quality stakeholder engagement.
- ISO 26000 2010 Standard (Guidance on Corporate Social Responsibility): a guidance statement providing direction on identification of stakeholders and how best to engage.
- Relevant International Finance Corporation Performance Standards.

### 7.1.1 Community consultation processes and implementation

Carnegie has already undertaken extensive stakeholder consultation and environment studies as part of the development of CETO technology. Stakeholder consultation for CETO technology has been an ongoing process since early 2008 regarding seabed and land tenure, environmental issues, permits and approvals requirements. Previous community consultation information relating to the CETO 3 unit and PWEF deployment is outlined in Carnegie (2009) and Oceanica (2012).

Carnegie has established a register/database of stakeholders which has been utilised for the CETO technologies and in the development of the PWEF Community Consultation Plan (Sheridan Coakes Consulting 2012). This has been reviewed and expanded for the CETO 6 Project (Carnegie 2015b). Early community consultation was undertaken by Carnegie with the government and fishing associations outlined in Table 7.1. Feedback from early consultation is provided in Appendix G

**Table 7.1 Early stakeholder consultation groups consulted by Carnegie as part of the CETO 6 Project**

Stakeholder category	Stakeholder Type	Stakeholder
Primary Stakeholders	Australian Federal Government	Australian Fisheries Management Authority
		Department of Agriculture
		Department of Defence
		Department of the Environment
	State Government	Department of Fisheries
		Department of Parks and Wildlife
		Department of Transport
	Industry, Business and Research Associations: Fishing and Boating Associations	Recfishwest

The key stakeholder groups identified and consulted with for the CETO 6 Project are outlined in Table 7.2. All of these groups have been consulted with to date by BMT Oceanica on behalf of Carnegie as part of their ongoing extensive stakeholder and community consultation process. Community consultation with the wider stakeholder group that were contacted and either no response was received or the invitations to comment was declined are provided in Appendix F.

**Table 7.2 Stakeholder groups consulted by BMT Oceanica on behalf of Carnegie as part of the CETO 6 Project**

Stakeholder category	Stakeholder Type	Stakeholder
Primary Stakeholders	Australian Federal Government	Department of Agriculture
		Department of Defence
		Department of the Environment
	State Government	Department of Fisheries
		Department of Transport
		Office of the Environmental Protection Authority
	Local Government	City of Rockingham
	Special Interest Groups: Recreational	Rockingham Volunteer Sea Rescue Group

### 7.1.2 Community consultation summary to date

Throughout the consultation period for the CETO 6, the majority of feedback received has been very positive.

Very few concerns were raised about environmental issues due to the information provided during the community consultation process and presentation material given during meetings. Furthermore, management for the CETO 6 Project is similar to management processes and responses implemented for the PWEF whereby feedback provided by stakeholders outlined in Table 7.2 had previously been incorporated and applied to CETO 6

All queries were answered with appropriate information and potential management processes, if required (Appendix G). Suggested management and mitigation measures provided by primary stakeholders in relation to the environment, flora and fauna, and maritime safety were considered and included where relevant within the MEMP.

Carnegie will maintain communications with relevant agencies, commercial and recreational groups, and other key stakeholders to ensure they are kept informed of Project activities and any changes which may affect other users of the area. This community and stakeholder consultation will be ongoing throughout the Project.

Temporary Notices to Mariners will be issued through the WA DoT to ensure that all vessel operators are aware of the installation activities, cable easement and exclusion zone applied. The cable easement and exclusion zone will be added to maritime charts.



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## **Appendix A**

### **Carnegie Wave Energy CETO 6 Project Information Technical Note**



# TECHNICAL NOTE

## CETO 6 GARDEN ISLAND PROJECT

### BACKGROUND

Parent Proj: N/A  
Project No: CP115  
Document No: CP115-0034

#### Document Revision History

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2	Updated to include gravity base foundation, general update to reflect current design status	A Nichols Signature:  Date: 30 OCT 15	EHR Davies Ward Signature:  Date: 30 Oct 2015	J Fiévez Signature:  Date: 30/10/2015	30/10/2015 5:43:00 PM
1	Document Revised	A Nichols	EHR Davies Ward	D Kessel	22/10/2015 12:42:00 PM
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## 1. INTRODUCTION

Carnegie Wave Energy, the developer and owner of the CETO wave energy technology has built the world's first grid connected wave energy array, the Perth Wave Energy Project (PWEF), at Garden Island in Western Australia utilising its 5th generation CETO technology with the support of the Federal and State Government.

Carnegie has been granted funding for their next stage of CETO development, the CETO 6 Project, which will design and demonstrate the next generation of CETO technology, 1 MW CETO 6 Units, to be deployed in an array of up to 3 MW in size. This project will consist of an array of up to 3 Units.

The CETO 6 Project (C6GI or the Project) will be located further offshore from PWEF, off the Perth metropolitan coast at a site that has a higher wave energy resource than the PWEF, which will allow for the demonstration of CETO technology in higher sea states. Additionally, this Project will demonstrate a number of technical and commercial innovations that will expand the potential market for the CETO technology and significantly advance the CETO technology towards commercialisation.

The Project builds on the learnings from the PWEF and CETO 6 concept design studies. As a result the CETO 6 Unit will have a significantly larger capacity and will produce significantly more power than the current CETO 5 generation. Additionally, the design will leverage initial offshore power generation trialled at CETO 3 by locating the electrical generation subsea. This will expand the market for the CETO technology by being the only wave power technology capable of operating both nearshore (with the hydraulic system) and distant to shore locations (with the subsea system).

The combination of these factors will progress CETO further along the innovation chain and deliver a significant reduction in the levelised cost of CETO power (LCOE) when built in large projects.

Financially, the CETO 6 Project will be funded via an \$13 m grant from the Australian Renewable Energy Agency (ARENA) and a \$20 m loan facility from the Clean Energy Finance Corporation (CEFC), showing the advancement of the technology and the market's increasing comfort with Carnegie and the CETO technology.

### 1.1. Objectives

The objective of the Project is to design, construct, install and operate the next generation of CETO wave energy technology, CETO6.

The main aims of the Project can be summarised as below:

- Demonstrate a system that can be operated safely and provide reliable and predictable power,

Meeting these aims will allow Carnegie to:

- Share knowledge and information relating to technology and Project development that can help improve the competitiveness of renewable energy technologies and increase the supply of renewable energy in Australia and globally,
- Meaningfully engage with Project finance markets, which is critical for future CETO Projects and other wave energy Projects,
- Identify key suppliers who can be engaged strategically on a multi-Project basis.

## 1.2. Carnegie Wave Energy

Carnegie Wave Energy Limited is the ASX-listed inventor, owner and developer of the patented CETO wave energy technology that converts ocean swell into zero-emission renewable power and desalinated freshwater. Carnegie has raised over \$140 m to fund the development of the CETO technology and employs unique rapid prototyping utilising computational simulation, wave tank testing, scaled, in-ocean testing at its private Wave Energy Research Facility and onshore/offshore test site and commercial scale in-ocean testing at Garden Island, Western Australia.

CETO has been under development for approximately 10 years of continuous testing and refinement. Significantly, the 5th generation of the CETO technology is being demonstrated as part of the Perth Wave Energy Project (PWEF) located off HMAS Stirling, Australia's largest navy base, at Garden Island in Western Australia. CETO is the only ocean-tested wave energy technology globally that is both fully submerged and capable of generating power both onshore and offshore. The CETO technology has been independently verified by UK engineering firm Frazer-Nash, EDF–Energies Nouvelles (EDF EN) and the French naval contractor DCNS.

Carnegie employs a team of approximately 45 staff in its Western Australia operations, based in Fremantle, that span a multidisciplinary skill base including hydrodynamics, mechanics, hydraulics, electrical, intellectual property, offshore engineering and operations, project planning, finance, environmental planning and stakeholder consultation. Carnegie also has a highly experienced Board of Directors who combined have delivered and overseen projects measured in the multiple-billions of dollars across renewables, oil and gas, offshore energy, power generation and transmission and mineral resources.

## 1.3. CETO Technology Development

Named after a Greek sea goddess, CETO offers the potential to revolutionise power and water production globally. CETO harnesses the enormous renewable energy present in our ocean's waves and converts it into two of the most valuable commodities underpinning the sustainable growth of the planet; zero-emission electricity and zero-emission desalinated water.

Initial development of the CETO wave energy technology began in 1999 with desk top research and design. Following on from preliminary design and analysis, work on the development of the CETO technology platform commenced in 2003 with construction of the first prototype Unit starting at the end of the same year. The CETO I prototype proved the concept of generating zero-emission power and freshwater from the ocean waves in 2006. Between 2006 and 2008 CETO II prototypes were developed and tested in the waters of Carnegie's Fremantle Wave Energy Research Facility, providing new commercial design concepts.

During this time, a unique and powerful in house capability harnessing modern computational power and hydrodynamic analysis techniques was developed which allowed numerous CETO designs to be tested in a virtual wave environment before data collection from in-sea trials validated these designs. This capability has been continually improved upon by Carnegie and results in both substantially cheaper and faster design development as well as a wider variety of ideas to be tested than would be otherwise possible.

In 2011, the CETO 3 Unit was tested at Carnegie's Perth Wave Energy Project site at Garden Island. Furthermore, in 2014, Carnegie's CETO 5 design, was deployed also at the PWEF Garden Island site. The PWEF is the first multi-Unit grid connected wave energy convertor array in the world and also the first wave energy project to produce both power and water.

The diameter of the Buoyant Actuator (BA) has the most significant influence on power output and has been increased from the 2 m diameter of the CETO 2 Unit (1kW) to the 11 m diameter CETO 5 Unit (240 kW). The CETO 6 Unit will be significantly larger and more powerful with a diameter of approximately 20 m and a rated capacity of 1MW (Figure 1).

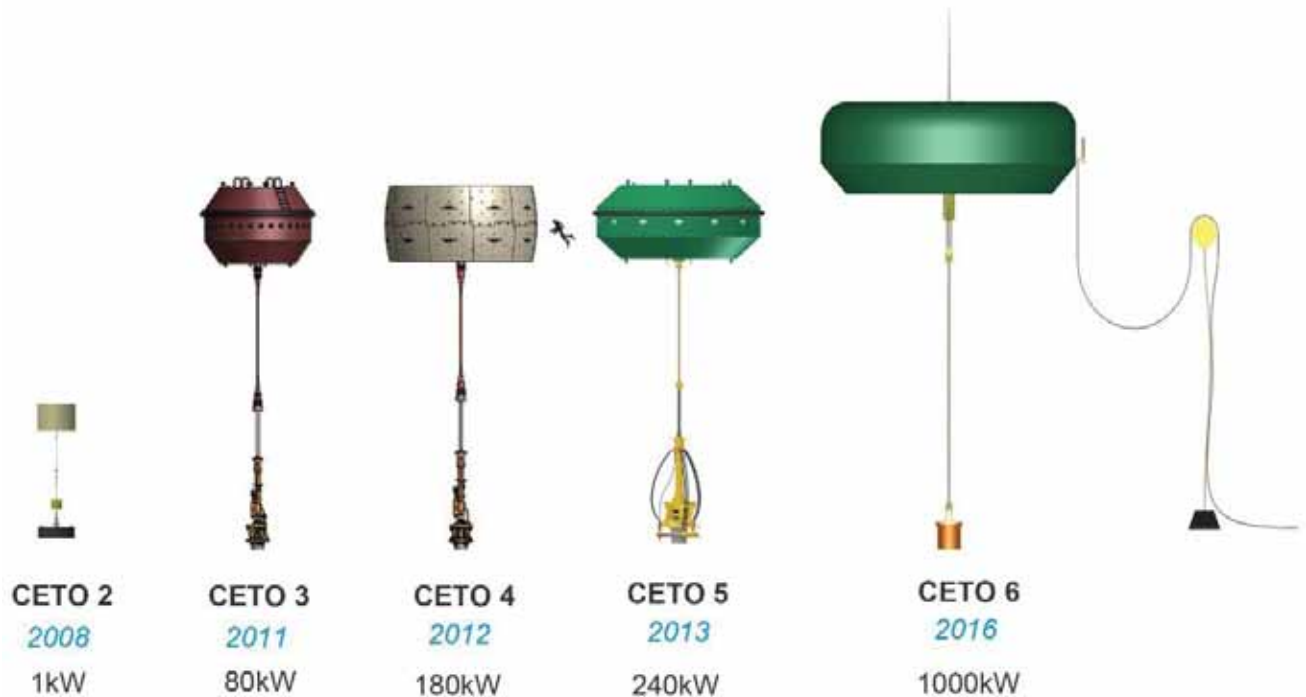


Figure 1 - CETO Unit Development Pathway

The design of the CETO 6 Unit will build upon the experience gained in previous generations, including drawing on the experience of PWEF, and will incorporate some important changes that will decrease cost and increase market opportunity for CETO technology.

The CETO 6 Unit will incorporate subsea electricity production (located in the BA) which uses subsea cables to connect to an onshore substation rather than using hydraulic pipelines to bring high pressure water to an onshore power plant (Figure 2). Offshore generation was previously tested in the CETO 3 prototype Unit in order to provide power to the offshore data instrumentation, SCADA control system and data communications. Adding the ability to generate power offshore will expand the market for CETO technology by opening up the potential for sites that are further from shore for physical or social reasons. In both cases the CETO Units will remain fully submerged using the same core hydrodynamic principles.

The CETO 6 Unit power take-off will be contained within the BA. This means there will no longer be pumps, accumulators and other hydraulic components attached to the seabed. The core technology will all be located within the BA, which will reduce installation and maintenance time and cost as the entire CETO Unit can be towed to shore for any routine maintenance required.

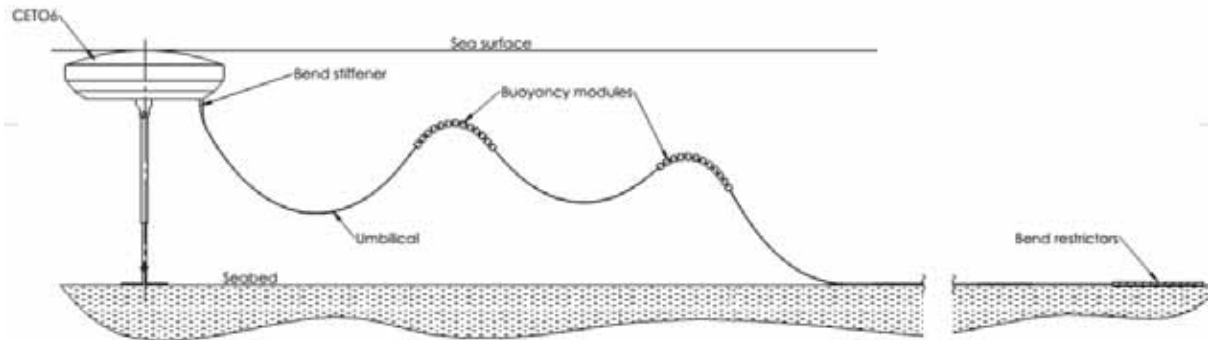


Figure 2 - CETO 6 Concept Design (with Dynamic Cables)

In developing the CETO 6 technology, Carnegie has been drawing upon the experience of CETO 5 design and development in the PWEF, as well as additional CETO 6 concept design work that Carnegie is undertaking internally and with expert partners from industry and the research community. Some of the concept design work includes hydrodynamic modelling and tank testing (see example of CETO hydrodynamic modelling in Figure 3), rope fatigue testing, electrical topology with Atlantis, foundation design optioneering study with University of Western Australia, power take-off design studies with industry partners as well as a number of internal Carnegie design studies.

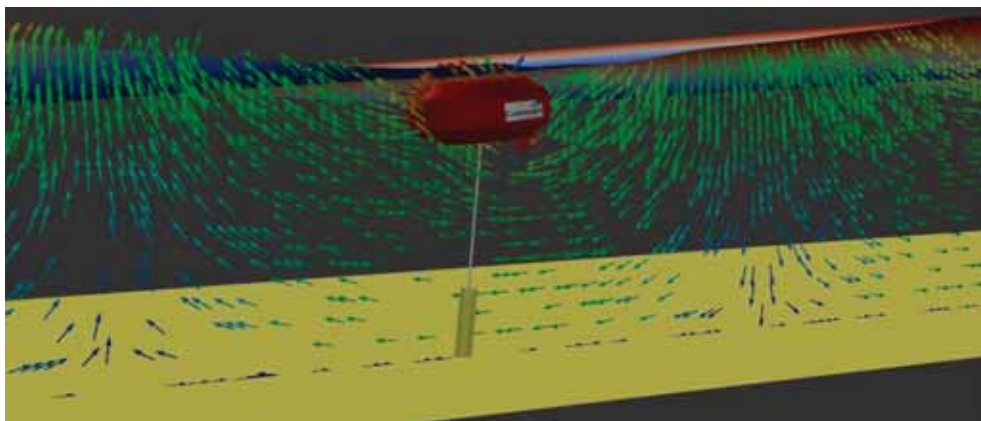


Figure 3 - CETO Hydrodynamic Modelling

## 2. CONVENTIONS

Not applicable



### 3. PROJECT DESCRIPTION

#### 3.1. Site Description

The Project will be located at a medium to high energy site that offers the potential for further commercial expansion, off the metropolitan coast of Perth in the waters adjacent to the current PWEF. Wave energy flows in the direction of wave propagation and is measured as the amount of power (in kW) contained in each linear metre of wave front. Typically energy above 20 kW/m may be suitable for CETO wave farm projects. The chosen offshore site will have a wave resource of approximately 30 kW/m as compared to approximately 10 kW/m at the current PWEF site. This allows the CETO 6 generation to be demonstrated and operated in a significantly higher sea states and in increased extreme design waves.

The area under which the export cable will be brought ashore will be the current PWEF onshore site on the west coast of Garden Island. The site can be seen in Figure 4.

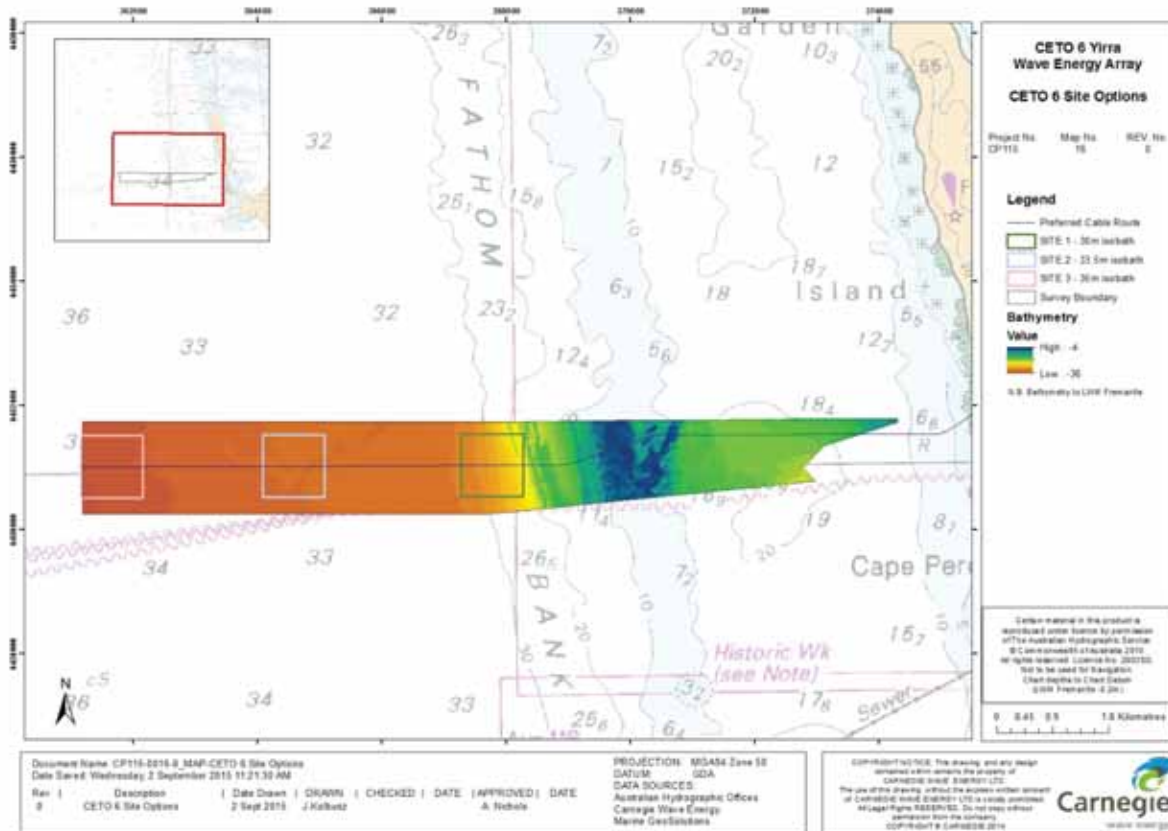


Figure 4 - CETO 6 Project Area

The final offshore site is yet to be chosen, but based on design development work so far and knowledge of the site from Benthic Habitat mapping and Geophysical survey work, this is expected to be approximately 9–10 km offshore in 30 to 35m of water, just west of Five Fathom Bank.

Carnegie is actively collecting wave energy data for this site to be used in the design and development of the Project. Carnegie deployed a directional wave monitoring buoy at the site in October 2014, which is supported by over 6 years of continuous wave data at its PWEF site and a comprehensive 15-year data set via the Rottnest Island wave monitoring buoy.

The Project will leverage Carnegie’s 10 years of experience in working within the Australian and Western Australian State and local government regulatory regimes. It will also take advantage of the work Carnegie has done over the previous 5 years in engaging with local key stakeholders.

The Garden Island project site offers the benefits of leveraging the well-established local stakeholder relationships from PWEF, in particular, the Department of Defence.

**3.1.1. Garden Island**

Garden Island is the site of Department of Defence’s HMAS Stirling and was the site of the CETO 3 Unit deployment as well as being the site of the current Perth Wave Energy Project (with the CETO 5 technology). As such, Carnegie has extensively studied the area and has a well-developed understanding of the wave resource and physical and social conditions. For the CETO 6 PWEF Expansion Project, the offshore site would be located further offshore, in deeper water and beyond the protection of Five Fathom Bank where the wave energy resource is greater (See Figure 4). The Project would connect back to a substation on Garden Island via a subsea, high-voltage, cable and would provide power to the Department of Defence.

Carnegie’s existing strong relationship with the Australian Department of Defence via the PWEF will be utilised in a Garden Island CETO 6 project. Also numerous aspects of the current PWEF can be leveraged in the expanded Project such as the offshore and onshore easements, onshore site and grid connection.

**3.2. Technology**

The Project will design, build and operate a wave energy array using up to three CETO 6 Units for power production. This new generation of the CETO technology will provide a step change in CETO development by introducing subsea generation and further increasing the power capacity which in turn decreases the cost of generation (Figure 5).

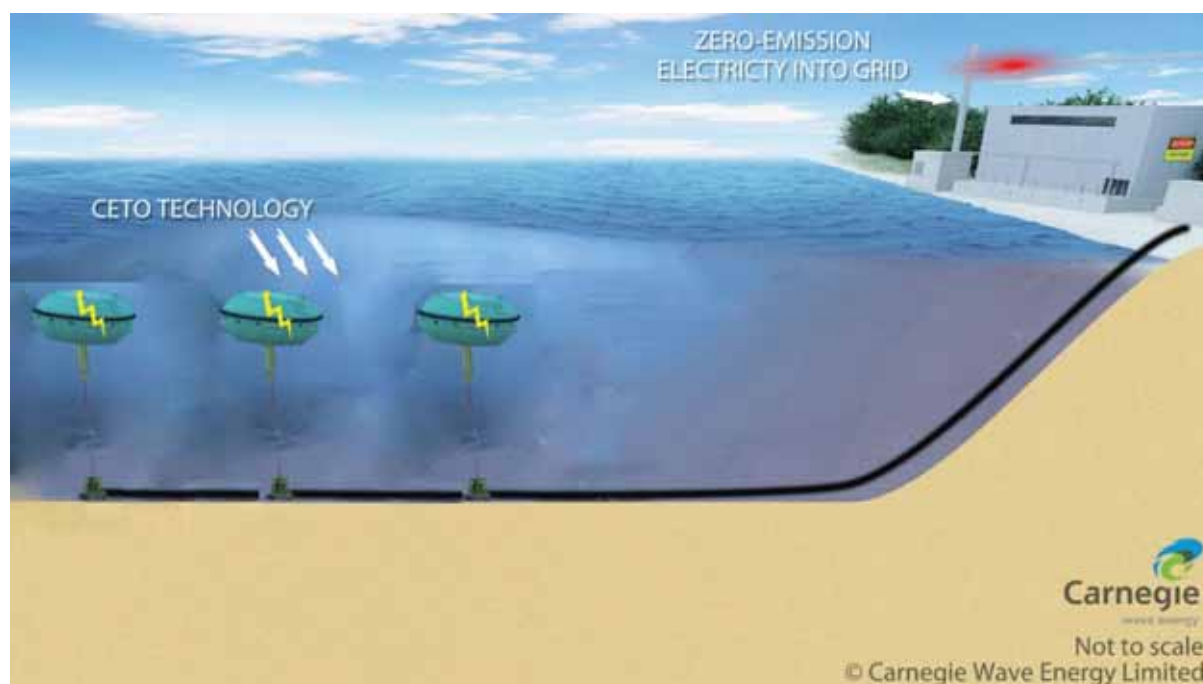


Figure 5 - CETO 6 PWEF Expansion Project Schematic

Significant innovation is involved in the development of the CETO 6 technology for the Project. Design work currently underway involves hydrodynamic analysis of a larger 20 m BA, load



path components and foundation designs capable of withstanding commensurately larger loads, electrical generator type (synchronous or asynchronous), offshore grid design and export (series versus parallel, AC versus DC), Unit installation, operation and maintenance and Project construction.

**3.3. Project Timeline**

The Project currently in the Concept Design Phase. Detailed design will commence in 2016 followed by procurement and start of construction in the following year. The expected Project timeline can be seen in Table 1 - CETO 6 Project Milestones which shows the final date each phase is expected to begin by. The Project would be commissioned in 2017 and would then be operated for a minimum of 12 months.

**Table 1 - CETO 6 Project Milestones**

<b>CETO 6 Project Milestones</b>	<b>Date</b>
Requirements and Concept Design completed	31 Oct 2015
Preliminary Design completed	31 Dec 2015
Critical/Detailed design completed	30 Jun 2016
Approvals, Permits & Consents completed	30 Jun 2016
Foundations installed	31 Dec 2016
Project commissioned (operations commence)	31 Dec 2017
Completion of 12 months operation	31 Dec 2018
Decommissioning completed	31 Dec 2019

#### 4. SYSTEM COMPONENTS

The CETO 6 product has been broken down into a number of constituent physical elements which are organised as follows and is depicted in Figure 6.

- Electrical System
  - a) Subsea Electrical System
    - i) Umbilical
    - ii) Junction
    - iii) Export Cable
  - b) Independent Instrumentation
  - c) Plant Control System
  - d) Grid Connection
- Power Take Off (PTO)
  - a) Pump
  - b) Pod
  - c) Interconnection (Hoses)
- BA System
  - a) BA
- Mooring System
  - a) Tether
  - b) Foundation Connector
  - c) Foundation

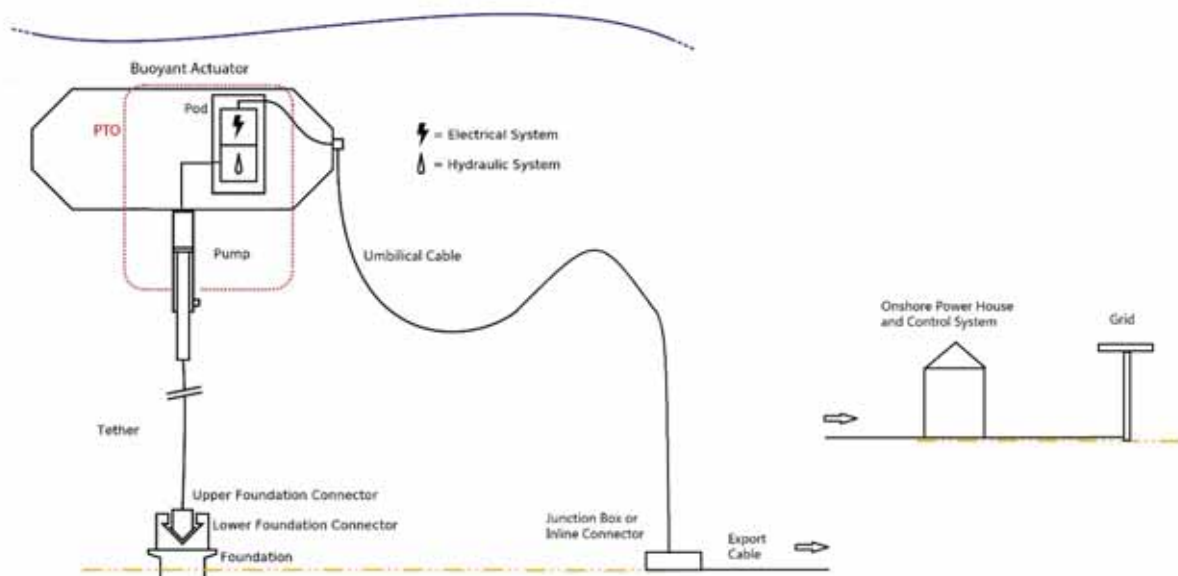
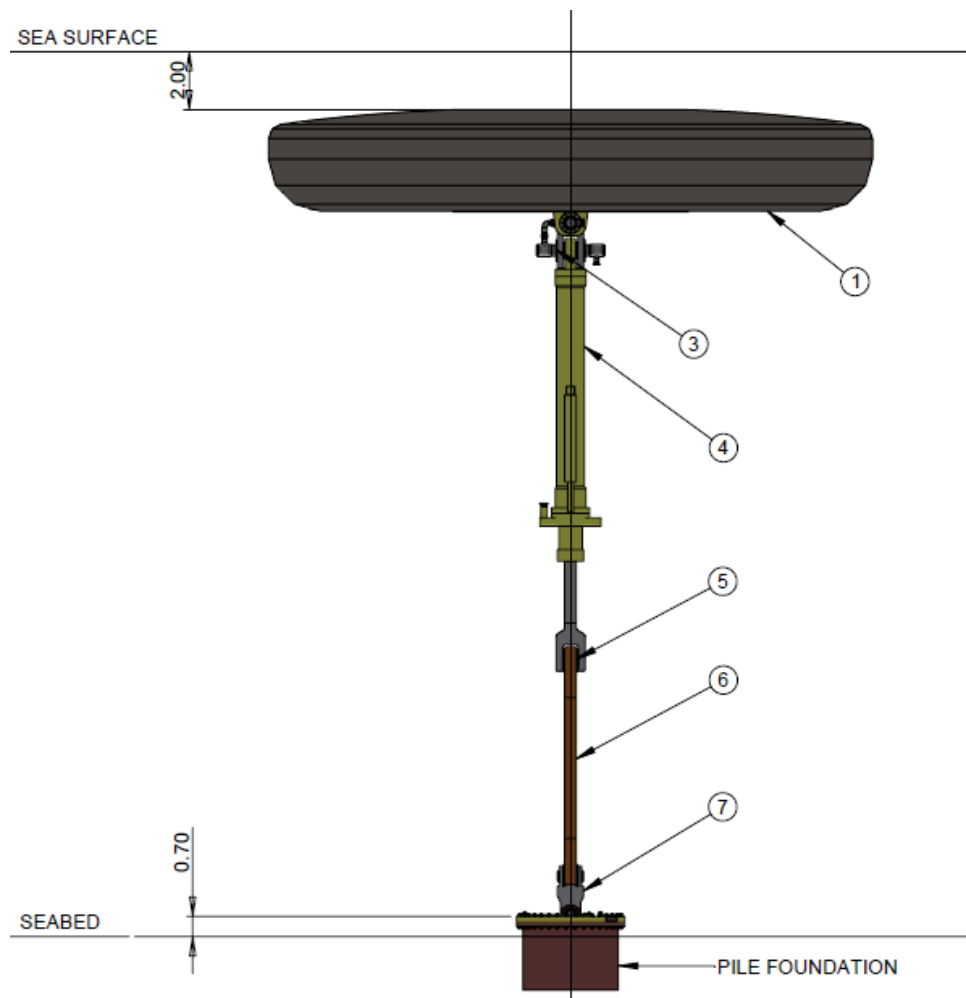


Figure 6 - CETO 6 System Architecture

A breakdown of the BA assembly through to the foundation is shown below in Table 2 and Figure 7.

**Table 2 - CETO 6 BA and Foundations**

Item No	Part
1	BA Assembly
2	PTO Housing
3	Gimbal
4	Pump
5	Pump Tether Connector
6	Rope
7	UFC Tether Connector
8	Upper Foundation Connector
9	Lower Foundation Connector



**Figure 7 - CETO 6 BA and Foundations**

## 4.1. Electrical Control System

### 4.1.1. Plant Control System

The Plant Control System (PCS) is the onshore controller that manages the overall system and has the following major elements:

- The Human Machine Interface (HMI) used by the operators to monitor the plant and make changes to the configuration
- The controller which translates HMI inputs into actions and also makes control decisions based on the inputs from system sensors, either directly or from the Unit Control Systems (UCSs). The majority of the commands will be sent to the UCS on each Unit which will then translate these into Unit specific actions
- The database which stores all plant data.

### 4.1.2. 5.1.2 Subsea Electrical System

The Subsea Electrical System consists of the following elements.

- Export Cable – the cable that joins the onshore power conditioning to the Junction. The export cable is expected to have the following characteristics:
  1. 11 kV, 3 phase power + 12 Optical Fibres for communications
  2. Outer Sheath: High Density Polyethylene (HDPE)
  3. Overall diameter of ~80 mm
- Junction – the point at which Export cable breaks out into separate connections to the Unit Umbilicals. This is probably a box that houses connectors and breakers
- Umbilical – the dynamic cable that connects the Junction to the Unit which includes the connectors and other elements that facilitate the connection and disconnection to the BA. The umbilical cable is expected to have the following characteristics:
  4. 11 kV, 3 phase power + 12 Optical Fibres for communications
  5. Outer Sheath: High Density Polyethylene (HDPE)
  6. Overall diameter of ~ 80 mm

The umbilical cable will be connected to the BA and to a subsea junction box. The subsea junction box will be built on a skid with lifting points to allow for deployment and retrieval. The subsea skid will have approximate maximum dimensions of 2 m x 2 m x 1 m.

This dynamic cable will have a catenary arrangement suspended in the water by floatation modules. The modules will be approximately 1 m long and 1 m in diameter. The catenary arrangement may be moored to the sea floor via a single anchor point if required. This mooring line (should it be required) for the catenary arrangement will always be taught due to the floatation modules on the cable.

Outline cable installation is expected to be conducted as follows:

- Pull export cable through shore-crossing conduit and allow enough cable to be installed through to HV substation.

- Barge (being propelled by tugs) equipped with the necessary laying gear, such as turntables or drums, anchoring systems, cranes, chutes and winches will be used to lay the cable from shore out to Yirra site. The cable will not be trenched and will lay on the seabed. Any movement will be restricted via clump weights and grout bags. The cable will have external protection attached should it be laid adjacent to exposed rock or reef.
- Onshore cable will be installed as per AS3000, AS2067 and any Defence requirements. The cable will require a trench and to be buried to a minimum depth of 750 mm. If buried to a depth of less than 900 mm it will be within a conduit. The cable will follow the same route as PWEF pipelines & cable to the CWE onshore facility.

#### **4.1.3. Grid Connection**

The Grid Connection includes the following items:

- Onshore Power Conditioning: could include a transformer and filtering
- Grid Protection System: would include metering, monitoring equipment and breakers for the connection between Carnegie and DoD and the existing connection between DoD and the utility if required
- Grid Connection Cabling: includes cables (probably buried) from the equipment building to the point of interconnection (POI)
- POI Equipment: could include breakers and telemetry (if required) for compliance

An HV substation will be located at the current PWEF site. This substation will include transformers, HV switch gear, power smoothing gear and SCADA. Where possible existing infrastructure will be reused to house this equipment. If the equipment cannot be housed inside existing infrastructure, a building with maximum dimension of 4 m x 5 m x 2 m may be constructed.

#### **4.2. Power Take Off (PTO)**

The PTO consists of the following items:

- Pump: the main hydraulic cylinder that pumps fluid to and from the Pod.
- Pod: the system that converts the hydraulic energy from the Pump into electricity. It includes the large vessel that contains all the equipment, the hydraulic system, the electrical system and the Unit Control System (UCS)
- Hoses/Fluid Connection: a means to communicate fluid between the Pump and the Pod is required. There are a number of means by which this could happen
- The PTO Layout is shown in Figure 8.

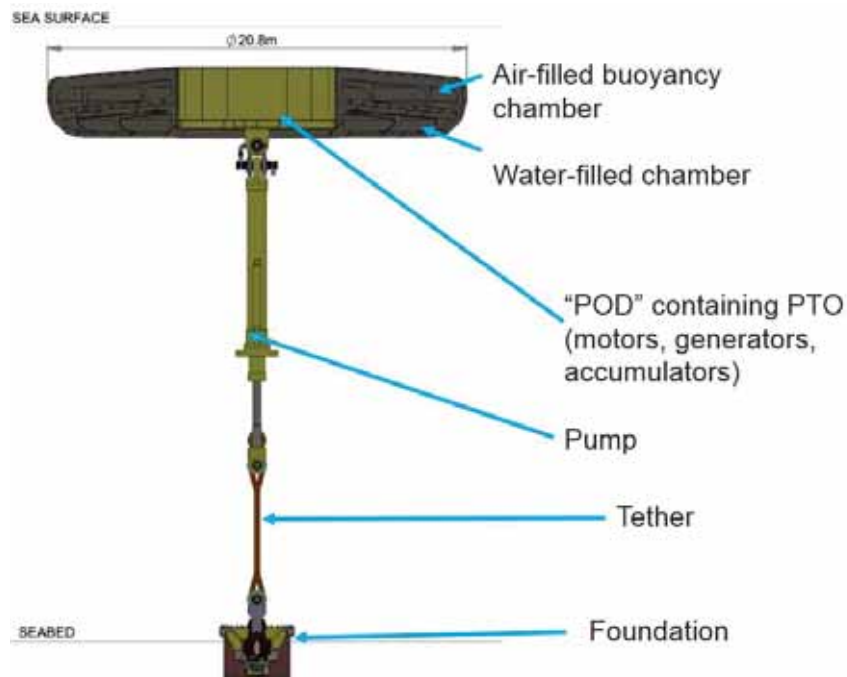


Figure 8 - PTO Layout

The PTO is expected to have a stored hydraulic fluid volume of 4000 to 5000 litres, maximum 6000 litres. The expected fluid will be a mineral-based fluid, such as Shell Tellus. This is based on component supplier recommendations. This fluid will be contained a sealed closed circuit hydraulic circuit.

Through careful design and selection of bearing materials CWE plans to reduce any leakage rates through external seals to negligible levels. However, it is acknowledged that during normal operation planned leakage per Unit may reach 10 litres per month as an estimate. This is considerably less than marine vessel stern tube lubricant loss.

As there is no connection and flushing offshore there will be no potential for release during installation.

The Pod has a waterproof enclosure so any external leaks coming from equipment inside the Pod will be contained within the Pod. If there were a catastrophic failure of the Pump, it is likely that all fluid in the cylinder volume will be lost (The Pump will extend fully) and the fluid in accumulators, as the system becomes depressurised. The rest of the fluid will probably remain in the hydraulic system. This loss would be reduced as far as possible through valve logic within the Pod.

The fluid connection between Pod and BA may be accomplished via a hoses or fixed pipe and a rotary hydraulic connection at the joint between the BA and pump. If hoses are used they will be approximately 14 m long as shown in Figure 9. The hose gap will vary from between 2 m and 6 m as the BA and pump cycles through its range of motion when operating. The pump is basically a hydraulic cylinder. It will have a diameter of approximately 1 m.



Figure 9 - Interconnection

### 4.3. Buoyant Actuator (BA) System

The BA System consists of the following:

- Buoyant Actuator (BA): the BA is the buoy-like structure that provides the Unit buoyancy and houses the PTO. It also includes the receptacle for the Umbilical, mounting points for the Positioning System and a variety of other installation aids such as bollards and lifting points.

The BA will house the Pod, which consists of the components that convert the hydraulic energy into electrical energy. The Pod will be a self-contained system that houses the hydraulic and electrical systems already described.

The BA will have a diameter of approximately 20 m and depth of 3.5 m. It will sit submerged as shown below in Figure 10.



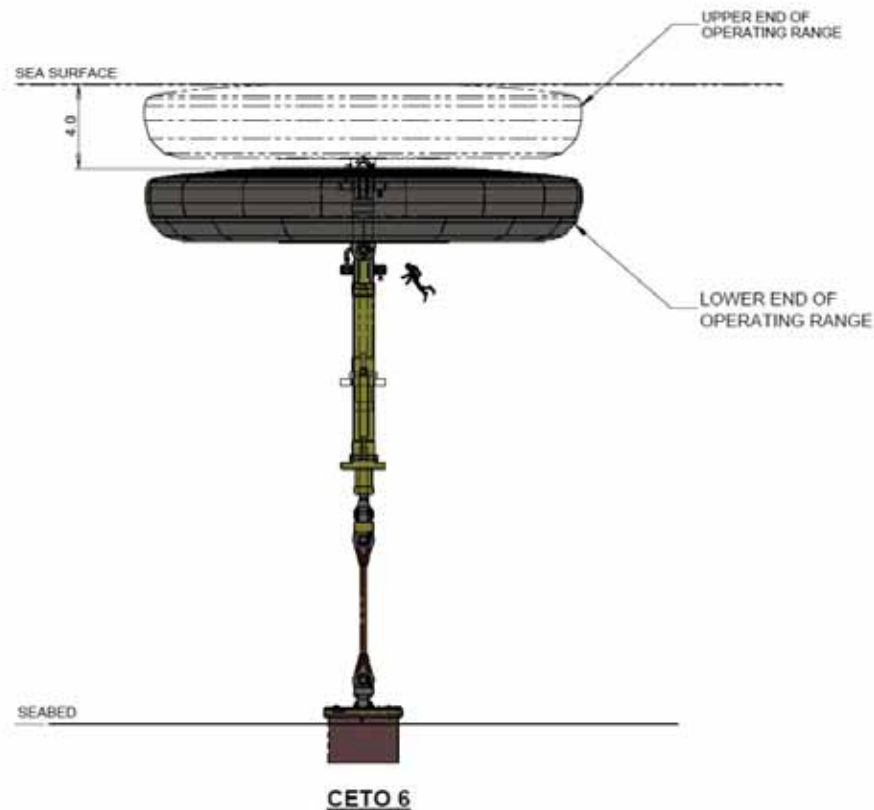


Figure 10 - BA system

#### 4.4. Mooring System

The Mooring System consists of the following:

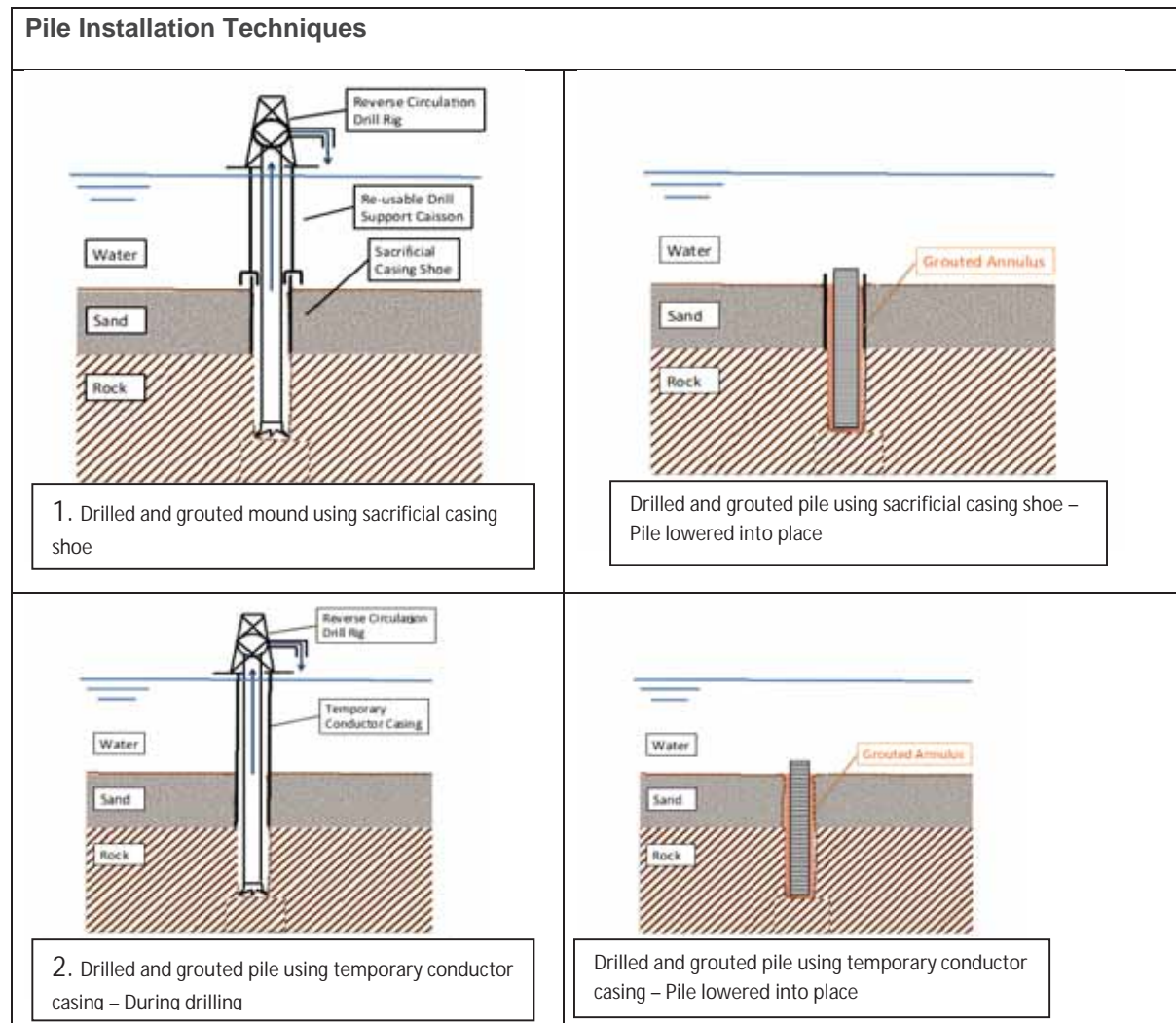
- Tether: this connects the Pump to the Foundation Connector and consists of a synthetic rope with terminations at either end.
- Foundation Connector: this consists of the upper and lower parts that automatically mate to form the connection between the Unit and the Foundation
- Foundation: this provides the restraint at seabed level of the Unit and could be in the form of a pile or a gravity base
- Secondary Connection: a short rope or chain between the UFC and LFC which functions as a secondary tether should the Ceto Unit be released from the foundation.

The Foundation Connector consists of an upper and lower connector as shown in Figure 7. The foundation will have a release mechanism that is triggered under load to release the BA Unit from the foundation. The BA, Pump and Tether will remain connected to the foundation via the secondary connection which will have a length of approximately 1 m. The release mechanism may take the form of a pyrotechnic device, similar to those used in the oil and gas industry for cutting of slicklines during downhole operations.

A gravity base, also considered for this project, will have maximum dimensions of 70 x 25 x 4 m. The concept under consideration for the gravity base would be a barge based or specially constructed buoyant structure. The structure would have sufficient mass built in to support the BA Unit when submerged on site. This structure would be towed to site and de-ballasted

so it sinks to the seabed. Recovery would be the reverse operation, where air would be used to displace the water from the ballast chambers and allow the Unit to refloat itself. The maximum weight of this system would be approximately 3,500 t per Unit. The gravity base would be constructed from steel and reinforced concrete.

The pile will be of steel construction and have maximum dimensions of diameter 2.5 m, with penetration of approximately 25 m into the seabed. The pile will protrude from the seabed approximately 700 mm. Each CETO Unit will be secured to this pile, which will be drilled into the seabed. Upon reaching the target depth, each pile will be cemented in place. During the drilling process, drill cuttings be generated. Approximately 125 m<sup>3</sup> of cuttings are expected to be generated during drilling of each pile. Potential installation techniques are shown in Figure 11 below.



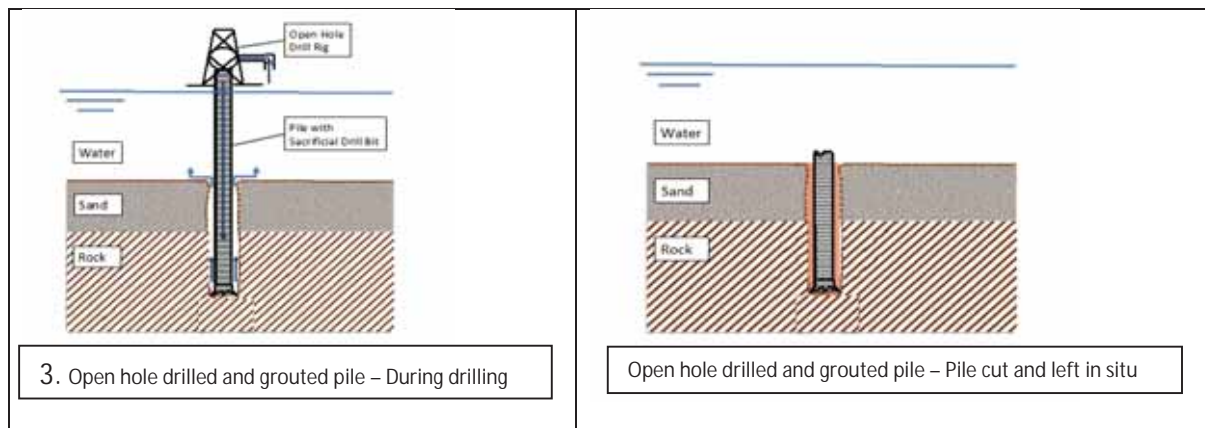


Figure 11 - Pile Installation Techniques

### 5. CONCLUSIONS

Not applicable.

### 6. RECOMMENDATIONS

Not applicable.

### 7. REFERENCES

Not applicable.

## **Appendix B**

### **Protected Matters Search Tool Results**





# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

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## [Summary](#)

### [Details](#)

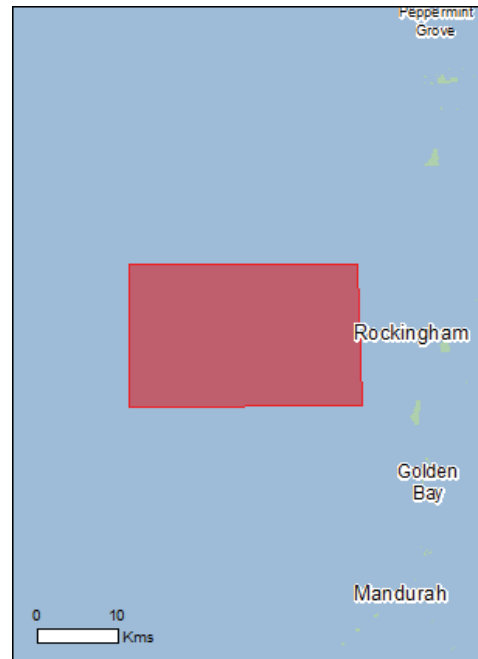
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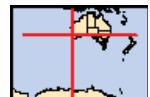
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# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	1
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	1
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	31
<a href="#">Listed Migratory Species:</a>	40

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	1
<a href="#">Commonwealth Heritage Places:</a>	1
<a href="#">Listed Marine Species:</a>	66
<a href="#">Whales and Other Cetaceans:</a>	13
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Commonwealth Reserves Marine:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	6
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	2



# Details

## Matters of National Environmental Significance

### Wetlands of International Importance (Ramsar) [\[ Resource Information \]](#)

Name	Proximity
<a href="#">Becher point wetlands</a>	Within 10km of Ramsar

### Commonwealth Marine Area [\[ Resource Information \]](#)

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

### Marine Regions [\[ Resource Information \]](#)

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
<a href="#">South-west</a>

### Listed Threatened Species [\[ Resource Information \]](#)

Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Anous tenuirostris melanops</a> Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
<a href="#">Diomedea epomophora epomophora</a> Southern Royal Albatross [25996]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea epomophora sanfordi</a> Northern Royal Albatross [82331]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans amsterdamensis</a> Amsterdam Albatross [82330]	Endangered	Species or species habitat may occur within area
<a href="#">Diomedea exulans exulans</a> Tristan Albatross [82337]	Endangered	Species or species habitat may occur within area
<a href="#">Diomedea exulans (sensu lato)</a> Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Halobaena caerulea</a> Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
<a href="#">Macronectes giganteus</a> Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pachyptila turtur subantarctica</a> Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Phoebastria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pterodroma mollis</a> Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Sternula nereis nereis</a> Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
<a href="#">Thalassarche cauta cauta</a> Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche cauta steadi</a> White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris impavida</a> Campbell Albatross [82449]	Vulnerable	Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Migration route known to occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Breeding known to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
<a href="#">Neophoca cinerea</a> Australian Sea-lion [22]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Setonix brachyurus</a> Quokka [229]	Vulnerable	Species or species habitat may occur within area
<b>Plants</b>		
<a href="#">Caladenia huegelii</a> King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area
<b>Reptiles</b>		
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Status	Type of Presence
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Sharks</b>		
<a href="#">Carcharias taurus (west coast population)</a> Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Carcharodon carcharias</a> Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [ [Resource Information](#) ]

\* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Diomedea amsterdamensis</a> Amsterdam Albatross [64405]	Endangered*	Species or species habitat may occur within area
<a href="#">Diomedea dabbenena</a> Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
<a href="#">Diomedea epomophora (sensu stricto)</a> Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans (sensu lato)</a> Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<a href="#">Phoebastria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
<a href="#">Puffinus carneipes</a> Flesh-footed Shearwater, Fleishy-footed Shearwater [1043]		Species or species habitat likely to occur within area
<a href="#">Sterna anaethetus</a> Bridled Tern [814]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Sterna caspia</a> Caspian Tern [59467]		Foraging, feeding or related behaviour known

Name	Threatened	Type of Presence
<a href="#">Sterna dougallii</a> Roseate Tern [817]		to occur within area  Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
<a href="#">Thalassarche cauta (sensu stricto)</a> Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<b>Migratory Marine Species</b>		
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Migration route known to occur within area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Species or species habitat may occur within area
<a href="#">Carcharodon carcharias</a> Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Breeding known to occur within area
<a href="#">Isurus oxyrinchus</a> Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area
<a href="#">Lamna nasus</a> Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
<a href="#">Manta alfredi</a> Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
<a href="#">Manta birostris</a> Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

#### Migratory Terrestrial Species

<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
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#### Migratory Wetlands Species

<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<a href="#">Calidris alba</a> Sanderling [875]		Species or species habitat likely to occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Breeding known to occur within area

### Other Matters Protected by the EPBC Act

#### Commonwealth Land [\[ Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN ISLAND

#### Commonwealth Heritage Places [\[ Resource Information \]](#)

Name	State	Status
<b>Natural</b>		
<a href="#">Garden Island</a>	WA	Listed place

#### Listed Marine Species [\[ Resource Information \]](#)

\* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
<b>Birds</b>		
<a href="#">Anous tenuirostris melanops</a> Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species

Name	Threatened	Type of Presence
<a href="#">Calidris alba</a> Sanderling [875]		habitat likely to occur within area  Species or species habitat likely to occur within area
<a href="#">Catharacta skua</a> Great Skua [59472]		Species or species habitat may occur within area
<a href="#">Diomedea amsterdamensis</a> Amsterdam Albatross [64405]	Endangered*	Species or species habitat may occur within area
<a href="#">Diomedea dabbenena</a> Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
<a href="#">Diomedea epomophora (sensu stricto)</a> Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans (sensu lato)</a> Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Halobaena caerulea</a> Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
<a href="#">Larus novaehollandiae</a> Silver Gull [810]		Breeding known to occur within area
<a href="#">Larus pacificus</a> Pacific Gull [811]		Foraging, feeding or related behaviour may occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Pachyptila turtur</a> Fairy Prion [1066]		Species or species habitat likely to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Breeding known to occur within area
<a href="#">Phoebastria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Pterodroma macroptera</a> Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area
<a href="#">Pterodroma mollis</a> Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Puffinus assimilis</a> Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
<a href="#">Puffinus carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
<a href="#">Sterna anaethetus</a> Bridled Tern [814]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Sterna caspia</a> Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
<a href="#">Sterna dougallii</a> Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Sterna fuscata</a> Sooty Tern [794]		Breeding known to occur within area
<a href="#">Sterna nereis</a> Fairy Tern [796]		Breeding known to occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
<a href="#">Thalassarche cauta (sensu stricto)</a> Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<b>Fish</b>		
<a href="#">Acentronura australe</a> Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
<a href="#">Campichthys galei</a> Gale's Pipefish [66191]		Species or species habitat may occur within area
<a href="#">Heraldia nocturna</a> Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
<a href="#">Hippocampus angustus</a> Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
<a href="#">Hippocampus breviceps</a> Short-head Seahorse, Short-snouted Seahorse		Species or species



Name	Threatened	Type of Presence
[66235]		habitat may occur within area
<a href="#">Hippocampus subelongatus</a> West Australian Seahorse [66722]		Species or species habitat may occur within area
<a href="#">Histiogamphelus cristatus</a> Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
<a href="#">Lissocampus caudalis</a> Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
<a href="#">Lissocampus fatiloquus</a> Prophet's Pipefish [66250]		Species or species habitat may occur within area
<a href="#">Lissocampus runa</a> Javelin Pipefish [66251]		Species or species habitat may occur within area
<a href="#">Maroubra perserrata</a> Sawtooth Pipefish [66252]		Species or species habitat may occur within area
<a href="#">Mitotichthys meraculus</a> Western Crested Pipefish [66259]		Species or species habitat may occur within area
<a href="#">Nannocampus subosseus</a> Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
<a href="#">Phycodurus eques</a> Leafy Seadragon [66267]		Species or species habitat may occur within area
<a href="#">Phyllopteryx taeniolatus</a> Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
<a href="#">Pugnaso curtirostris</a> Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
<a href="#">Solegnathus lettiensis</a> Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
<a href="#">Stigmatopora argus</a> Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area
<a href="#">Stigmatopora nigra</a> Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
<a href="#">Stigmatopora olivacea</a> a pipefish [74966]		Species or species habitat may occur within area
<a href="#">Urocampus carinirostris</a> Hairy Pipefish [66282]		Species or species habitat may occur within area
<a href="#">Vanacampus margaritifer</a> Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
<a href="#">Vanacampus phillipi</a> Port Phillip Pipefish [66284]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
<a href="#">Vanacampus poecilolaemus</a> Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Arctocephalus forsteri</a> Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
<a href="#">Neophoca cinerea</a> Australian Sea-lion [22]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<b>Reptiles</b>		
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Whales and other Cetaceans</b>		<a href="#">[ Resource Information ]</a>
Name	Status	Type of Presence
<b>Mammals</b>		
<a href="#">Balaenoptera acutorostrata</a> Minke Whale [33]		Species or species habitat may occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Migration route known to occur within area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Species or species habitat may occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Breeding known to occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Congregation or aggregation known to

Name	Status	Type of Presence
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		occur within area  Species or species habitat may occur within area
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area

## Extra Information

### Invasive Species [ Resource Information ]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
<b>Birds</b>		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
<b>Mammals</b>		
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<b>Plants</b>		
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
<a href="#">Commonwealth marine environment within and</a>	South-west
<a href="#">Western rock lobster</a>	South-west

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Coordinates

-32.22554 115.677531,-32.356142 115.682337,-32.357882 115.425532,-32.22554 115.425532,-32.22554 115.677531

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Parks and Wildlife Commission NT, Northern Territory Government](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.





## **Appendix C**

### **Aboriginal Heritage Enquiry System Search Results**



## Search Criteria

0 Registered Aboriginal Sites in Custom search area: 358260.25mE, 6429184.36mN z50 (MGA94) : 375990.66mE, 6435274.43mN z50 (MGA94)

## Disclaimer

The *Aboriginal Heritage Act 1972* preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Aboriginal Affairs by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at [heritageenquiries@daa.wa.gov.au](mailto:heritageenquiries@daa.wa.gov.au) and we will make every effort to rectify it as soon as possible.

## South West Settlement ILUA Disclaimer

Your heritage enquiry is on land within the following Indigenous Land Use Agreement(s): Gnaala Karla Booja People ILUA

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boorjah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Mines and Petroleum (DMP) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DMP, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at <https://www.dpc.wa.gov.au/lantu/Claims/Pages/SouthWestSettlement.aspx>.

Further advice can also be sought from the Department of Aboriginal Affairs (DAA) at [heritageenquiries@daa.wa.gov.au](mailto:heritageenquiries@daa.wa.gov.au).



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## Coordinate Accuracy

Accuracy is shown as a code in brackets following the coordinates. Map coordinates (Latitude/Longitude and Easting/Northing) are based on the GDA 94 Datum. The Easting/Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '500000mE:Z50' means Easting=500000, Zone=50.

## Terminology (NB that some terminology has varied over the life of the legislation)

**Place ID/Site ID:** This a unique ID assigned by the Department of Aboriginal Affairs to the place

### Status:

- o **Registered Site:** The place has been assessed as meeting Section 5 of the *Aboriginal Heritage Act 1972*
- o **Other Heritage Place which includes:**
  - **Stored Data / Not a Site:** The place has been assessed as not meeting Section 5 of the *Aboriginal Heritage Act 1972*
  - **Lodged:** Information has been received in relation to the place, but an assessment has not been completed at this stage to determine if it meets Section 5 of the *Aboriginal Heritage Act 1972*

### Access and Restrictions:

- o **File Restricted = No:** Availability of information (other than boundary) that the Department of Aboriginal Affairs holds in relation to the place is not restricted in any way.
- o **File Restricted = Yes:** Some of the information that the Department of Aboriginal Affairs holds in relation to the place is restricted if it is considered culturally sensitive. This information will only be made available if the Department of Aboriginal Affairs receives written approval from the informants who provided the information. Download the [Request to Access Restricted Information](#) letter and form.
- o **Boundary Restricted = No:** place location is shown as accurately as the information lodged with the Registrar allows.
- o **Boundary Restricted = Yes:** To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km<sup>2</sup>) provides a general indication of where the place is located. If you are a landowner and wish to find out more about the exact location of the place, please contact DAA.
- o **Restrictions:**
  - **No Restrictions:** Anyone can view the information.
  - **Male Access Only:** Only males can view restricted information.
  - **Female Access Only:** Only females can view restricted information

**Legacy ID:** This is the former unique number that the former Department of Aboriginal Sites assigned to the place. This has been replaced by the Place ID / Site ID.



### List of Registered Aboriginal Sites with Map

No Results








# Aboriginal Heritage Inquiry System

Aboriginal Sites Database



## Legend

### Selected Heritage Sites

-  Registered Sites
-  Aboriginal Community Occupied
-  Aboriginal Community Unoccupied
-  Town
-  Search Area

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For further important information on using this information please see the Department of Aboriginal Affairs' Terms of Use statement at <http://www.daa.wa.gov.au/Terms-Of-Use/>

## **Appendix D**

### **Environmental Risk Assessment**





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# WORKSHEET

## CETO 6 GI Initial Scoping Environmental Risk Assessment

**Parent Project:** N/A  
**Project No:** CP115  
**Document No:** CP115-0007

### Document Revision History

Revision	Reason for issue	Prepared by	Reviewed by	Approved by	Issue Date
A	Document creation	J Kolbusz	EHR Davies Ward	D Kessel	22/12/2015 14:30
		Signature:	Signature:	Signature:	
		Date:	Date:	Date:	

Risk Assessment Matrix

Likelihood	Consequence				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Almost Certain 5	Medium 5	Medium 10	High 15	Unacceptable 20	Unacceptable 25
Likely 4	Low 4	Medium 8	High 12	High 16	Unacceptable 20
Possible 3	Low 3	Medium 6	Medium 9	High 12	High 15
Unlikely 2	Low 2	Low 4	Low 2	Medium 8	Medium 10
Rare 1	Low 1	Low 2	Low 3	Low 4	Medium 5
Risk Severity	Low 1 to 4	Medium 5 to 10	High 12 to 16	Unacceptable 20 to 25	

Likelihood Descriptions (modified from AS/NZS ISO 31000:2009)

Value	Descriptor	Description	Indicative Frequency (Expectation to occur)
5	Almost Certain	Is expected to occur in most circumstances during the life cycle of the proposed Project	e.g., daily to monthly
4	Likely	Will probably occur in most normal circumstances during the life cycle of the proposed Project	e.g., quarterly to annually
3	Possible	Could occur at some time during the life cycle of the proposed Project	e.g., few times per decade
2	Unlikely	Not expected to occur during the life cycle of the proposed Project	e.g., once per decade
1	Rare	Occur only under exceptional circumstances during the life cycle of the proposed Project	e.g., once per century

Consequence Descriptions (modified from AS/NZS ISO 31000:2009)

Value	Description AS/NZS ISO 31000:2009 (modified)	Generic Descriptors - Public Health (Impact on natural environment &/or public health)	Generic Descriptors - Environment & Public Health (Impact on natural environment &/or public health)	Generic Descriptors - Natural Environment (Impact on ecosystem &/or specific species or communities, recovery, remediation)	Specific Descriptors - Marine Fauna (Individuals)	Specific Descriptors - Marine Fauna (Populations)	Specific Descriptors - BPPH (Impact on Benthic Primary Producer Habitat)	Specific Descriptors - IMPs (Impact on Introduced Marine Pests)
5	Catastrophic	Significant irreversible damage to the environment and/or public health, e.g. loss of an ecosystem, extinction of a species, multiple loss of human life or irreversible disability	Significant irreversible damage to the environment and/or public health, e.g. loss of an ecosystem, extinction of a species, multiple loss of human life or irreversible disability to one or two individuals	Massive impacts with significant remediation required Irreversible alteration to ecosystem functioning Long term environmental recovery that may take decades or longer	Behaviour, physiology, and well-being severely (or mortally) affected with individual reproductive success greatly reduced or ceased	Effects initiate substantial population decline; possible mass mortality	BBPH loss exceeds EPA (2004) Guideline Cumulative Loss Threshold (CLT - for relevant category of ecosystem protection and management unit). Large-scale remediation of BPPH and/or offsets required.	Many IMPs present on vessels within port, with realised release within port limits and/or detection/establishment within port waters/substrates
4	Major	Moderate irreversible damage to the environment and/or public health, e.g. irreversible damage to part of an ecosystem, loss of single human life or permanent disability to one or two individuals	Moderate irreversible damage to the environment and/or public health, e.g. irreversible damage to part of an ecosystem, loss of single human life or permanent disability to one or two individuals	Major impacts with considerable remediation required Major alteration to ecosystem Recovery period measured in years to decades	Behaviour, physiology, and well-being substantially affected with reduction in individual reproductive success	Effects are biologically significant with key demographic parameters adversely affected; population in slow/moderate decline	BBPH loss exceeds CLT. Moderate remediation of BPPH and/or offsets required.	Few to many IMPs present on vessels within port, with potential or realised release within port limits and/or detection within port waters/substrates
3	Moderate	Significant but reversible (through management) damage to the environment and/or public health, e.g. short-term dip in the fauna population, recovery of an actual injury following suitable medical treatment	Significant but reversible (through management) damage to the environment and/or public health, e.g. short-term dip in the fauna population, recovery of an actual injury following suitable medical treatment	Moderate impacts with some management required Moderate alteration to ecosystems Recovery period measured in months to years	Behaviour, physiology, and well-being affected to a degree that individual reproductive success is reduced	Effects detectable for demographic factors at population-level but not biologically sufficient to unless effect is sustained	BBPH loss approaches (but does not exceed) CLT. Some management required.	Few IMPs present on vessels within port, with potential release within port limits
2	Minor	No lasting effect on the environment and/or public health, e.g. pollution spill cleaned up immediately	No lasting effect on the environment and/or public health, e.g. pollution spill cleaned up immediately	Minor impacts with minimal management required Minor alteration to ecosystems, not affecting function Recovery period measured in weeks to months	Behaviour, physiology, and well-being affected to a degree that minimally influences individual reproductive success	Effects potentially observable at population-level but insufficient to be biologically significant	Some BBPH loss, but not approaching CLT. Some management required.	IMP/s present on vessels within port limits, but exterminated and not released
1	Insignificant	No effect to the environment and/or public health, e.g. an incident may occur but is not measurable and has no effect	No effect to the environment and/or public health, e.g. an incident may occur but is not measurable and has no effect	Negligible impact with no management required No alteration to ecosystems	Behaviour, physiology, and well-being barely or weakly affected	Effects not observable at population-level, no effect of biological significance	No loss of BPPH. Minor and temporary impact on primary producer health.	IMP/s present on vessels out of port limits, but do not enter port due to management measures

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No	Environmental Aspect	Environmental Factor	Sources/Cause of Risk	Potential Impact	Likelihood	Consequence	Risk Rating	Key Risk Management or Mitigation Actions	Likelihood	Consequence	Residual Risk
<b>Construction</b>											
1	Marine construction	Coastal sediment transport	Cable installation and shore-crossing trenching	Interruption to coastal sediment transport resulting in destabilisation of the coastline and significant negative impacts on BPPH.	3	2	6	Use of existing RPEP pipeline routes and avoid where possible. Marine disturbance will be reduced through design. The disturbance to dune vegetation during onshore trenching and cable burial will be kept to a minimum to prevent dune destabilisation and the creation of blowouts. Dune revegetation in disturbed areas will be undertaken following cable installation. Investigate coastal processes to determine coastal geomorphological features; and seasonal variability in beach profile elevations and shoreline position. Monitor the beach and shore crossing after installation.	2	2	4
2	Marine construction	Benthic Primary Producer Habitat (BPPH)	Installation of subsea cables and CETO mooring unit cuttings release from pile installation.	Significant direct loss and/or disturbance to BPPH. Cumulative Loss Guidelines, from CETO infrastructure installation (e.g., CETO unit foundations, drill cuttings, cable and cable stabilisation, and by vessel mooring/anchoring processes during surveys and construction).	2	4	8	Benthic habitat survey undertaken offshore within marine area to inform EIA and project design. Minimise disturbance to BPPH by ensuring cables are installed and proximal to BPPH. Minimise disturbance within existing disturbed corridors where possible. Ensure CETO 6 meeting the EPAs objectives as described in EPA (2009). Minimise disturbance from anchoring through adherence to vessel anchoring procedures outlined within a Construction Management Plan to be prepared by Carnegie. Logging of environmental incidents involving loss of BPPH, including spatial estimate of loss.	1	3	3
3	Marine construction	Marine Fauna (excluding BPPH)	Construction activities and vessels, artificial lighting, drill cuttings. Mooring/anchoring lines, entrapment within structures	Significant impacts on marine fauna under matters of NES under EPBC Act 1999 resulting in behavioural disturbance, injury or death.	3	3	9	Project survey works have been referred to DOC and further required actions under EPBC Act 1999 will be applied for in the same manner. NES species usage of the area, e.g. seabirds and/or cetaceans migratory paths and periods, leading areas, etc. avoid species high migration periods where possible. If pile-driving construction methods are used, a 500 m exclusion zone will be maintained through dedicated on-deck surveillance boat search for susceptible marine fauna prior to commencement and during pile driving each pile foundation. If required, night-time construction activities will only be undertaken if protected marine fauna have not been observed in the 500 m exclusion zone in the previous day. Use of a suitably qualified marine fauna observer (MFO) to undertake mammal observations if pile driving is the chosen method for foundation installation. Night-time management to reduce potential interactions, e.g., minimise loose anchoring/mooring lines, lights, etc. Minimal lighting only will be used overnight for security and maritime safety purposes. Vessel movements during the construction works, particularly during the offshore construction components, will be limited to speeds appropriate for the nature of work being undertaken. There will be no interaction with marine fauna and/or fishing by Carnegie contractors. Onshore and coastal construction activities (i.e. pulling the cable through the shore crossing conduit) will be managed to minimise risk to local fauna (penguins, pinnipeds etc.)	2	2	4
4	Marine construction	Marine Fauna (excluding BPPH)	Construction activities and vessels, artificial lighting, drill cuttings. Mooring/anchoring lines, entrapment within structures	Significant disruption to the migration phase of the western rock lobster, whites. Significant impacts to local fish and shellfish of commercial and recreational importance. Significant impacts to local reef.	2	2	4	Short temporary construction activities. Desktop investigation of local, marine fish and shellfish species usage of the area, e.g., migratory paths and periods to avoid if possible, including other local FADs. EMP to include management to reduce potential interactions, e.g., minimise loose anchoring/mooring lines, avoid species high migratory periods where possible, lighting kept to a minimum, as required for construction operators and maritime safety.	2	1	2
5	Marine construction	Marine Fauna (excluding BPPH)	Underwater noise from geophysical & geotechnical surveys, construction activities and vessels	Significant impacts on marine fauna under matters of NES under EPBC Act 1999 resulting in behavioural disturbance, injury or death.	3	3	9	If pile driving, during site surveys and construction activities apply EPBC Act 1999 Policy Statement 2.1 - Interaction between offshore seismic exploration and whales: Industry guidelines. If pile-driving construction methods are used, a 500 m exclusion zone will be maintained through dedicated on-deck surveillance boat search for susceptible marine fauna prior to commencement and during pile driving each pile foundation. If required, night-time construction activities will only be undertaken if protected marine fauna have not been observed in the 500 m exclusion zone in the previous day. Use of a suitably qualified marine fauna observer (MFO) to undertake fauna observations should pile driving be the chosen method for foundation installation. System in place to record boat/deck searches and presence and location of protected marine fauna. If foundation installations via pile driving, start up procedures shall commence with soft 'fairy taps' to warn proximal marine fauna. Plan construction activities to avoid high fauna migration periods where possible, e.g., humpback whales & calves closer to WA coast in Oct-Dec. Estimated timing for foundation installation: <ul style="list-style-type: none"> <li>• pile driving, approx 24 h pile driving over 1-5 days/pile with max. 3 piles, dependent on weather</li> <li>• drill &amp; grout est. 5-10 days per pile, max. 3 piles dependent on weather windows</li> <li>• gravity base: 5-10 days low and install/unit all dependent on weather windows</li> </ul> CETO unit designed to minimise potential noise sources with core technology housed within the BA	2	2	4



No	Environmental Aspect	Environmental Factor	Sources/Cause of Risk	Potential Impact	Likelihood	Consequence	Risk Rating	Key Risk Management or Mitigation Actions	Likelihood	Consequence	Residual Risk
6	Marine construction	Marine sediments, water quality, BPPH & Marine Fauna	Drilling operations including grouting and drilling cuttings Cooling water discharge Vessel movement, waste disposal, spills of hazardous substances, including oil, during CETO unit low and/or installation Detachment of units from foundation connection	Significant contamination of marine sediments and/or water quality due to pollution by hazardous substances, leading to significant acute/chronic impacts on BPH and marine fauna (including cetaceans). Significantly impacts marine life	4	2	8	Project design to reduce potential for hydraulic fluid release, majority of fluid contained within in a closed circuit and external seals to reduce leakage to negligible levels Project design of CETO units are secured with a secondary leaker in the event of unit detachment as a result of catastrophic failure Hydraulic fluid selected to avoid potential significant impacts in life with industry standards and with as low as possible (LAD) criteria All hazardous materials to be handled, used and stored in accordance with the SDS and industry standards SDS sheets to be made available for all hazardous products required throughout the construction phase All vessel operators will ensure potentially hazardous materials and/or waste is secured appropriately on board in accordance with Dangerous Goods requirements, including storage in bonded drums for licensed on-shore disposal Supplier contracts shall require adherence to national/international legislative requirements for oil spill prevention All spills will be immediately contained, cleaned up and disposed of appropriately Spills appropriate to the nature, type and amount of material(s) will be maintained on board each vessel, until they can be safely and responsibly disposed of Waste shall be disposed of and stored in secured, lidded bins for appropriate onshore disposal Mechanical/hydraulic equipment, fuel pumps, tanks and storage areas will be regularly inspected Lifting equipment shall be certified and crane operation shall be to WA Department of Commerce WorkSite requirements to ensure safe operation and no loss of equipment/materials Small project, temporary construction operations, with low volumes of drill cuttings Use of existing PWEP infrastructure where possible for cable installation including the shoreline crossing conduit to minimise disturbance Estimated timelines for foundation installation: • pile driving, approx. 24 hr pile driving over 1-5 days/pile, with max 3 piles, dependent on weather • drill & grout est. 5-10 days per pile, max 3 piles dependent on weather windows • all dependent on weather windows	2	2	4
7	Marine construction	Marine Ecosystem	Use of vessels (inc tender vessels to site) from domestic water/recessed movement/balast/balast/outrigger water discharge during site surveys and/or construction activities	Introduction of marine pest species and function; competition with indigenous species	2	4	8	Vetting of vessels and suppliers, use domestic vessels where possible Reference to Department of Agriculture tabulating guidelines for commercial vessels Reference to the WA Department of Fisheries state wide vessel-to-keel draft Arrange construction vessels for clearance of marine pests if supported risk as soon as possible	1	3	3
8	Marine construction	Aboriginal and European Heritage	Disturbance of heritage values, e.g., ship wrecks, from construction activities, including installation of foundations and cables	Significant destruction/disturbance to existing Aboriginal and European Heritage (archaeology and cultural heritage) 15 assigned historic wrecks in the area of the road, Garden Island offshore area	3	3	9	Carnegie access to DoD reports on known history and heritage sites for Garden Island No known aboriginal heritage sites in search area as reported in Aboriginal Heritage Inquiry Search Geophysical survey undertaken to identify shipwreck relics & report any finds to the regulator The locations of all known shipwrecks within close proximity to the Project are will be clearly identified and mapped (including navigational maps) prior to the commencement of cable laying and installation Project designed to avoid identified heritage values Any previously unknown shipwrecks or historical relics encountered during the course of the Project will be immediately reported to DoE as required by, and in accordance with the Historic Shipwrecks Act 1976	2	2	4
9	Marine construction	Socio-economic	Disturbance to existing infrastructure from construction activities and vessels	Significant damage/disturbance to existing marine infrastructure including UWTR cable and PWEP cable routes	2	4	8	Consultation with Australian Department of Defence and Carnegie regarding existing infrastructure Verification of the UWTR, PWEP infrastructure has been verified through geophysical surveys Carnegie will ensure the precise locations of existing infrastructure are identified and marked up on all drawings and charts used for CETO 6 installation DoD has recently decommissioned UWTR Buffer of at least 50 m from all known location of existing infrastructure Project design to avoid installed infrastructure and minimise potential for disturbance	1	3	3
10	Marine construction	Socio-economic	Possible UXO in area	Significant damage/disturbance to existing marine infrastructure including UWTR cable and PWEP Significant environmental damage including direct toxic effects to marine biota, potential for noise from possible explosions Exposure to personnel injury	2	5	10	Verification of the UWTR, PWEP infrastructure and any UXO locations has been verified through geophysical surveys and there are no UXO present	1	4	4
11	Marine construction	Socio-economic	Disturbance to existing sea users from surveys and construction activities and implementation of exclusion zone around key infrastructure	Significant increase of vessel collision risks from the presence of construction vessels and installed infrastructure Significant impact to recreational activities due to restricted access to defined project closure areas Significant impact to fish/shellfish catch (commercial and recreational), and/or behaviour due to increased marine life around the CETO units (attract recreational fishers, divers, etc.) Significant impact on the use of petroleum exploration licences	2	4	8	Consultation with key stakeholders, including AMSA, AHO, AFMA, DoD, WADoF, commercial and recreational fishing peak bodies Project design to minimise disturbance of existing sea users All CETO units will be secured during mobilisation In the unlikely event that materials or components are lost during mobilisation, they will be retrieved in a timely and safe manner either by suitably qualified Carnegie personnel, or contractors under the direct supervision of Carnegie personnel Issuing of Temporary Notices to Mariners (WA DoT/AMSA) and chart notifications outlining Project infrastructure, as required for maritime safety Implement permanent exclusion areas/safety zones to reduce the potential for vessel collision for entire Project lifecycle Consider legal exclusion zone to legally prevent vessel access and reporting procedure to AMSA should vessels be impacted or boats shall be operated by qualified personnel Marine vessels and boats shall be operated by qualified personnel Adherence to International Association of Lighthouse Authorities (IALA) standards for lighting and marking of wave farms No known petroleum exploration licences in area	2	3	6
12	Marine construction	All	Other projects in the area	Cumulative impacts from other Projects in the Garden Island area combined with the potential impacts from the CEG Project, may result in a cumulative impact that does not meet the EPA's Objectives for each Environmental Factor	3	3	9	Desktop EA of cumulative impacts from other Projects in the area - particularly the Water Corporation of WA, Sea Design Ocean Outlet, and CETO5 Project UWTR recently decommissioned Marine impacts to be reduced to meet EPA's objectives	2	2	4
13	Terrestrial construction	Coastal geomorphology	Cable installation and trenching through the shoreline, onshore cable route through quarry, along roadside to grid	Significant impacts to stability of coastal processes, dune system and terrestrial geomorphology, leading to increased erosion and impacts to coastal geomorphology	3	3	9	Ongoing coastal processes study along cable route to determine coastal geomorphological features, seasonal variability in beach profile elevations and shoreline position Use of existing PWEP pipeline route and conduit, through the shore crossing, where possible Avoid listed geomorphological features where possible Include dune stability measures during construction activities	2	2	4

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No	Environmental Aspect	Environmental Factor	Sources/Cause of Risk	Potential Impact	Likelihood	Consequence	Risk Rating	Key Risk Management or Mitigation Actions	Likelihood	Consequence	Residual Risk
14	Terrestrial construction	Soil and Groundwater	Introduction of pollution/waste from construction works equipment, activities, installation and trenching through the shoreline, onshore cable route through quarry, along roadside to grid	Significant soil and groundwater contamination	3	3	9	Construction will be short term and with a small footprint Manage construction equipment and activities to avoid pollution impacts All hazardous materials to be handled, used and stored in accordance with the SDS and industry standards, for the safe storage and transfer of fuels, liquids and potentially hazardous substances Changes in Project design have no requirement for hydraulic fluid on Garden Island - all contained within buoy Waste management protocols (storage and removal) in line with DoD protocols for Garden Island, e.g., no loose waste left outside, enclosed large bins on site, with lids kept closed Induction of procedures for all contractors and staff	2	2	4
15	Terrestrial construction	Flora	Cable installation and trenching through the shoreline, onshore cable route, through quarry, along roadside to grid Construction equipment, works, access and laydown areas	Significant erosion and disturbance to native vegetation, including priority listed species and Threatened Ecological Communities (TECs) Significantly increased weed/plant pathogens from project construction equipment, activities and increased vehicular traffic	3	2	6	Follow existing disturbed corridors and reuse PWEP shoreline conduits and trenches, where possible and practicable Surface stabilisation, vegetation retention and revegetation in the impacted areas during PWEP construction and operation demonstrate high capacity to achieve DoD Licence requirements Design project construction activities to reduce trenching, flora clearing and/or disturbance to prevent dune blowouts Design cable route to avoid high value flora Use vehicles, machinery and clothing/bags free of weeds, plant matter, mud and soil prior to entering the site Conduct vegetation surveys/transects along potential new flora disturbance routes, to identify species presence and to inform flora rehabilitation Immediate use of erosion matting, seeding and appropriate vegetation restoration, as required No plants or plant material to be brought on to Garden Island including indoor ornamental plants and plant cuttings, plants for landscaping around facilities or for bushland restoration (all such plants must be obtained from the Garden Island nursery or through DoD-agreed seed collection procedures)	2	2	4
16	Terrestrial construction	Fauna	Introduction of pollution/waste from construction works equipment, activities, installation and trenching through the shoreline, onshore cable route through quarry, along roadside to grid	Significant impacts to listed fauna due to behaviour change, death and/or injury	3	3	9	Construction will be short term and with a small footprint Manage construction equipment and activities to avoid pollution impacts All hazardous materials to be handled, used and stored in accordance with the SDS and industry standards Changes in Project design have no requirement for hydraulic fluid on Garden Island - all contained within buoy Implement all Carnegies and Contractor protocols and procedures for spill prevention and management All vehicles to adhere to DoD traffic management instructions and to keep to 15 km/h or below when off the bitumen, i.e., on all gravel roads and access tracks. Great care to be taken to avoid injuring protected fauna No pets or other animals are to be brought onto site Baseline Garden Island fauna survey undertaken for listed fauna construction activities and manage to minimise disturbance, to be determined in liaison with DoD Native fauna not to be captured, fed, harmed or disturbed DoD waste management procedures to be included in CEMP, contracts and awareness training Implement procedures for early detection and removal of fauna (particularly pythons, tiger snakes and lined skinks) whilst trenching, disturbing ground, or clearing any vegetation, based on DPAPV guidelines	3	2	6
17	Terrestrial construction	Flora and Fauna	Bush Fire ignition risk posed by construction works, activities and laydowns	Significant impacts to listed fauna by death and/or injury and/or significant habitat destruction/damage	3	4	12	A separate Project Bushfire Management Plan incorporating the DoD Garden Island Bushfire Management Plan procedures, including prevention and response, and noting that the seasonal and daily conditions under which high risk activities are being undertaken greatly dictate necessary measures. All contractors and staff to know and refer to the Project Bushfire Management Plan and any specific response Ensure safe practise with HSE requirements for all contractors and CWE personnel Construction Management Plan, incorporating Construction Environment Management Plan Design to reduce hot works if possible, abide by DFES bush fire regulations Abide by Carnegies Self Permit to Work approved by DoD	2	4	8
18	Terrestrial construction	Aboriginal and European Heritage	Cable installation and trenching through the shoreline, onshore cable route through quarry, along roadside, to grid Construction works, access and laydowns	Significant damaged/disturbance to unidentified heritage site/artefact (archaeology and Aboriginal/European cultural heritage)	2	4	8	Carnegie have access to DoD reports on known history and heritage sites for Garden Island No known Aboriginal heritage sites in search area as reported in Aboriginal Heritage Inquiry Search For PWEP cable route issue already addressed, particular care to be taken where disturbing any new areas or increasing depth of disturbance in previously disturbed areas If heritage site/artefact found, stop work and notify DoD Environment Officer Inform DoD if any artefacts/sites are found	2	3	6
19	Terrestrial construction	Fauna and Socio-economic	Noise from construction works equipment, access and laydown areas, e.g., cable installation and trenching through the shoreline, onshore cable route through quarry, along roadside to grid	Significant impact on fauna behaviour and public use in surrounding area from construction noise	3	2	6	Construction will be short term and with a small footprint Manage construction equipment and activities to reduce noise impacts EMP to include management and mitigation to minimise construction period and noise as much as possible	3	1	3
20	Terrestrial construction	Socio-economic	Construction site works equipment, access and laydown areas, e.g., cable installation and trenching through the shoreline, onshore cable route through quarry, along roadside to grid	Visual amenity/DoD and ADF staff and public significantly affected by construction activities	3	2	6	Construction will be short term and with a small footprint Design project to minimise construction period as much as possible Use same pathway as PWEP for cable route if possible Quarry site and access road below public view from onshore Public access limited, as site on south-western side of Garden Island and only available approach is from the open ocean	3	1	3
21	Terrestrial construction	Socio-economic	Construction site works equipment, access and laydown areas, e.g., cable installation and trenching through the shoreline, onshore cable route through quarry, along roadside to grid	Significant impacts on recreational amenity for DoD and ADF staff and public significantly affected by construction activities Significant impacts on vehicle access for DoD and ADF staff during onshore construction activities	4	2	8	Construction will be short term and with a small footprint Minimise construction period as much as possible, especially alongside bitumen roads Liaise with DoD as to whether recreational access by Defence personnel to Quarry Rd Beach is to be closed during some or all of the construction period for safety/security reasons Consult and notify users beforehand Warning signage posted during construction activities	3	1	3

No	Environmental Aspect	Environmental Factor	Sources/Cause of Risk	Potential Impact	Likelihood	Consequence	Risk Rating	Key Risk Management or Mitigation Actions	Likelihood	Consequence	Residual Risk
22	Terrestrial construction	All	Other projects in the area	Cumulative impacts from other projects in the Garden Island area, combined with the potential impacts from the C6G1 Project, may result in a cumulative impact that does not meet the EPA's Objectives for each Environmental Factor	3	3	9	Desktop EA of cumulative impacts from other projects in the area - particularly the Water Corporation of WA, Shipa Depression, Ocean Outlet and CETO5 project. Terrestrial infrastructure to occur within existing cleared area on Garden Island to eliminate any cumulative terrestrial impacts. Any future proposed projects on Garden Island to be in consultation with DoD and Carnegie to reduce potential terrestrial cumulative impacts. Impacts to be reduced to meet EPA's objectives	2	2	4
<b>Operations</b>											
23	Marine Operations	Coastal sediment transport and coastal processes	Presence of CETO units and foundations, plus cables, cable stabilisation and conduit along seabed	Significant impacts and interruption to sediment transport from presence of CETO units, cable and cable stabilisation, and conduit affecting coastal processes and leading to significant destabilisation of the coastline and significant negative impacts on BPPH. Significant seabed scouring and sediment transport impacts from cable stabilisation and conduit. Significant impact from CETO unit energy extraction on coastal processes	2	2	4	Small project with few units, small diameter cable in limited geographical area and area of high sediment movement activity. Design cable installation and stabilisation to address cable movement and shore crossing conduit, taking into account currents and water movement. Information from presence of PWEP flexible pipelines and cables, which slightly larger diameter, show no issues regarding sediment transport and coastal processes to date. Information from knowledge-sharing project with UWA Oceans Institute on nearshore coastal processes show no issues regarding sediment transport and coastal processes to date	1	1	1
24	Marine Operations	BPPH	Presence of CETO units and foundations, plus cables, cable stabilisation and conduit. Movement of cable across seabed	Significant addition of artificial hard substrate, primarily from foundations, cable stabilisation, and conduit, leading to significant impacts on native/local marine flora and fauna. Significant scouring from cable and cable stabilisation presence and potential movement	3	2	6	Existing offshore substrate consists of coarse sandy sediments and limestone reef, as such the habitat change is not significantly different in complexity, nor is it at a regionally-significant scale. Small project with few units, small diameter cable in limited geographical area and area of high sediment movement activity. Design cable installation and stabilisation to address cable movement and shore crossing conduit, taking into account reefs and BPPH, avoiding where possible. Information from presence of PWEP flexible pipelines and cables, which slightly larger diameter, show no issues regarding BPPH to date	2	1	2
25	Marine Operations	Marine sediments, water quality BPPH & Marine Fauna	Pollution from loss/spills of hazardous substances, hydraulic fluids and presence of antifouling materials due to project infrastructure and/or maintenance vessels	Significant contamination of sediment and water due to pollution, hydraulic fluids and spills, leading to significant impacts on BPPH and marine fauna. Significant contamination of sediment and water due to application of antifouling materials, leading to significant impact on BPPH and marine fauna, e.g., molluscan imposex. Elevation in seawater temperature significantly impacts marine life	4	2	8	Project design to reduce potential for hydraulic fluid release, majority of fluid contained within the CETO 6 units. Project design to contain hydraulic fluid in a closed circuit and external seals to reduce leakage to the environment. Project design of CETO units are secured with a secondary connection in the event of unit detachment as a result of catastrophic failure. Select hydraulic fluid to avoid potential significant impacts in line with industry standards and with as low toxicity as possible (as per CEPA's ratings using least toxic possible). Ensure antifouling materials' storage and application methods, and storage of equipment with antifouling materials applied, in line with industry standards, to prevent excess material shedding in water during re-applications. Design project and equipment to limit uses of antifouling coatings. Hazardous materials to be handled, used, and stored in accordance with the SDS and industry standards. SDS sheets to be available for the hydraulic fluid/antifouling products and other hazardous materials required throughout the operational phase. All maintenance vessel operators will ensure potentially hazardous materials and/or waste is secured appropriately on board in accordance with Dangerous Goods requirements, including storage in bundled drums for licensed on-shore disposal. Supplier contracts shall require adherence to national/international legislative requirements for oil spill prevention. All spills will be immediately contained, cleaned up and disposed of appropriately. Equipment used for maintenance of the project shall be stored on board maintenance vessels, with personnel appropriately trained in spill kit use. Waste shall be disposed of and stored in secured, lidded bins for appropriate onshore disposal. Mechanical/hydraulic maintenance equipment, fuel pumps, tanks and storage areas on vessels will be regularly inspected if offshore prolonged maintenance is required. Lifting equipment shall be certified and crane operation shall be to WA Department of Commerce WorkSafe requirements to ensure safe operation and no loss of equipment/materials.	2	2	4
26	Marine Operations	Marine Fauna (excluding BPPH)	Presence of infrastructure, e.g., CETO units and foundations, cables, cable stabilisation and maintenance vessels	Significant impacts on faunal populations from entanglement by the migration of the "whites" phase of the development cycle of Western Rock Lobsters, entanglement in mooring ropes by marine fauna, etc., leading to significant death/injury of NES marine species. Significant marine fauna attraction to cable and CETO units (CETO units act as a magnet for significant impacts on local reef/marine ecosystem). Significantly increased vessel mooring impacts from maintenance vessels	3	3	9	Small project with few units, small diameter cable in limited geographical area and in area of high sediment movement activity. Design cable systems to ensure taught mooring lines and to avoid entanglement of NES marine species, e.g., marine turtles, prawns, cephalopods. Using knowledge-sharing project for PWEP to investigate marine species interaction with submerged infrastructure, whether demersal or pelagic species and whether foraging/leading behaviour changes. Generally only shallow diving seabirds in SW WA, used to avoiding reefs and sandbanks, so unlikely to collide with CETO BAs. The presence of the CETO units themselves are unlikely to have any effect upon the annual migration of the "white" phase of the Western Rock Lobster, however the presence of the cable/conduit may act as a boundary to the lobsters and interrupt their migratory journey through the area, though unlikely as small in diameter	2	2	4
27	Marine Operations	Marine Fauna (excluding BPPH)	Electromagnetic field (EMF) from cable and CETO units	Significant marine fauna interaction with cable and CETO units due to EMF, leading to significant impacts to marine fauna	2	2	4	EMF to include management and mitigation to ensure appropriate shielding of cables to limit EMF emissions. Marine fauna interactions with electrical cables and EMF unlikely due to small Project footprint and cable diameter	1	2	2



No	Environmental Aspect	Environmental Factor (excluding BPPH)	Sources/Cause of Risk	Potential Impact	Likelihood	Consequence	Risk Rating	Key Risk Management or Mitigation Actions	Likelihood	Consequence	Residual Risk
28	Marine Operations	Marine Fauna (excluding BPPH)	CETO units operation	Underwater noise significantly impacting sensitive marine fauna and NES. Potential for significant behavioural changes, injury or death.	3	3	9	Design project to minimise underwater noise. Information from PWEF and CETO units fished sound levels used to inform CETO unit design. Underwater noise impacts, the underwater sound levels produced by the CETO array are unlikely to cause serious physiological damage to marine fauna.	2	2	4
29	Marine Operations	BPPH, Marine Fauna and Socio-economic	Biofouling, underwater infrastructure attracts species settling. Potential for introduced species. Maintenance vessels.	Introduced Marine Pests settling on infrastructure, with significant impacts on sensitive species. Introduced marine species biosecurity issues.	2	4	8	Reference to regulations outlined in Biosecurity Act 2016 (Biosecurity) Agriculture Guidelines for commercial vessels. Refer to the WA Department of Fisheries website vessel-load checklist. Project design and equipment to limit use of antifouling coatings. Selection antifouling product to avoid potential significant impacts in line with industry standards and regulations and with as low environmental toxicity as possible. SDS sheets to be made available for the antifouling applications/products. Antifouling materials storage, application methods, and storage of antifouling materials applied will adhere with industry standards, to prevent excess material shedding in water. Vetting of maintenance vessels and suppliers. Use of domestic vessels where possible. Antifouling materials storage, application methods, and storage of antifouling materials. Observation, maintenance and appropriate infrastructure cleaning protocols. Arrange operational vessels for marine pest inspection for clearance if suspected risk as soon as possible.	1	3	3
30	Marine Operations	Socio-economic	Increased infrastructure in coastal waters have the potential to degrade the visual amenity of coastal waters. Disturbance to existing sea users in terms of recreational activities including boating, fishing surfing, snorkelling due to temporary diminished access of a small area of water.	Significant visual amenity or aesthetic impacts to seascapes. Potential disruption to recreational activities. Surface piercing antennas on CETO units and significant changes due to presence of CETO units.	3	2	6	Site located 8-15 km offshore, away from nearshore recreational boating. Small project with few units in limited geographical area. Close proximity of CETO units to the ocean surface. Design to avoid surface piercing antennas, if possible. Small closure area with cardinal markers installed, with closure area and cable easement to be marked on maritime charts, according to maritime guidelines. Continue to implement effective community consultation with all key stakeholders.	2	1	2
31	Marine Operations	Socio-economic	Presence of infrastructure, e.g., CETO units and foundations, plus cables, cable mooring lines, cable stabilisation and mooring along seabed, and maintenance vessels. Close proximity of CETO units to the ocean surface and small closure zone. Increased vessel activities for infrastructure maintenance. Detachment of units from foundation connection.	Significant increased maritime safety risk from human vessel behaviour and interaction within the lease and mooring areas. Potential for collision risk with CETO units, potential anchoring incidents with cables. Increased vessel activity entering closure area to view CETO units and surrounding infrastructure, resulting in significantly increased maritime safety risk. Lease and easement areas leading to significant impacts to recreational activities. Significant changes to accessible fishing areas, trawling prevented over new cable, recreational edge fishing, significant changes to tourism activities.	3	4	12	Consultation with key stakeholders, including AMSA, AHO, AFMA, DoD, WA DoF, commercial and recreational fishing peak bodies. Campaign to implement approval and permitting processes for new closure area, lease and cable easement. Project design with small lease area. Project placement of CETO units in centre of lease area to avoid interference with fisherman mooring to navigational aids delineating the lease/easement area. Work with AMSA/AHO and WA DoT to ensure TNTMs and lease and easements as well as location of export cable to shore on navigation charts. Implement maritime safety legislative requirements for observation and maintenance. Maintenance of operations to recommendations and standards of International Association of Lighthouse Authorities (IALA) Maritime Buoyage System, IALA Recommendation C-131 on the Marking of Offshore Structures and IALA Recommendation C-132 on the Marking of Man Made Offshore Structures. Continue to implement effective community consultation with all key stakeholders and wider community. Consider legal exclusion zone to legally prevent vessel access and reporting procedure to AMSA should vessels be identified in exclusion area. Carnegie will work in close association with the WA DoT, AMSA, AHO, WA Water Police and local sea rescue organisations to monitor and manage interaction between recreational boats and the CETO 6 infrastructure. Through Project design, cable mooring lines designed out to reduce risk of anchor entanglement, ensure CETO units are fully secured and consider installation of secondary connection to the foundation connection. Emergency Response Plan and associated Communications Plan outlining procedures and communication protocols in relation to achieving ongoing maritime safety. The plan will include procedures for catastrophic failure (i.e. unlikely event a unit detaches from the secondary connection).	2	3	6
32	Terrestrial Operations	Coastal geomorphology	Presence of cables and conduit. Exposure of shore crossing conduit and cables over time. Potential for erosion. CETO connection of wave energy.	Significant impact on coastal/shoreline processes, including sediment transport and adjacent wave energy affecting coastal geomorphology leading to significant destabilisation of the coastline and significant negative impacts on dune system and coastal geomorphology. Significant accumulation of wrack and sediment against conduit and cable. Rehabilitated areas will continue to be at risk of deteriorating for several seasons after construction has ceased.	3	2	6	Use of existing PWEF pipeline route and shoreline conduit where practicable. Surface stabilisation, vegetation retention and revegetation in the impacted areas during PWEF maintenance operations to ensure high capacity to achieve the required aims. Maintain the shore crossing conduit with regular inspections for signs of destabilisation, scouring, movement, damage and/or build-up of material against the conduit/cable, (both seasonal and in extreme weather events) to detect if cable/conduit is becoming exposed (in the case of trenching) or undermined (in the case of surface laying). Implement additional stability measures such if there is risk to cable stability (less likely if cable/conduit trenches). Remedial dune stability measures, erosion management and revegetation where required.	2	2	4

No	Environmental Aspect	Environmental Factor	Sources/Cause of Risk	Potential Impact	Likelihood	Consequence	Risk Rating	Key Risk Management or Mitigation Actions	Likelihood	Consequence	Residual Risk
33	Terrestrial Operations	Soil and Groundwater	Introduction of pollution from hazardous substances and/or waste due to operation and/or maintenance works, equipment, activities, access and laydown areas	Significant soil and groundwater contamination	3	3	9	Limited geographical area affected, short time period and little/no operational infrastructure onshore as flexible cables with small profile, cables will be buried within a trench and follow the same route as PWEP pipelines and cable to the Carnegie onshore facility Manage maintenance equipment and activities to avoid pollution impacts All hazardous materials to be handled, used, and stored in accordance with the SDS and industry standards, in the safe storage and transfer of fluids, liquids and potentially hazardous substances Changes in Project design have no requirement for hydraulic fluid on Garden Island - all containers within bay Waste management protocols (storage and removal) in line with DoD protocols for Garden Island, e.g., no loose waste left outside, enclosed large bins on site, with lids kept closed Induction of procedures for all contractors and staff	2	1	2
34	Terrestrial Operations	Flora	Destabilisation of areas impacted by associated construction activities Traffic onto Garden Island and operational activities around the site resulting in introduction of new and/or spread of existing weeds, other non-native species and plant pathogens	Significant erosion and disturbance to vegetation and disturbance to priority listed species and Threatened Ecological Communities (TECs) Significantly increased weed/plant pathogens from project activities and increased vehicular traffic Tanner impacts on vegetation restoration areas	3	2	6	Effective dune and flora management and restoration, e.g., dune profile and erosion protection, seeding, revegetation, and regular monitoring Surface stabilisation/vegetation restoration in the affected areas during PWEP construction and operation demonstrate high capacity to achieve DoD Licence requirements Summer watering Conduct vegetation surveys with baseline records, vegetation transects and along newly disturbed routes The area proposed is already highly degraded and subject to frequent visitation as it is in a disused quarry, adjacent to the HSF, and an access track to a DoD recreational beach. Risks are lower in the operations phase than for the construction phase due to much lower traffic movements, primarily by permanent staff	2	2	4
35	Terrestrial Operations	Fauna	Presence of cable/conduit through the shoreline, onshore cable route through quarry, along roadsides, to grid Additional traffic activities from operators Introduction of waste, noise, light, EMF	Significant changes to (priority listed) fauna behaviour impacting on faunal survival Significant death and/or injury from (priority listed) fauna casualties along shore and introduction of priority-listed fauna to EMF/cables impacting on faunal survival	3	3	9	Flexible cables with small profile, cables will follow the same route as PWEP pipelines and cable to the Carnegie onshore facility Onshore cables to be installed as per Western Power Standards AS3000 and AS2067 and DoD requirements Onshore cables to be trenched and buried, buried to depth less than 900mm. It will be within a conduit which is compliant with IEC 60332-1-2 high fire usage, e.g., remaining of fauna and site access to be maintained for the life of the project Strict fauna management and mitigation and HSE protocols for the safe vehicle use and speeds, as with PWEP Use of lids on waste bins which kept closed to prevent fauna access Buried cables will present negligible risk to fauna	2	2	4
36	Terrestrial Operations	Flora, Fauna & Socio-economic	Bushfire ignition risk posed by operations and maintenance activities	Operational faults, repairs and/or maintenance cause ignition source and result in bush fire with significant impacts of flora, fauna and human health	3	4	12	There have been no major fires on Garden Island since 1997 and issues of fire prevention and response to be taken very seriously, as reflected in PWEP Licence conditions and updated for CETO6 Risk from operational and maintenance activities will be greatly reduced, compared with construction, but accidents can occur when the issue is less in focus Existing infrastructure used where possible A separate Project Bushfire Management Plan incorporating the DoD Garden Island Bushfire Management Plan procedures, including prevention and response, and noting that the seasonal and daily conditions under which high risk activities are being undertaken greatly dictate necessary measures. All contractors will be aware and refer to the Project Bushfire Management Plan and any specific response measures Abide by DFES bush fire regulations at all times Ensure safe practise with HSE requirements for all contractors and CWE personnel No sources of ignition associated with Carnegie infrastructure Design maintenance and repairs to reduce hot works if possible Abide by Carnegies Self Permit to Work approved by DoD	2	4	8
37	Terrestrial Operations	Socio-economic	Presence of project infrastructure and operational activities	Noise from operational activities causing significant impacts on faunal behaviour and recreational use of area, with significant number of complaints	2	2	4	Limited geographical area affected, short time period and little/no operational machinery to make any noise Implementation of DoD HSE protocols for the safe vehicle use and speeds, as with PWEP, limiting speeds to 15 km/h on gravel roads	2	1	2
38	Terrestrial Operations	Socio-economic	Presence of project infrastructure and operational activities Cable/conduit installation across shoreline and into the grid	Visual amenity affected by operation activities, both onshore for DoD and ADF staff and for public from offshore	2	2	4	Design project with management and mitigation to minimise operational visual impacts Limited geographical area affected, short time period and little infrastructure in view Small diameter cable/conduit with same PWEP route if possible Quarry site below public view from offshore	2	1	2
39	Terrestrial Operations	Socio-economic	Presence of project infrastructure and operational activities Cable/conduit installation across shoreline and into the grid	Significantly reduce recreational access by DoD, ADF and public during operations onshore leading to significant number of complaints	3	1	3	Limited geographical area affected, short time period and little/no operational infrastructure onshore as flexible cables with small profile, cables will be buried within a trench and follow the same route as PWEP pipelines to the Carnegie onshore facility Access to the beach will be maintained by Defence personnel to Quarry Rd Beach. It is to be closed during some or all of the construction period for safety/security reasons Should the beach closure be required, the beach will be reopened for DoD recreational access and access from the sea and along the coast by public on completion of construction works Any additional traffic relating to operations, e.g., for inspections and/or maintenance, etc., will be an insignificant addition with implementation of DoD HSE protocols for the safe vehicle use and speeds, as with PWEP, limiting speeds to 15 km/h on gravel roads	2	1	2
40	Marine Decommissioning	Coastal sediment transport, marine sediments and marine water quality	Deteriorating infrastructure, with potentially highly corrosive, waste, hazardous substances Introduction of waste and pollution during decommissioning activities Increased vessel activities during decommissioning	Significant contamination of marine water quality and sediments Interruption to coastal sediment transport affecting coastal processes leading to destabilisation of the coastline and significant negative impacts on BPHH	3	3	9	Small project with few units, small diameter cable in limited geographical area and area of high sediment movement activity All non-buried infrastructure to be removed during decommissioning phase All buried infrastructure to remain in place and made safe to avoid re-disturbance of sea bed, shore-crossing and beach areas Management and mitigation to ensure implementation of HSE standards for waste, pollution and hazardous substances management Post-decommissioning survey, with sign off and approval by regulatory authorities, as appropriate	2	2	4

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No	Environmental Aspect	Environmental Factor	Sources/Cause of Risk	Potential Impact	Likelihood	Consequence	Risk Rating	Key Risk Management or Mitigation Actions	Likelihood	Consequence	Residual Risk	
41	Marine Decommissioning	BPPH & Marine Fauna	Deteriorating infrastructure, with potentially highly corrosive, waste, hazardous substances Introduction of waste and pollution during decommissioning activities Increased vessel activities during decommissioning	Deteriorating infrastructure leading to significant localised contamination and marine fauna through pollution and/or entanglement/trapment	3	3	9	Small project with few units, small diameter cable in limited geographical area and area of high sediment movement activity All non-buried infrastructure to be removed during decommissioning phase All buried infrastructure to remain in place and made safe to avoid re-disturbance of sea bed, shore-crossing and beach areas Management and mitigation to ensure implementation of HSE standards for waste, pollution and hazardous substances during decommissioning Post-decommissioning sediment survey, with sign off and approval by regulatory authorities, as appropriate	2	2	4	
42	Marine Decommissioning	Marine Ecosystem	Use of vessels (inc tender vessels to site) from domestic water/vessel movement/balast/water discharge during decommissioning activities	Introduction of marine pest species Alteration to community composition and function; competition with indigenous species	2	4	8	Use of domestic vessels where possible Reference to regulations outlined in Biosecurity Act 2016 Reference to Department of Agriculture biosecurity guidelines for commercial vessels Preparation of a biosecurity risk assessment Arrange decommissioning vessels for clearance at marine pests if suspected risk as soon as possible	1	3	3	
43	Marine Decommissioning	Socio-economic	Deteriorating infrastructure, with potentially highly corrosive, waste, hazardous substances Introduction of waste and pollution during decommissioning activities Increased vessel activities during decommissioning	Significant damage/disturbance to existing marine infrastructure, including UWTR cable and PWEF	2	4	8	Ongoing consultation with Australian Department of Defence and Carnegie regarding existing infrastructure throughout the decommissioning phase Verification of the UWTR and PWEF infrastructure has been verified through geophysical surveys DoD has recently decommissioned UWTR Carnegie will ensure the precise locations of existing infrastructure are identified and marked up on all drawings and charts used for CETO installation Implementation of PWEF and Project construction operations Buffer of at least 50 m from all known location of existing infrastructure Project design decommissioning to avoid installed infrastructure and minimise potential for disturbance	2	2	4	
44	Marine Decommissioning	Socio-economic	Possible UXO in area	Significant damage/disturbance to existing marine infrastructure including UWTR cable and PWEF cable routes Significant environmental damage including direct toxic effects to marine organisms, underwater noise from possible explosions Exposure to personnel injury	2	5	10	Verification of the UWTR, PWEF infrastructure and any UXO locations has been verified through geophysical surveys and there are no UXO present				
45	Marine Decommissioning	Socio-economic	Deteriorating infrastructure, with potentially highly corrosive waste and/or hazardous substances Decommissioning activities, e.g., increased vessel activities, introduction of waste and pollution, and implementation of temporary exclusion zones around key activities	Disturbance to existing sea users from: • significant increase of vessel collision risks from the presence of decommissioning vessels and installed infrastructure • significant maritime safety hazard from deteriorating infrastructure breaking up and moving through the ocean • significant impact to commercial/leisure vessels • significant impact to fish/shellfish catch (commercial and recreational), including change in human presence and/or behaviour due to increased marine life around the CETO units (attract recreational fishers, divers, boats) Significant impact on the use of petroleum exploration licences	3	4	12	Small project with low decommissioning activities over limited geographical area Consultation with key stakeholders, including AMSA, AFMA, DoD, WA DoF, commercial and recreational fishing peak bodies Design decommissioning to minimise disturbance of existing sea users Implement temporary/permanent exclusion areas/safety zones to reduce the potential for vessel collision The safety zone will exclude all vessels, other than those undertaking decommissioning activities A guard vessel will be engaged by Carnegie to assist with providing warnings to approaching vessels of the decommissioning activities and requirement for all vessels to remain clear of the safety zone Issuing of Temporary Notices to Mariners and chart notifications, as required for maritime safety No known petroleum exploration licences in area	2	2	4	
46	Terrestrial Decommissioning	Coastal geomorphology	Deteriorating infrastructure causing site disturbance, erosion, with potentially highly corrosive, waste, hazardous substances Removal of infrastructure Introduction of waste and pollution during decommissioning activities Increased vehicle activities during decommissioning	Significant changes in coastal geomorphology due to abandoned infrastructure or with decommissioning activities to remove buried/non-buried infrastructure If abandoned, potential scouring next to conduit/cable shore crossing, potential erosion over time with terrestrial area of cable/conduit If conduit/cable removed, initial erosion	3	3	9	Decommissioning design to minimise disturbance All non-buried infrastructure to be removed during decommissioning phase All buried foundations, to remain in place and made safe to avoid re-disturbance of surrounding vegetation, dune and beach areas Management and mitigation to ensure implementation of HSE standards for waste, pollution and hazardous substances during decommissioning, stabilisation measures implemented for shore-crossing and disturbed dune areas and baseline, pre- and post decommissioning surveys Post-decommissioning survey and sign-off by DoD				
47	Terrestrial Decommissioning	Flora	Deteriorating infrastructure causing site disturbance, erosion, with potentially highly corrosive, waste, hazardous substances Removal of infrastructure Introduction of waste and pollution during decommissioning activities Increased vehicle activities during decommissioning	Significant erosion and disturbance to native vegetation, including priority listed species and Threatened Ecological Communities (TECs) Significantly increased weed/plant pathogens from decommissioning activities and increased vehicular traffic The near impacts on vegetation restoration areas	3	3	9	Decommissioning plan to include procedures that minimise all impacts to flora All non-buried infrastructure to be removed during decommissioning phase All buried infrastructure, including buried cable/conduits in terrestrial, nearshore and shore-crossing areas, to remain in place and made safe to avoid re-disturbance of surrounding vegetation, dune and beach areas All vehicles, machinery and clothing/boots are free of weeds, plant matter, mud and soil prior to entering the island Conduct vegetation surveys/assess along potential new flora disturbance routes, to identify species at risk to inform rehabilitation Immediate use of erosion matting, seeding and appropriate vegetation restoration, as required No plants or plant material to be brought on to Garden Island including indoor ornamental plants and plant cuttings, plants for landscaping around facilities or for bushland restoration (all such plants must be obtained from the Garden Island nursery or through DoD-agreed seed collection procedures) Management and mitigation to ensure implementation of HSE standards for waste, pollution and hazardous substances during decommissioning, stabilisation measures implemented for shore-crossing and disturbed dune areas and baseline, pre- and post decommissioning surveys Post-decommissioning survey and sign-off by DoD	2	2	4	

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No	Environmental Aspect	Environmental Factor	Sources/Cause of Risk	Potential Impact	Likelihood	Consequence	Risk Rating	Key Risk Management or Mitigation Actions	Likelihood	Consequence	Residual Risk
48	Terrestrial Decommissioning	Fauna	Deteriorating infrastructure causing site disturbance, erosion, with potentially highly corrosive, waste, hazardous substances and increased vehicle activities during decommissioning	Significant impacts to fauna causing behaviour changes, injury or death, including Commonwealth heritage fauna species	3	3	9	Low decommissioning activities over limited area Decommissioning plan to include procedures that minimise all impacts to fauna All non-buried infrastructure to be removed during decommissioning phase All buried infrastructure to be removed during decommissioning phase Efforts to be made to ensure that all shore-crossing areas and effluent foundations, to remain in place and made safe to avoid impact on fauna Management and mitigation to ensure minimal impacts to fauna, implementation of DoD HSE standards for waste, pollution and hazardous substances during decommissioning All hazardous materials to be handled, used and stored in accordance with the SDS and industry standards Implement all Carnegie and Contractor protocols and procedures for spills prevention and management All vehicles to adhere to DoD traffic management instructions and to keep to 15 km/h or below when off the main road, i.e., on all gravel roads and access tracks. Great care to be taken to avoid injuring protected fauna Surveys for listed fauna throughout decommissioning site before decommissioning activities and manage to minimise disturbance, to be determined in liaison with DoD Native fauna not to be captured, fed, harmed or disturbed Implement procedures for early detection and removal of fauna (particularly pythons, tiger snakes and lined skinks) whilst trenching, disturbing ground, or clearing any vegetation, based on DPaw guidelines No pets or other animals are to be brought onto site Post-decommissioning survey and sign-off by DoD	3	2	6
49	Terrestrial Decommissioning	Flora and Fauna	Bush Fire Ignition risk posed by decommissioning works, activities and lay-downs	Significant impacts to listed fauna by bush fire and/or significant habitat destruction/damage	3	4	12	A separate Project Bushfire Management Plan incorporating the DoD Garden Island Bushfire Management Plan, including prevention and response, and noting that the seasonal and dry conditions which bring the risk of bush fire, but not the risk of bush fire, are not within the scope of this assessment. All contractors and staff to know and refer to the Project Bushfire Management Plan and any specific response measures/plans Ensure safe practise with HSE requirements for all contractors and CVE personnel Decommissioning Management Plan, incorporating decommissioning Environment Management Plan Design decommissioning to reduce hot works if possible; abide by DFES bush fire regulations Carnegie to consider the use of bushfire management system	2	4	8
50	Terrestrial Decommissioning	Socio-economic	Deteriorating infrastructure causing site disturbance, erosion, with potentially highly corrosive, waste, hazardous substances and increased vehicle activities during decommissioning	Significant visual amenity changes due to erosion, and potentially highly significant hazards to human health/safety from presence of deteriorating infrastructure Significant impacts on recreational amenity for DoD and ADF staff and public significantly affected by decommissioning activities Significant impacts on vehicle access for DoD and ADF staff during onshore decommissioning activities	3	4	12	Limited geographical area affected, short time period and little/no operational infrastructure onshore as the onshore decommissioning activities are not within the conduit, they will generally be surface laid, channels buried within a conduit Liaise with DoD as to whether recreational access by Defence personnel to Quarry Rd Beach is to be closed during some or all of the construction period for safety/security reasons Should the beach closure be required, the beach will be reopened for DoD recreational access and access from the sea and along the coast by public on completion of construction works Decommissioning plan will include procedures that minimise all impacts to human health and safety; removal of infrastructure, recycling of useful materials, and the return to as natural a state as possible, based on equipment and structures Decommissioning plan to include procedures that minimise all impacts to human health and safety; removal of infrastructure, recycling of useful materials, and the return to as natural a state as possible, based on equipment and structures Any additional traffic relating to decommissioning will be an insignificant addition with implementation of DoD HSE protocols for the safe vehicle use and speeds, as with PWEF, limiting speeds to 15 km/h on gravel roads All non-buried infrastructure to be removed during decommissioning phase, i.e., surface-laid cables and stabilisation infrastructure removed All buried infrastructure, including buried cable/conduits through the shoreline, onshore cable route through quarry, along roadside to grid, to remain in place and made safe to avoid re-disturbance of surrounding vegetation, dune and beach areas Management and mitigation to ensure minimal impacts to human health and safety, implementation of HSE standards for waste, pollution and hazardous substances during decommissioning Surveys implemented for shore-crossing and disturbed dune areas, and baseline, pre- and post decommissioning surveys Environmental monitoring during operations to inform steps required for decommissioning and the appropriate approvals, licences and permissions required Consult and notify users beforehand Warning signage posted during decommissioning activities Post-decommissioning survey and sign-off by DoD and other regulators	2	2	4

Assessment Stage	Total number of Factors			
	Low	Medium	High	
Initial Risk Assessment				
Construction	1	19	2	2
Operations	5	10	2	2
Decommissioning	7	7	4	4
Total	6	36	8	8
Residual Risk Assessment				
Construction	17	5	2	—
Operations	15	2	—	—
Decommissioning	8	3	—	—
Total	40	10	—	—

## **Appendix E**

### **CETO 6 Community Consultation Plan**



# COMMUNITY CONSULTATION PLAN CETO 6 GARDEN ISLAND PROJECT

Project No: CP115  
Document No: CP115-0003-1

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## Abbreviations and Definitions

<b>AS</b>	Australian Standard
<b>AS/NZS</b>	Australian Standard/New Zealand Standard
<b>BA</b>	Buoyant Actuator
<b>BSM</b>	Base Support Manager
<b>C6GI</b>	CETO 6 Expansion Project offshore Garden Island
<b>Carnegie</b>	Carnegie Wave Energy Ltd
<b>CCP</b>	Community Consultation Plan
<b>CEO</b>	Chief Executive Officer
<b>CEFC</b>	Clean Energy Finance Corporation
<b>CETO</b>	Named after the Greek sea goddess, CETO is the name given by Carnegie Wave Energy Ltd to its submerged wave energy technology that converts ocean wave energy into usable energy onshore
<b>Community</b>	The word 'community' is also a very broad term used to define groups of people; whether they are stakeholders, interest groups, citizen groups, etc. A community may be a geographic location (community of place), a community of similar interest (community of practice), or a community of affiliation or identity (such as industry or sporting club).
<b>COO</b>	Chief Operating Officer
<b>DER</b>	Western Australian Department of Environmental Regulation
<b>DoD</b>	Australian Government Department of Defence
<b>DoT</b>	Western Australian Department of Transport
<b>DPaW</b>	Western Australian Department of Parks and Wildlife
<b>Environment</b>	Living things, their physical, biological and social surroundings and interactions between all of these (WA OEPA definition)
<b>EP Act 1986</b>	Western Australian <i>Environmental Protection Act 1986</i>
<b>EPA</b>	Western Australian Environmental Protection Authority
<b>EPBC Act 1999</b>	Australian Government <i>Environment Protection and Biodiversity Conservation Act 1999</i>
<b>ERA</b>	Environmental Risk Assessment
<b>FAQ</b>	Frequently Asked Questions
<b>HMAS</b>	Her Majesty's Australian Ship: the designation of any Australian warship, as well as major Australian naval bases, such as <i>HMAS Stirling</i> on Garden Island
<b>ISO</b>	International Organization for Standardization
<b>LCoE</b>	Levelised cost of energy
<b>MW</b>	Megawatt: measurement of energy/electricity, equal to one million (10 <sup>6</sup> ) watts

<b>PWEP</b>	Perth Wave Energy Project
<b>Stakeholder</b>	A stakeholder is anybody who can affect or is affected by an organisation, strategy or project
<b>TNTM</b>	Temporary Notice to Mariners
<b>WA</b>	Western Australia



## 1. INTRODUCTION

### 1.1. Purpose of this document

The purpose of this Community Consultation Plan (hereafter referred to as the CCP or Plan) is to provide a strategic approach and a detailed engagement plan, with clear objectives, activities and process evaluation, specific to the CETO 6 Offshore Garden Island Project (hereafter referred to as C6GI or the Project) located in the offshore Garden Island location. It builds on previous community consultation work Carnegie Wave Energy Limited (Carnegie) has undertaken for:

- the CETO wave energy technology (CETO),
- previous activities of the Perth Wave Energy Project (PWEF), and
- the PWEF CCP (Sheridan Coakes Consulting Pty Ltd, 2012).

The Plan also identifies a fair and transparent engagement and feedback process for community consultation and integrates the social/community component in line with key planning phases and C6GI milestones. It is important to recognise that the CCP is a live document that will be reviewed and updated on an ongoing basis in response to material changes as a form of adaptive management.

This CCP has been developed in accordance with relevant industry standards and best practice, reflecting the type of project and community consultation to be undertaken, for example:

- AA1000 Stakeholder Engagement Standard (Accountability): a principles-based, open-source framework for the design, implementation, assessment and communication of quality stakeholder engagement
- ISO 26000:2010 Standard (Guidance on Corporate Social Responsibility): a guidance statement providing direction on identification of stakeholders and how best to engage
- Relevant International Finance Corporation Performance Standards.

### 1.2. Project Background

Carnegie is the Australian-owned and Australian-based, ASX-listed inventor, 100 % owner and developer of the patented CETO wave energy technology. CETO is a fully-submerged, ocean technology that converts ocean swell into zero-emission renewable power and desalinated freshwater. As the company's main business is the development and commercialisation of the CETO technology, the full resources of the company are committed to making CETO successful.

Significantly, the 5th generation (CETO 5) is being demonstrated in 2014–15 as part of the PWEF located off HMAS Stirling at Garden Island in Western Australia, Australia's largest navy base. CETO is the only ocean-tested wave energy technology globally that is both fully submerged and capable of generating power both onshore and offshore.

Carnegie is now developing a follow-on, pre-commercial project to design and demonstrate the next generation of CETO technology, the 1 MW CETO 6 Unit. The CETO 6 project builds on the knowledge gained from the PWEF and incorporates offshore power generation, using an electrical export cable connected to the shore. In comparison to CETO 5, the CETO 6 design will offer a lower levelised cost of energy (LCoE) in sites where the array is far from shore.

This CCP has been developed as an update of the PWEF CCP to apply to the C6GI project at a location, offshore Garden Island in Western Australia (Figure 1).

The C6GI will be a grid-connected, up to 3-MW array, located approximately 10 km offshore from Garden Island, at a site with a higher wave energy resource than the PWEF. This will allow for the demonstration of the CETO technology in higher sea states. Additionally, the C6GI will demonstrate

a number of technical and commercial innovations that will expand the potential market for the CETO technology and advance it to the point of commercialisation.

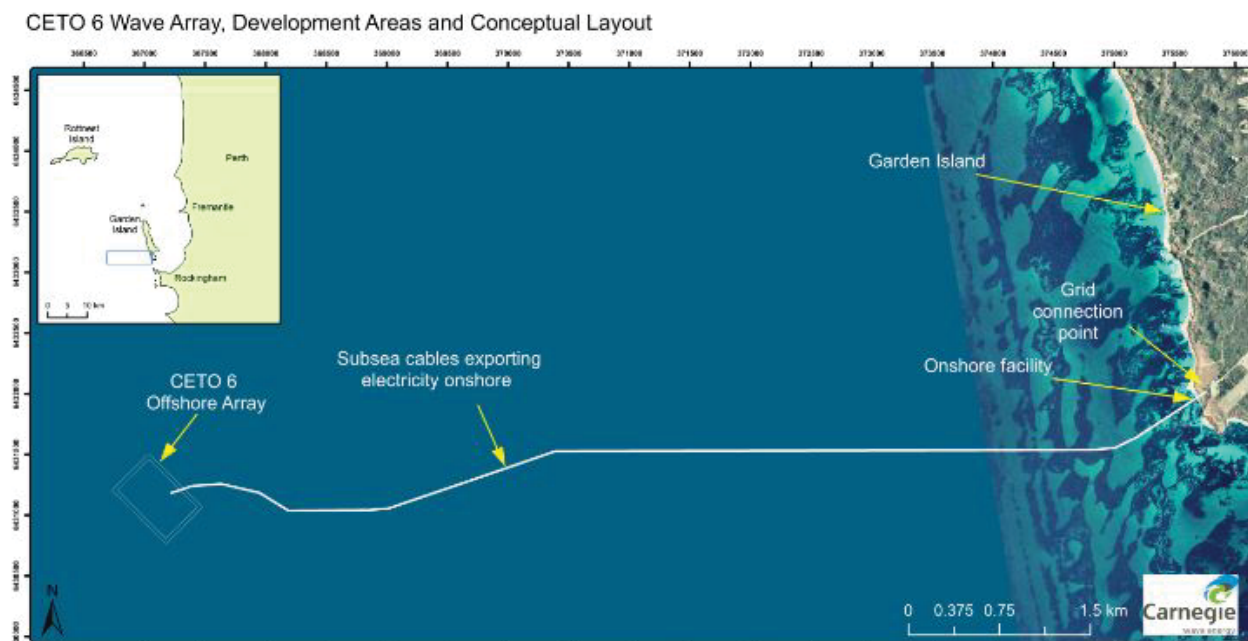


Figure 1. Proposed CETO 6 Project Location

The C6GI builds on the learnings from the PWEF and CETO 6 concept design studies. The CETO 6 unit will have a significantly larger capacity and will produce considerably more power than the current CETO 5 generation. Additionally, the design will leverage initial offshore power generation trialled at CETO 3 by locating the electrical generation offshore and subsea using electrical cables to transport electrical energy back to a shore-based substation. This will expand the market for the CETO technology by being the only wave power technology capable of operating both near-shore (with the hydraulic system) and distant to shore locations (with the subsea cable system).

### 1.3. Objective with Project Timing

The offshore C6GI falls within numerous jurisdictions, such as Commonwealth Lands, Western Australian (WA) State Coastal Waters and Commonwealth marine areas. As such, C6GI will require a portfolio of environmental and planning approvals. A key objective of the project is to obtain the required environmental and planning approvals, covering the Commonwealth marine area, WA State Coastal Waters and Commonwealth (Defence) Land jurisdictions, and undertake adequate community consultation in accordance with the development schedule for the C6GI.

Nominally, key approvals and permits, in particular those required under Section 38 of the WA *Environmental Protection Act 1986 (EP Act 1986)* and Commonwealth *Environment Protection and Biodiversity and Conservation Act 1999 (EPBC Act 1999)*, should be obtained by end June 2016, in line with C6GI milestones (Figure 2).

Supporting key approvals and permitting is the need to conduct appropriate community consultation at all levels from Federal, State, and Local government (including the Department of Defence) to local stakeholders, including users of Garden Island, and the broader community. This should be done in a planned and structured manner to build better ongoing relationships and give adequate opportunity for feedback.

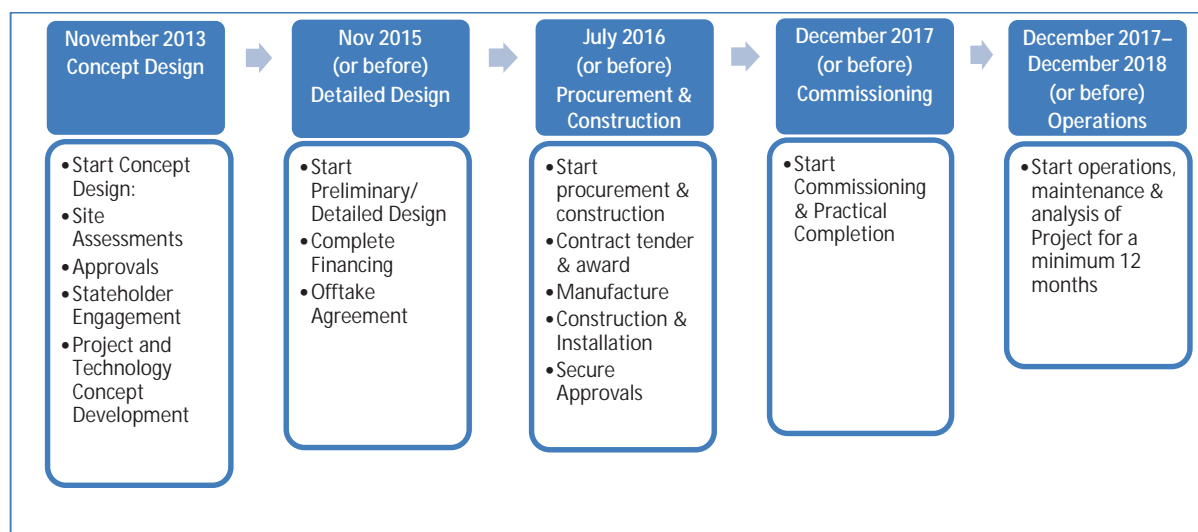


Figure 2. CETO6 Project Milestones

### 1.4. Outline of Relevant Jurisdictions and Key Approvals

The C6GI site is located partly within Commonwealth jurisdiction (specifically both with the onshore component on Garden Island itself, and a cable installed within Controlled Naval Waters), partly within Coastal (State) Waters for the cables, and with the remaining section of offshore cables and offshore CETO 6 unit array area in the Commonwealth marine area. Consequently the C6GI will require a range of permits and approvals from both the Australian Government, including Department of Defence (DoD), and the State of Western Australia. The DoD administers all approvals for environment and planning development on its lands in WA in line with State legislation.

The range of jurisdictions with project components and jurisdictions with associated legislation are shown in Table 1 and Figure 3.

Table 1 - Jurisdiction of CETO 6 Expansion Project Components

Jurisdiction	Project Component/s
Commonwealth Lands	Onshore cable/s and grid connection, shore-based substation
WA State (Coastal) Waters	Easement for Cable/s
Commonwealth marine area	CETO 6 array, interconnections and cable/s

### 1.5. Project Funding

Carnegie has spent over \$118 m to fund the development of the CETO technology over the last 15 years. The C6GI Project Budget is \$31 m, excluding payroll and overheads, and is supported by \$11 m in Australian Government funding through the Australian Renewable Energy Agency’s Emerging Renewables Program and by a five-year, \$20 million loan facility from the Australian Commonwealth Bank of Australia.

COMMUNITY CONSULTATION PLAN CETO 6 GARDEN ISLAND PROJECT

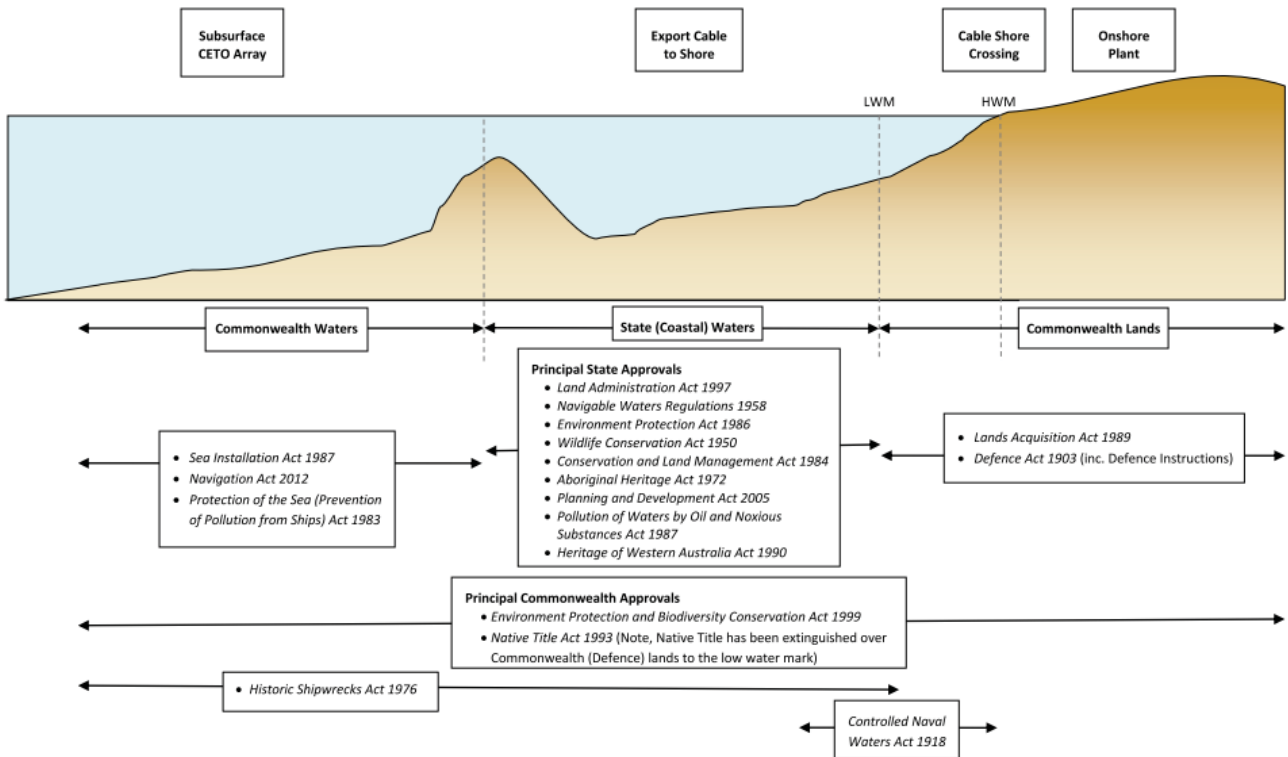


Figure 3. Range of Jurisdictions and Associated Legislation

## 2. ENGAGEMENT APPROACH AND OBJECTIVES

A systematic and strategic approach to stakeholder engagement is very important in building sustainable and resilient relationships with stakeholders. Too often relationships with stakeholders are conducted in an *ad hoc* manner. A strategic approach and a detailed engagement plan with clear objectives, milestones and process evaluation, builds better ongoing relationships and is more likely to realise benefits for Carnegie and its stakeholders.

This CCP is specific to the C6GI and aims to build on the previous work undertaken by Carnegie for the CETO commercial scale unit testing and the PWEF, with the additional aims of:

- Developing a fair and transparent engagement process, where stakeholder views can be voiced, documented and considered
- Providing feedback to stakeholders to indicate how their information has been incorporated into Project planning and implementation
- Integration of the social/community component in line with key planning phases and C6GI milestones.

### 2.1. Benefits of Stakeholder Engagement

Key benefits of stakeholder engagement include the following:

- Knowledge of community perceived impacts
- Development of improved management/mitigation measures
- Improved community awareness (including key stakeholders) of the C6GI and Carnegie
- Improved relationships with local community stakeholders
- Identification of Carnegie as an employer/partner of choice.

All these components contribute to a company's social licence to operate. Risks associated with *not* engaging stakeholders may include the following:

- Dissatisfied neighbours and stakeholders
- Dissatisfied recreational users
- Negative media and public relations
- Delays in C6GI schedules
- Deterioration in company reputation
- Levels of stakeholder and wider community outrage.

### 2.2. Plan Objectives

The objectives of this CCP include:

- Identification of stakeholders relevant to the C6GI
- Identification of the appropriate level, type and timing of engagement required for each stakeholder group
- Provision of opportunities for stakeholders' input to project planning through the identification of potential project issues and impacts
- Development of a framework for monitoring engagement activities and community attitudes in relation to the Project.

- Adherence to relevant requirements of any government funding.

In order to achieve these objectives, the CCP clearly outlines:

- **WHO** should be engaged: which stakeholders should be involved in the C6GI
- **HOW** they should be engaged: proposed communication and engagement mechanisms required to afford meaningful stakeholder involvement and input
- **WHEN** they should be engaged: when is the appropriate time in the project for involvement to occur?

The CCP also identifies methods to evaluate the effectiveness of the program.

In order to identify the relevant stakeholders and the appropriate engagement mechanisms for these groups, the development of this CCP has been supported by the knowledge scan and contextual analysis undertaken by *Sheridan Coakes Consulting Pty Ltd* for the PWEPP CCP and updated to include any extra and updated information required for the extended offshore location. This is to provide a better appreciation of the C6GI location; the background and attributes of the local area and its communities; and salient issues that may have Project implications. The outcomes of this contextual analysis are provided in C6GI CCP, Appendices A, B & C (Sheridan Coakes Consulting Pty Ltd, 2012).



### 3. STAKEHOLDER ANALYSIS

This section identifies key stakeholders of relevance to Project. The analysis draws upon the following data sources:

- Carnegie's existing stakeholder database
- Carnegie's PWEPP CCP (Sheridan Coakes Consulting Pty Ltd, 2012)
- Carnegie's internal documents
- Analysis of relevant government websites and social indicators
- Other relevant reports/outcomes of historical consultation programs undertaken in the local area
- Contextual analysis is the same as that for the PWEPP (Sheridan Coakes Consulting Pty Ltd, 2012, Appendices A, B & C).

#### 3.1. Identifying Key Stakeholders for the C6GI

As defined by Burdige (Burdige, 2004), stakeholders are those who:

- Live nearby a resource
- Use/value a resource
- Have an interest in the resource.

Consequently, in developing a comprehensive CCP for the C6GI it is important that a broad range of stakeholders are involved in the process. Such groups will include not only those with an active interest in the Project, but also those groups that have a functional linkage to the Project (Sheridan Coakes Consulting Pty Ltd, 2012).

A summary of the types of stakeholder group categories for consideration in stakeholder identification is provided in the following chart (Figure 4) developed by Coakes Consulting (2012). Each of these stakeholder groups are further described below, culminating in the development of a comprehensive Stakeholder Register for the C6GI and a summary Stakeholder Map (Appendix A).

To ensure adequate representation of the community and stakeholders, the following stakeholder groupings have been identified as being potentially relevant to the C6GI at this stage. Examples of strategies proposed to engage each group are outlined in Section 5.1.

##### 3.1.1. Primary Stakeholders

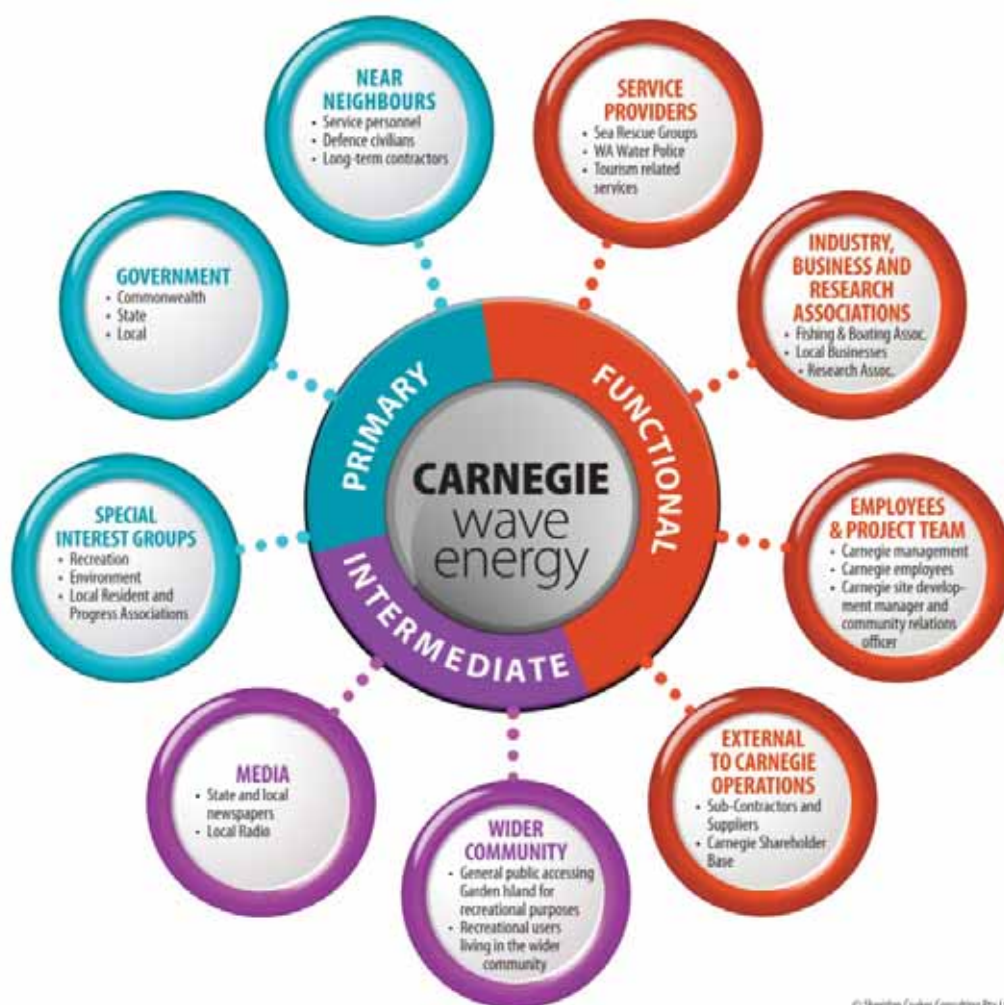
###### 3.1.1.1. Near Neighbours

Specifically, those near neighbour areas in closest proximity to the PWEPP include:

- Garden Island Residents:
  - 2300 service personnel living on the HMAS Stirling Naval Base
  - 600 defence civilians
  - 500 long-term contractors (plus short-term contractors on the island)
  - Other local recreational users

Nearby landholders and local residents are a key stakeholder group for any operation. However, in the case of Garden Island, many residents are military personnel and Defence contractors and will potentially have different concerns than typical, private landholders and tenants. Military personnel will likely be more concerned with security issues and any impacts on military operations rather





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Figure 4. Map of Key Stakeholders (Source: Coakes Consulting©)

than property values and perceived disruption to their way of life. The one exception will be off-duty DoD personnel and contractors whose off-duty recreational activities may be impacted for short time periods. (Sheridan Coakes Consulting Pty Ltd, 2012)

### 3.1.1.2. Government

The Australian Federal, WA State and Local Governments are key stakeholders to be considered as part of planning and operations (Table 2).

Carnegie has had a formalised relationship with the DoD since PWEF inception, initially through a Memorandum of Understanding and more recently with agreements for onshore tenure, project development, environmental and planning approvals and power and water offtake.

In addition to the DoD, other Australian Government departments, agencies and relevant representatives need to be engaged where appropriate, such as Department of the Environment regarding environmental approvals and Department of Industry regarding federal project funding and tenure. Western Australian Federal Members of Parliament (MPs) local to the C6GI should also be consulted, e.g., Gary Gray, member for Brand, Melissa Parkes, member for Fremantle, and relevant senators.

Relevant WA State Government departments also need to be engaged, particularly those departments involved in project approvals such as the Environmental Protection Authority, the WA Department of Lands, the WA Department of Planning and the WA Department of Parks and Wildlife.

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It is also vital that WA State MLAs/MLCs are involved in any stakeholder engagement activities, as these members can be active in community representation and advocate on behalf of renewable energy, e.g., the Honourable Phillip Edman, MLC, Ms Simone McGurk, MLA and Members for South Metropolitan Region.

Both the City of Rockingham and City of Fremantle have expressed interest in keeping abreast and informed of Carnegie's wave energy developments. Potential LGA representatives to continue to engage include: the Mayor, Chief Executive Officers (CEOs), councillors, environment officers, planning officers and coastal engineering officers. Of note, in a 2012 news report, Rockingham Mayor, Barry Sammels, publicly praised the completion of the offshore trial of CETO 3 in 2011, citing wave energy as a growth industry with the potential to bring employment and economic benefits to the area.

**Table 2 - Key Government Stakeholders**

Australian Government	WA State Government	Local/Regional Government
<ul style="list-style-type: none"> <li>• AusIndustry Business Services</li> <li>• Australian Communications &amp; Media Authority</li> <li>• Australian Fisheries Management Authority</li> <li>• Australian Hydrographic Service</li> <li>• Australian Maritime Safety Authority</li> <li>• Australian Renewable Energy Agency (ARENA) (Independent funding body associated with the Department of Industry)</li> <li>• Clean Energy Finance Corporation</li> <li>• Department of Defence, RAN, HMAS Stirling (Commanding Officer, Commander, Defence Support Group, Central &amp; West, and Base Support Group)</li> <li>• Department of Environment</li> <li>• Department of Finance</li> <li>• Department of Industry</li> <li>• National Native Title Tribunal (Commonwealth Attorney-General)</li> <li>• Relevant Members of Parliament and Senators</li> </ul>	<ul style="list-style-type: none"> <li>• Cockburn Sound Management Council</li> <li>• WA Department of Aboriginal Affairs</li> <li>• WA Department of Commerce</li> <li>• WA Department of Environmental Regulation</li> <li>• WA Department of Fire and Emergency Services</li> <li>• WA Department of Finance: Public Utilities Office</li> <li>• WA Department of Fisheries</li> <li>• WA Department of Lands</li> <li>• WA Department of Mines and Petroleum</li> <li>• WA Department of Parks and Wildlife</li> <li>• WA Department of Planning</li> <li>• WA Department of Transport: Maritime Safety &amp; Oceanographic Services</li> <li>• WA Environmental Protection Authority</li> <li>• Fremantle Port Authority</li> <li>• Heritage Council of WA</li> <li>• WA Marine Parks and Reserves Authority</li> <li>• WA Metro South-West Development Assessment Panel</li> <li>• WA Museum (Maritime)</li> <li>• WA Planning Commission</li> <li>• WA State Natural Resource Management Office</li> <li>• WA Water Police</li> <li>• Western Power</li> <li>• Appropriate MLAs and MLCs</li> </ul>	<ul style="list-style-type: none"> <li>• City of Cockburn Mayor</li> <li>• City of Cockburn Councillors</li> <li>• City of Cockburn CEO</li> <li>• City of Cockburn coastal engineering officers</li> <li>• City of Fremantle Mayor</li> <li>• City of Fremantle Councillors</li> <li>• City of Fremantle CEO</li> <li>• City of Fremantle coastal engineering officers</li> <li>• City of Fremantle environment officers</li> <li>• City of Rockingham Mayor</li> <li>• City of Rockingham Councillors</li> <li>• City of Rockingham CEO</li> <li>• City of Rockingham coastal engineering officers</li> <li>• City of Rockingham planning officers</li> <li>• City of Rockingham environment officers</li> <li>• Peron Naturaliste Partnership</li> </ul>

**3.1.1.3. Special Interest/Recreation/Environment Groups**

There are various special interest and recreational groups who may have significant interest in the C6GI, particularly as it relates to offshore development activities and the need for a marine closure area.

PWEP was positively perceived by many special interest and environmental groups as wave energy is an abundant renewable energy resource generating zero emissions and C6GI may have the same support. However, some groups may raise concerns and issues with regard to potential impacts to offshore flora and fauna, economic and social and recreational activities. Further, other groups may also have an interest in seeking community investments at regional and local levels.

Local special interest groups with a particular interest in the Project may include those identified in Table 3.

**Table 3 - Potential Special Interest Groups**

Recreational Groups	Environment Groups	Other
<ul style="list-style-type: none"> <li>• Australasian Diving Academy</li> <li>• Boating WA</li> <li>• Cockburn Powerboat Association</li> <li>• Cruising Yacht Club of WA</li> <li>• Fremantle Cruising Yacht Club</li> <li>• Fremantle Sailing Club</li> <li>• Mangles Bay Fishing Club</li> <li>• Other recreational fishing groups</li> <li>• Perth Game Fishing Club</li> <li>• RecfishWest</li> <li>• Rockingham Offshore Fishing Club</li> <li>• Rockingham Volunteer Sea Rescue Group</li> <li>• Safety Bay Yacht Club</li> <li>• Scubanautics Diving Academy</li> <li>• Surfing WA</li> <li>• Volunteer Sea Search and Rescue Association</li> <li>• WA Yachting</li> <li>• West Coast Dive Club</li> </ul>	<ul style="list-style-type: none"> <li>• Australian Marine Conservation Society</li> <li>• Birdlife Australia</li> <li>• Conservation Council of WA</li> <li>• Conservation of Rockingham Environment (CORE)</li> <li>• Friends of Lake Richmond</li> <li>• Friends of Point Peron</li> <li>• Friends of Shoalwater Islands Marine Park</li> <li>• Naragebup Rockingham Regional Environment Centre</li> <li>• Preserve Point Peron</li> <li>• The Pew Trusts Foundation</li> <li>• The Wilderness Society</li> </ul>	<ul style="list-style-type: none"> <li>• Capricorn Sea Kayaking</li> <li>• Local Resident and Progress Associations</li> <li>• Rivergods</li> </ul>

**3.1.2. Functional Stakeholders**

**3.1.2.1. Service Providers**

*Rescue-related Services*

Offshore, the C6GI will comprise of three CETO units and subsea cables. The offshore area occupied by the CETO units themselves will be a closure area for maritime safety reasons. Whilst the location of CETO units will be clearly marked in accordance with maritime safety regulations and notifications issues through Temporary Notice to Mariners (TNTM), there is the possibility that

boaters, divers and fishers will encroach upon the closure area. Further, there is the possibility, however remote, of C6GI equipment failure potentially causing a hazard to vessels operating in the immediate area. As a result, it may become necessary for the WA Water Police or local sea rescue groups to become involved.

Carnegie previously worked with the WA Department of Transport and Australian Maritime Safety Authority to develop and implement a maritime safety strategy which included safety marks, TNTMs and implementation of a marine closure area for safety reasons. In addition Carnegie developed an Emergency Management Plan for the single CETO unit deployment in 2011 and an Emergency Response Plan for PWEP in consultation with WA Department of Transport, WA Water Police, the City of Rockingham and Rockingham Volunteer Sea Rescue Group. This will be refined for the purposes of the C6GI.

Examples of relevant water rescue groups include:

- Cockburn Volunteer Sea Search & Rescue
- Fremantle Sea Rescue
- Rockingham Volunteer Sea Rescue Group
- Volunteer Marine Rescue WA
- WA Water Police.

#### *Tourism-related Services*

The City of Rockingham markets itself as a popular tourist destination that offers a range of experiences and activities for visitors including a penguin viewing facility, scuba diving, golf and swimming with dolphins (Sheridan Coakes Consulting Pty Ltd, 2012). As many of these activities are marine-based, tourism bodies may be interested in being informed about the C6GI progress, as with the PWEP, and have an opportunity to share their views. It should be noted that during previous community consultation processes these stakeholders had little interest to hear of the PWEP and expressed no concerns.

Examples of relevant tourism bodies include:

- Marine Tourism WA
- Peel Tourism Association
- Rockingham Visitor Centre
- Tourism Council WA.

#### **3.1.2.2. Industry, Business and Research Associations**

##### *Fishing and Boating Associations*

The following are boating, fishing and general industry associations that could be potentially impacted by the C6GI and should be engaged, as previously with the PWEP.

- Commonwealth Fisheries Association
- Charter Boat Owners and Operators Association
- WA Boating Association
- WA Fishing Industry Council
- WA Game Fishing Association

- WA RecFishWest
- Western Rock Lobster Association
- Western Rock Lobster Council
- Yachting WA

### *Business Groups*

As has been highlighted above, Rockingham City is a popular tourist destination given its proximity to the sheltered waters of Cockburn Sound and Warnbro Sound, with Penguin Island, Seal Island and Garden Island also close by. The city promotes itself as an area attracting residents who wish “to enjoy an excellent quality of life by the seaside”. Although C6GI is much further offshore than the PWEP, examples of business stakeholders that could potentially be impacted include:

- Chamber of Commerce and Industry of WA
- Clean Energy Council
- Rockingham Kwinana Chamber of Commerce
- Rockingham Wild Encounters
- Local boat hire companies.

It should be noted that during previous community consultation processes these stakeholders were interested to hear of the PWEP and expressed no concerns.

### *Research and Renewable Energy Associations*

Carnegie will engage with a range of stakeholders via relevant renewable energy industry associations and other related energy and research associations around the world. This will allow Carnegie to reach other stakeholders interested in, and engaged with, marine energy and offshore industries (e.g., general environmental specialists, the finance community and lawyers, etc.), for example:

- Australian Institute of Marine Science
- Centre for Marine Science and Technology, Curtin University
- Clean Energy Council
- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- European Ocean Energy Association
- Murdoch University
- Ocean Energy Systems
- Oceans Institute, University of Western Australia
- Renewables UK
- Scottish Association for Marine Science
- UK Natural Environment Research Council
- University of Tasmania's Australian Maritime College



### **3.1.2.3. Employees and Project Team**

Employees and the Project Team are a functional stakeholder group, i.e., have a functional linkage to the operation and its activities. This group includes the following individuals and groups:

- Carnegie board of directors
- Carnegie management
- Carnegie project team
- Carnegie employees

### **3.1.2.4. Others External to Carnegie Operations**

Previously, additional individuals and groups with a functional linkage to Carnegie and the PWEF have formed a part of ongoing community consultation, with by far the majority keen to be kept informed of ongoing activities by receiving newsletters, etc. This aspect of community consultation should be continued with this Project's consultation activities.

Additional individuals and groups with a functional linkage to the C6GI and its activities include:

- Consultants to Carnegie
- Contractors and sub-contractors
- Shareholders
- Suppliers
- Other interested parties

### **3.1.3. Intermediate Stakeholders**

#### **3.1.3.1. Wider Community**

The wider community is defined as community residents residing within the broader City of Rockingham, City of Cockburn, Town of Kwinana and City of Fremantle. Whilst unlikely to be contacted personally, as with PWEF these groups will be kept informed through wide-reaching communication mechanisms such as community information days and/or displays, newsletters, information sheets, and local media (See Section 5.1 for details of engagement strategies).

Civilians taking a day-visit to Garden Island may be concerned with impacts to their recreational activities, although this did not turn out to be the case with the PWEF. Many issues commonly associated with recreational land and water use may be amplified due to the island and offshore development activities of C6GI. In particular, issues such as closure areas and related safety implications could be the subject of concern, an issue raised by some during PWEF community consultations undertaken to date (see Section 3.2). These wider community members may include:

- General public who visit/access Garden Island for recreational purposes. (NOTE: The public must travel by private boat, can only land during daylight hours and must leave the island by nightfall).
- Recreational users living in the wider community who could potentially be impacted from a recreational (e.g., exclusion zones) and visual perspective.

#### **Media**

Media stakeholders include newspaper (print and electronic), broadcasting (television, radio) and internet media, at global, national, state and regional/local levels. Media relationships are managed by Carnegie directly.

### 3.2. Stakeholder Issues

The following section provides a summary of known stakeholder issues based on information obtained from a number of sources:

- Internal database and records of community consultation. Carnegie has already undertaken a range of engagement activities with community consultation at both a corporate and project-specific level over 15 years of development and testing of the CETO technology and the PWEF (mechanisms that have been used by the company to date are discussed at Section 4.0)
- Review of relevant internal company documents and reports
- Media review and analysis.

An awareness of historic and/or existing community issues is critical to the development and implementation of the CCP as these issues are likely to be raised during any future engagement activities with reference to the current C6GI. Direct acknowledgement of these in the engagement process affords Carnegie the opportunity to be prepared to address such issues, should they arise during future planned consultation activities.

#### 3.2.1. Issues Identified During Previous Consultations

Main themes that have been identified during consultation activities undertaken for the single CETO unit commercial demonstration completed in 2011 and the broader PWEF to date are identified in Table 4.

**Table 4 -Community Issues and Concerns by Theme**

Theme	Issues Raised
Construction and Operation Impacts	<p>Potential for damage to the causeway from CETO in the event that the Buoyant Actuator (BA) breaks loose</p> <p>Enquiry about the submerged depth of the BA and why it could not be submerged further below the surface than current specifications</p> <p>General construction impacts</p> <p>Clarification between capacity factor and resource factor of the full-scale unit</p> <p>Clarification of general PWEF timing</p>
Current Uses of the Project Area	<p>Accessibility</p> <p>Potential disturbance to existing infrastructure, including the Naval Underwater Tracking Range</p> <p>Impacts on sea users, including divers, surfers and recreational and commercial boaters and fishers</p> <p>Necessity for vessels to remain clear of construction activities and the marine closure areas</p> <p>The requirement for a closure area that may further impact fishing activity in the area.</p>
Marine Environment	<p>Marine fauna interactions</p> <p>Marine fauna entanglement, e.g., cetaceans, marine turtles, pinnipeds</p> <p>Impact of underwater noise on cetaceans and pinnipeds</p> <p>Potential impacts to the marine and terrestrial environment including disturbance of sensitive fauna, underwater noise, vegetation clearance and accidental release of hydraulic fluid</p>



Theme	Issues Raised
	Changes to coastal geomorphology and wave climate through energy extraction General landscape and seascape impacts Potential of the CETO units to attract marine life and become FADs/artificial reefs.
Marine Safety	Maritime safety related to the presence of the offshore CETO units Concern over maritime safety issues Public maritime safety and emergency response procedures.
Project Economics and Capacity	Funding security Viability of wave energy industry and renewable energy industry Variable energy peak impacts on grid Ability for the PWEP to power Rockingham (both as a demonstration project and for future commercial projects) and potential for providing power to the Mangles Bay Marina.
Employment	Opportunities for employment Opportunities for local industry involvement in manufacturing and provision of services.
Heritage	Potential impacts on cultural heritage, both indigenous and non-Indigenous.
Collaboration and Support	General support of wave energy and interested in research collaboration Overall support for the PWEP.

### 3.2.2. Issues Arising From Media Review

Typically a media review is a useful tool in helping establish the Project context and identifying potential issues of stakeholder concern during the implementation of the engagement plan. Carnegie will continue to remain abreast of any emerging community concerns via their media monitoring program and feedback from community consultation.

A review of newspaper articles and letters to the editors from 2009 to May 2012 was undertaken by *Sheridan Coakes Consulting* for the PWEP CCP in order to identify potential issues as they related to Carnegie as an organisation, the PWEP, the renewable energy industry as a whole and wave energy specifically (*Sheridan Coakes Consulting Pty Ltd, 2012*). Common issues and discussion points that emerged through the analysis included: growing the renewable energy sector and associated benefits; commercialisation of wave energy projects and potential for project failure.

These issues were thematically summarised in the PWEP CCP (*Sheridan Coakes Consulting Pty Ltd, 2012, Table 3.4*) and the sub-sections below come from this report (*Sheridan Coakes Consulting Pty Ltd, 2012*). Since the PWEP CCP there has been a change of Federal and State governments with a different approach to renewable energy, although globally there is a more generally supportive approach (*Nachmany, et al., 2014*).

#### 3.2.2.1. Economic Benefits of CETO Technology

A large proportion of media reviewed in the analysis generally revealed favourable coverage of Carnegie as an organisation. Wave energy in general, and the CETO technology in particular, were also positioned by several public officials as a valuable source of renewable energy with the potential to create employment, generate investment in the area, and boost the economy. This positive outlook toward Carnegie and CETO was underscored by the fact that the WA state government is

targeting the renewable energy sector as a significant source of energy production over the next few years.

### **3.2.2.2. Commercial Viability of Renewable Energy**

The media review identified questions raised about the commercial viability of the emerging renewable sector without financial support. For example, articles reported in 2011 discussed the fact that Carnegie's Albany Project was deemed unviable as a demonstration project due to the high costs of infrastructure (Randall, 2009). It was suggested only a significant infusion of government grant funding could expedite the Project. Articles stated that government subsidies were vital for fostering and commercialising renewable energy innovations and letters to the editor revealed concern over the technical/operational viability of wave energy projects during periods of low swell.

Questions about the viability of the renewable energy sector more generally were also raised and a need for financial support through government funding was identified in order for Australia to position itself as a world leader in renewable energy.

### **3.2.2.3. Failure of a Competing Wave Energy Project**

In 2010, a high profile failure was experienced by another ocean energy project developer. A wave energy structure located in NSW was undermined by the very water forces it was intended to harness. Despite attempts to tow the structure to shore, workers were hampered by heavy seas and unable to rescue it. The structure was carefully monitored over several days to ensure it didn't enter shipping channels, but the entire platform ultimately sunk. According to reports, the decommissioned generator remains at sea in need of dismantling and salvaging at exorbitant costs and is aimed to be removed next year (Humphries, 2015).

Further to this, Oceanlinx has gone into liquidation and, globally, some other wave energy companies have experienced financial difficulties, e.g., Pelamis, Aquamarine, though still managing to proceed with projects.

A more recent media review shows media reports of other ocean energy companies and projects proceeding very positively, e.g., OTEC, WavePOD, DTOcean. A new analysis recently published in the Journal, *Renewable Energy*, by Oregon State University suggests "...that large-scale wave energy systems developed in the Pacific Northwest should be comparatively steady, dependable and able to be integrated into the overall energy grid at lower costs than some other forms of alternative energy, including wind power." (Oregon State University, 2015).

#### 4. COMMUNITY ENGAGEMENT TO DATE

To date, Carnegie has used a range of mechanisms for community consultation relating to the development of the CETO technology, the previous commercial scale CETO unit demonstration project and the PWEF. These are directed by Carnegie’s internal communications plan (Carnegie Wave Energy Ltd, 2012) which includes the requirements of ASX guidelines and rules, corporate objectives and project specific plans such as the CETO3 Stakeholder Consultation Plan (Sheridan Coakes Consulting Pty Ltd, 2012).

Carnegie is bound by the continuous disclosure rules of the ASX and releases material information to the market, and broader public, on a routine basis.

In addition to liaison with the Australian, State and Local Governments, Carnegie has been engaging with local community groups (e.g., specific interest groups, schools, community groups, etc.) both throughout the PWEF consultation process and on an *ad hoc* basis.

For the single commercial scale CETO unit deployment off Garden Island in 2011 and the PWEF, Carnegie developed and implemented stakeholder management plans. These identified key stakeholders, engagement mechanisms and recorded issues raised, responses and associated management and mitigations measures. Methods for stakeholder engagement included personal/face interviews, information sheets, public meetings, project briefings, public notices, email notices, targeted letters, presentation at conferences and public events and progress reports to relevant authorities. Outputs from stakeholder consultation formed a significant part of the environmental management plan that supported the applications for the required permits and approvals and also formed part of regular milestone reporting to funding bodies.

For the purposes of this CCP, it is important to distinguish and separate relevant stakeholder engagement for the C6GI from more general engagement activities undertaken as part of Carnegie’s general corporate relations function.

Consultation mechanisms employed by the company to date are summarised in Table 5.

**Table 5 - Carnegie's Existing Engagement Mechanisms**

Approach	Details
<b>General</b>	
Annual General Meetings (AGM)	Australian Stock Exchange (ASX) requirements oblige Carnegie to hold AGMs which can be attended by any shareholder or their proxy. Prior to these meetings, a Notice of Meeting is dispatched to every shareholder as well as released to the public via the ASX. Carnegie’s AGMs are also advertised in the Business Calendar of The West Australian, Sydney Morning Herald, Brisbane Times, Border Mail and AAP Newswire. The most recent AGM was held on 1 November 2013 at Cottesloe Surf Lifesaving Club, 87 Marine Parade, Cottesloe, Western Australia. Approximately 80 people attended the meeting which consisted of formal AGM proceedings, as well as a company update presentation and a Q&A session with the full Carnegie board.
Company Website	Carnegie maintains a comprehensive website with information on the company, CETO technology, projects, investor relations and global market potential. The website’s function is to ensure ASX and ASIC compliance as well as to act as a public communication tool. A record of Carnegie announcements can be found on the website. Content on the website is controlled by Carnegie’s CEO and COO and administration of the website is the responsibility of the PAs to the CEO and COO.
Social Media	Carnegie currently maintains a <i>Facebook</i> page and a <i>LinkedIn</i> page.

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<b>Approach</b>	<b>Details</b>
Stakeholder Database	Carnegie actively maintains a database of direct enquires received via email and telephone, as well as responses. A recent analysis revealed, that approximately 29 % of enquiries related specifically to PWEF.
Community Outreach	<p>Carnegie is very active in the community, frequently presenting at conferences, community-based information sessions, schools, and to industry and other interested parties (e.g., Rotary meetings) either at its Fremantle Wave Energy Research Facility or off-site at various venues in Fremantle, Rockingham, Perth, regional WA, inter-state and internationally.</p> <p>Carnegie has provided information and visual displays for Scitech and the WA Maritime Museum, had public displays and information days at Rockingham Shopping Centre (2012) and at Fremantle Maritime Day (2013 &amp; 2014), as well as presenting and exhibiting nationally and internationally, e.g., at the Clean Energy Council Week, the WA SEA exhibition, the International Desalination Association Conference, the 2013 World Renewable Energy Congress, 2014 Renewable UK Wave &amp; Tidal Conference, 2014 Environmental Interactions with Marine Renewables II Conference, Institute of Mechanical Engineers, Australian Academy of Technological Sciences and Engineering, 2015 Scottish Renewables Marine Conference, 2015 European Wave and Tidal Energy Conference, 2015 Australian Water Association Conference, 2015 Ocean Energy Europe Conference, etc.</p>
<b>Project Specific</b>	
Letters and emails	Letters and emails are sent to inform key stakeholders of project progress and seek input on potential issues and management and mitigation measures. Letters are sent during project planning, execution and decommissioning, as evidenced by the single commercial scale unit deployment and ongoing PWEF consultation.
Newsletters via emails	Regular project updates sent via email to key project stakeholders, such as Department of Defence (DoD) and WA Department of Parks and Wildlife (DPaW), WA Department of Transport (DoT), and other interested parties in specific interest groups and the wider community via a company email database, plus entered on the website.
Project Briefings	Targeted project briefings have been held with a wide range of key stakeholder groups, for example DoD, WA State Government departments including DPaW, appropriate Federal and State Members of Parliament, Local Government Authorities, and peak industry, environmental and recreational bodies, e.g., RecFishWest, Conservation Council of WA, Rockingham Volunteer Sea Rescue Group.
Public Notices	Public notices have been issued through WA Department of Transport in the form of Temporary Notice to Mariners (TNTMs) to inform the general public and specific interest groups about offshore activities. Recent examples include those for foundation installation activities in the Carnegie Temporary Lease closure zone and for pipeline installation from Garden Island to the Carnegie Temporary Lease closure zone.
Public Information Meetings	Many public information displays and presentations have been held over the last 5 years, with the examples shown in Table 6 giving a brief overview.
Milestone/Progress reports	Milestone/Progress reports are issued to funding authorities and key stakeholders, including the Federal ARENA, AusIndustry, and the WA DER, on completion of project milestones.



**Table 6 - Examples of Carnegie’s Public Information Displays and Presentations**

Date	Event	More Information
8 Nov 2014	Fremantle Port Authority's annual Maritime Day	A Carnegie and Perth Wave Energy Project (PWEF) community information display included information posters and animations, information brochures and newsletters, as well as a community survey for wider community feedback. There was overwhelming support for the PWEF in general, with the only people not supportive of the project being those not supportive of renewable energy itself (one person). Those with maritime safety and/or environmental concerns expressed satisfaction and support after being informed how these issues were to be managed
31 Aug 2013		
5 Oct 2012	Defence Walk to Work Day on Garden Island, WA	A PWEF community information display was set up as a part of the Defence Walk to Work Day on Garden Island, WA. This included information posters and animations, information brochures, as well as a community survey for wider community feedback. There was overwhelming support for the PWEF in general, with those with maritime safety and/or environmental queries expressing satisfaction and support after being informed how these issues were to be managed.
11 Aug 2012	PWEF community information display held in Rockingham Shopping Centre plus 4 local boat ramps' surveys	Community surveys were undertaken in Rockingham Shopping Centre (where a display was set up) and at 4 local boat ramps to receive feedback from the wider community. There was strong support for the PWEF in general, with only one person not supportive of the project being not supportive of renewable energy in any form. Those with maritime safety and/or environmental concerns expressed satisfaction and support after being informed how these issues were to be managed.
3 Nov 2010	PWEF specific stakeholder update meeting was held to inform key stakeholders	Perth Wave Energy Project specific stakeholder update meeting was held to inform key stakeholders on progress with the PWEF and seek opinions on key issues at an early stage. Attendees included members of the public, Federal, State and Local government peak representative bodies and consultants. A record of all comments and issues raised was kept along with the responses given and any requirement for follow up.
1 Dec 2009	Rockingham Kwinana Development Organisation (RKDO) at The Cruising Yacht Club in Rockingham	Carnegie presented at a public information session organised by the Rockingham Kwinana Development Organisation (RKDO) at The Cruising Yacht Club in Rockingham. The session was open to the public and advertised through prominent local media ( <i>Sound Telegraph</i> and <i>Weekend Courier</i> ). The presentation focused on the proposed PWEF off Garden Island, WA. It was hosted by the Honourable Phil Edman MLC, member for South Metropolitan. Carnegie's Chief Operating Officer, Greg Allen, gave an update of the CETO wave energy technology and the proposed PWEF, followed by a question and answer session.
8 Sept 2009	Kwinana Liaison Committee Meeting, hosted by the Port of Fremantle	Tim Sawyer of Carnegie Wave Energy presented at the Kwinana Liaison Committee Meeting, hosted by the Port of Fremantle. The group was made up of representatives from various progress associations in the Kwinana and Cockburn Councils, local environmental groups and local industry representatives from BP and Alcoa. The presentation covered Carnegie Wave Energy Limited, CETO technology and the PWEF.



## 5. CETO 6 EXPANSION PROJECT CONSULTATION PLAN

Best practice community consultation is important in a project’s development and implementation phases. Managing stakeholders and the issues they identify through effective and targeted communication and engagement mechanisms can assist in: mitigating potential conflict that may arise; managing risks involved with company activities; and increasing community understanding and awareness of a project, operational activities and associated issues/impacts.

The following section outlines identified relevant key stakeholders and possible methods of engagement.

### 5.1. Engagement Plan

The engagement of stakeholders as part of the Project will continue to include a combination of:

- **Consultation and engagement:** to facilitate key stakeholder involvement in the identification of areas of interest/concern and strategies to address the issues raised.
- **Information provision:** to improve community knowledge and awareness of the company, its activities, the project and key issues/impacts should they arise.

In relation to C6GI, the following mechanisms will be used across the various stakeholder groups identified. Mechanisms previously adopted by Carnegie are also incorporated where relevant.

The following section presents a plan for community consultation that includes a description of possible mechanisms (Table 6), the application of these mechanisms to different types of stakeholders (Table 7) and a summary engagement plan, including proposed timing for activities (Table 8).

**Table 7 - Potential Mechanisms or Tools for Community Engagement**

Mechanism/Tools	Description
<b>Consultation Mechanisms</b>	
<i>Industry: Issue-specific Focus Groups/Small Group meetings</i>	Small group meetings and/or focus groups (of approximately six to eight participants) to discuss specific issues and potential management strategies during key Project phases. Relevant data collected through these would inform the assessment process, e.g., recreational users, Defence contractors. For example, groups would identify: <ul style="list-style-type: none"> <li>• current uses of and values associated with the Project area</li> <li>• issues /concerns in relation to the proposed project development and relevant mitigation/enhancement strategies</li> <li>• ongoing social impact monitoring and evaluation</li> </ul>
<i>Personal/face-to-face interviews</i>	A mix of face-to-face/phone interviews can be used to gather relevant data which may include perceptions about a project, stakeholder issues/concerns and/or opportunities in relation to a project. Such interviews are critical to inform project planning. These can also be undertaken at Community Open Days and information displays with the wider community
<i>Intercept Surveys</i>	A survey/s of local recreational users may be undertaken; could include recreational users of the City of Rockingham beach and boat ramp areas, and could be undertaken using an intercept survey method at local boat ramps or at community information displays NB: Rockingham Volunteer Sea Rescue Group provides rescue services from Point Peron and interacts with those launching boats from the Point Peron ramp



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<b>Mechanism/Tools</b>	<b>Description</b>
<i>Surveys (telephone/online)</i>	Broader survey/s may be undertaken, via telephone or online, to capture a random sample of the wider community Such a survey would assess community awareness, knowledge and issues associated with a project and Carnegie in general. This mechanism affords involvement/participation of the broader community. Appropriate sampling strategies should be used to inform relevant studies
<b>Communication Mechanisms</b>	
<i>Project/Community Information Sheets</i>	Project Community Information Sheets (CIS) and/or Project newsletters could be developed and distributed during key phases of a project. These may include: <ul style="list-style-type: none"> <li>• a detailed description of a project</li> <li>• outcomes of Carnegie’s environmental scoping studies/summary of consultation outcomes/perceived issues/proposed management strategies</li> <li>• details of detailed design and approvals.</li> </ul> Specific items which could also be included are: <ul style="list-style-type: none"> <li>• feature/s providing a summary of community and industry attitudes derived from the stakeholder consultation process</li> <li>• an overview of Carnegie’s engagement strategy going forward</li> <li>• project status updates</li> <li>• information regarding Carnegie’s various partnerships and grants, e.g., ARENA, CEFC, DoD, etc.</li> <li>• contact details for feedback /further information</li> <li>• relevant Q &amp; A’s</li> </ul>
<i>Community Open/Information Days</i>	Community Open/Information Days should be advertised in the local newspapers and on local radio stations at least 7 days in advance
<i>Annual General Meeting</i>	ASX requirements oblige Carnegie to hold Annual General Meetings every November which can be attended by any shareholder or their proxy. Prior to these meetings, a Notice of Meeting is dispatched to every shareholder as well as released to the public via the ASX. Carnegie’s AGMs are also advertised in the Business Calendar of <i>The West Australian</i> , <i>Sydney Morning Herald</i> , <i>Brisbane Times</i> , <i>Border Mail</i> and <i>AAP Newswire</i>
<i>Project Briefings</i>	In addition to personal meetings and/or focus groups, project briefings may be held with key stakeholder groups on an ‘as needed’ basis
<i>Key Stakeholder briefings/meetings</i>	Contact with wide range of key stakeholder groups, for example, appropriate relevant government agencies and elected officials, e.g., DoD, DoE, DoI, WA DoF, WA DPaW, WA DoT, etc., and peak industry, environmental and recreational bodies, e.g., Commonwealth Fisheries Association, RecFishWest, Conservation Council of WA, Rockingham Volunteer Sea Rescue Group, Western Rock Lobster Council, etc., will be maintained through the implementation of regular briefing sessions or meetings as required. These should be face-to-face where appropriate
<i>Website</i>	Carnegie’s website currently has dedicated Community Engagement and Projects sections that should be continually updated and refreshed. In addition to projects, the website lists general information about the company, CETO technology, investor relations and global market potential. Once released to the market, ASX announcements are added to the Company’s website
<i>Public Notices</i>	Notices in public places, as well as Temporary Notices to Mariners sent via the WA DoT, e.g., next to boat ramps, on Garden Island

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<b>Mechanism/Tools</b>	<b>Description</b>
<i>Email notices</i>	Notices related to key project activities can be sent electronically to relevant stakeholders listed on the company database, including a hyperlink to the Carnegie website
<i>Letters</i>	Letters should be sent to those key stakeholders directly impacted by a CETO project construction, deployment and operation. Letters will be differentiated according to the stakeholder's level of knowledge of a project, (i.e., new stakeholders versus those already familiar with a project)
<i>Community/Special Interest Group Newsletters</i>	Notices of relevant project updates and milestones could be sent via community/special interest group newsletters, e.g., newsletters sponsored by the WA DoT and RecFishWest.
<i>Project Site Visits</i>	Carnegie allows escorted site visits to the PWEP for Ministers, ARENA/LEED Staff and other parties/key stakeholders, as appropriate. Visits will be subject to safety and operation requirements, as well as subject to DoD security requirements and regulations. Media has also been invited to selected escorted site visits. Site visits must be coordinated in advance with Carnegie and the DoD Site visits may include visits to the Fremantle Wave Testing Facility, the PWEP's onshore power generation station (subject to DoD requirements and approval) and/or visits to the offshore PWEP site
<i>Information Booths at Community Events</i>	The company will investigate the sponsorship of booths at community events or festivals such as Fremantle Port Authority's Maritime Day.
<i>Conferences/Knowledge Sharing</i>	Presentations and booths at national and international conferences will be presented for sharing of technical information amongst other members of the renewable energy industry, e.g., the 2013 World Renewable Energy Congress, 2014 Renewable UK Wave & Tidal Conference, 2014 Environmental Interactions with Marine Renewables II Conference, 2015 Scottish Renewables Marine Conference, 2015 European Wave and Tidal Energy Conference, 2015 Australian Water Association Conference, 2015 Ocean Energy Europe Conference, etc.
<i>Media statements</i>	Media statements will be issued at key milestones during project assessment, construction and operation, for dissemination through print, radio, TV and internet media, company website. Statements will summarise project information, provide project updates and provide feedback as information becomes available
<i>Milestone/Progress Reports</i>	Milestone/progress updates (as per relevant funding agreements) will be issued by Carnegie to funding providers, e.g., the Federal ARENA and the WA LEED, on completion of project milestones or others as appropriate

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Table 8 - Potential Engagement Mechanisms for Different Stakeholder Types

	Department of Defence	Base Personnel	Contractors as appropriate	Recreational Users	Federal Government	State	Local Government Authorities	Funding Bodies	Appropriate Elected Members	Recreational Groups	Environmental Groups	Rescue Groups	Industry Associations	Research Associations	Tourism/Local Businesses	Internal Carnegie Operations	Wider Community	Shareholders	Media
Focus Groups/small meetings			✓							✓	✓	✓	✓	✓	✓	✓			
Personal interviews	✓	✓	✓		✓	✓	✓	✓								✓			
Intercept Surveys		✓		✓												✓	✓		
Surveys (Telephone/online)																	✓		
Project Community Information Sheet	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Community Open/ Information Days	✓	✓		✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AGMs																		✓	
Project briefings/ Key Stakeholder briefings/meetings	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Website	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Public Notices	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓
Email notices	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Letters	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Newsletters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Project Site Visits	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Information Booths at Community Events	✓			✓						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Conferences/ Knowledge sharing					✓	✓	✓	✓					✓	✓			✓	✓	✓
Media Statements	✓				✓	✓	✓	✓					✓	✓			✓	✓	✓
Milestone/project progress reports	✓				✓	✓	✓	✓								✓	✓	✓	✓

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**Table 9 - Summary Community Consultation Plan**

Purpose	Stakeholder Groups	Mechanism/Tools	Proposed Timing
<b>Consultation Mechanisms</b>			
<ul style="list-style-type: none"> <li>To facilitate C6GI approvals</li> <li>To keep key stakeholders informed of C6GI progress</li> </ul>	<ul style="list-style-type: none"> <li>Government departments</li> </ul>	Personal/face-to-face meetings Project briefings Email notices/newsletters Milestones/progress reports	Initial Nov 2014–Feb 2015; July 2015–June 2016 Ongoing interviews with key stakeholders on an as needs basis. Progress reports on completion of key activities/ milestones Ongoing to Q4 2017
<ul style="list-style-type: none"> <li>To understand current uses of and values associated with the C6GI area</li> <li>To identify issues/concerns in relation to the proposed C6GI</li> <li>To identify potential mitigation/enhancement strategies</li> </ul>	<ul style="list-style-type: none"> <li>Government agencies</li> </ul>	Personal/face-to-face meetings Project briefings Email notices/letters	C6GI Design Phase (Oct 2014 up to June 2016) During Construction (July 2016 up to Dec 2017) During Operations (Dec 2107–Dec 2018 or before) Ongoing interviews with key stakeholders on an as needs basis. (focus Nov 2014–Feb 2015 and July 2015–June 2016, and ongoing as appropriate) Regular feedback and updates at appropriate project milestones and on as-needs basis
	<ul style="list-style-type: none"> <li>Near neighbours</li> <li>Special interest/recreational/environmental groups</li> <li>Service providers</li> <li>Research groups</li> <li>Associations/Local businesses</li> </ul>	Personal/face-to-face meetings Community Open Day/s &/or Information booths at community events Intercept Surveys Emails/Letters CISs/Newsletters	C6GI Design Phase (Oct 2014 up to June 2016) During Construction (July 2016 up to Dec 2017) During Operations (Dec 2107–Dec 2018 or before) Ongoing interviews with key stakeholders on an as needs basis. Ongoing to Q4 2018 Regular feedback and updates at appropriate C6GI milestones to end of C6GI
<ul style="list-style-type: none"> <li>To assess general community knowledge and awareness of the C6GI and the company</li> <li>To identify community issues in relation to the C6GI</li> <li>To ensure the wider community has a voice in the process</li> </ul>	<ul style="list-style-type: none"> <li>Wider community</li> </ul>	Intercept survey/s Community Open Day/s &/or Information booths at community events Website CISs/Newsletters	Design & Approvals Phase (Oct 2014–June 2016) Feedback and updates at appropriate key C6GI activities Ongoing/as appropriate

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Purpose	Stakeholder Groups	Mechanism/Tools	Proposed Timing
<p><b>Communication Mechanisms</b></p> <ul style="list-style-type: none"> <li>To provide information about the C6GI</li> <li>To raise general public awareness of the C6GI               <ul style="list-style-type: none"> <li>Outcomes of consultation activities and environmental technical studies</li> <li>Proposed mitigation/enhancement strategies to address identified issues</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>All</li> </ul>	Project/Community Information Sheets Newsletters/Letters/Emails	Design & Approvals Phase (Oct 2014–June 2016) Feedback and updates at appropriate key project activities Ongoing/as appropriate
<ul style="list-style-type: none"> <li>To raise general public awareness of the C6GI</li> <li>To provide feedback to the community on the outcomes of technical studies</li> <li>To provide information on proposed mitigation/enhancement strategies</li> </ul>	<ul style="list-style-type: none"> <li>Invited key stakeholders</li> <li>Wider community</li> </ul>	Personal/face-to-face meetings Newsletters/Letters/Emails Community Information booths, e.g., at community events Garden Is, Rockingham, Fremantle	Design & Approvals Phase (Oct 2014–June 2016) Ongoing/as appropriate
<ul style="list-style-type: none"> <li>To keep shareholders informed of Carnegie's corporate and C6GI -related developments</li> </ul>	Shareholders	Annual General Meeting Email/ASX notices/Newsletters Website	Ongoing/as required
<ul style="list-style-type: none"> <li>To inform key stakeholders on C6GI progress and seek opinions on key issues at appropriate C6GI milestones</li> </ul>	<ul style="list-style-type: none"> <li>Government agencies</li> <li>Political Members</li> <li>Funding agencies</li> <li>Special Interest Groups</li> </ul>	Project Presentations Key Stakeholder briefings	Ongoing/as required
<ul style="list-style-type: none"> <li>To provide relevant C6GI information, and regular updates of consultation activities and assessment results</li> <li>To ensure company transparency and meet ASX and ASIC requirements</li> </ul>	<ul style="list-style-type: none"> <li>All</li> </ul>	Website Newsletters Submit to ASX	Ongoing/as appropriate

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Purpose	Stakeholder Groups	Mechanism/Tools	Proposed Timing
<ul style="list-style-type: none"> <li>To keep mariners informed of navigational hazards</li> <li>To provide details to mariners and base personnel affected by C6GI operations (i.e., timing, location, permitters of prohibited areas, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Service personnel</li> <li>Defence civilians/contractors</li> <li>Recreational users</li> <li>Rockingham LGA</li> <li>State Government</li> <li>Department of Transport</li> <li>AMSA</li> <li>Department of Defence</li> <li>Recreational groups</li> <li>Rescue groups</li> <li>Industry associations</li> </ul>	Public Notices Email notices Letters	Ongoing/as appropriate
<ul style="list-style-type: none"> <li>To explain the C6GI Project,</li> <li>Demonstrate Project progress</li> </ul>	<ul style="list-style-type: none"> <li>Media Representatives</li> <li>Invited key stakeholders</li> <li>Industry</li> </ul>	Project Site Visits Conferences/Presentations	As appropriate
<ul style="list-style-type: none"> <li>To inform general community members and active recreational users</li> </ul>	<ul style="list-style-type: none"> <li>Tourism/local business</li> <li>Wider community</li> <li>Media</li> </ul>	Information Booths at key Community Events Public notices Newsletters	As appropriate
<ul style="list-style-type: none"> <li>To provide C6GI information, updates and feedback in a timely manner to the print and broadcast media</li> </ul>	<ul style="list-style-type: none"> <li>Media</li> </ul>	Media statements	As appropriate

## 6. IMPLEMENTATION PLAN

### 6.1. Implementation Priority

The priority for implementation of the engagement activities for C6GI is provided in Table 10. Specific timings for activities are found in Table 8. The content of key communication messages will be informed by social, economic and environmental activities of the C6GI and will vary according to Project stage. Irrespective of the stage of the C6GI, a baseline level of community consultation and dialogue opportunities will be critical to building community trust and confidence in the company and the C6GI.

The following table (Table 10) presents consultation mechanisms relative to priority.

**Table 10 - Stakeholder Consultation Prioritisation**

Mechanism	Priority
Ongoing and as required personal interviews with key: <ul style="list-style-type: none"> <li>Federal Government Agencies</li> <li>State Government Agencies.</li> </ul>	Red
Personal/ face-to-face meetings and Project Briefings with: <ul style="list-style-type: none"> <li>Defence personnel and contractors</li> <li>recreation groups</li> <li>rescue groups</li> <li>local government and local development authorities</li> <li>other state government</li> <li>commercial fishers and boating industry groups</li> <li>Local businesses</li> </ul>	Red
Public Notices including Notices to Mariners of water impacts	Red
ASX releases, Company website, and social media updates	Red
Community Information Sheets	Red
Project Newsletters	Red
Community Information Day/s and/or Information Booths at Community Events with visual displays	Red
Email/Letter Updates	Orange
Intercept interviews with recreational users at Point Peron boat ramp/s and with wider community at Community Information Displays	Orange
Conferences/Knowledge-sharing	Orange
Regular media releases	Yellow
Project Site Visits	Yellow

Note: Red indicates high priority, orange indicates medium priority, and yellow indicates low priority



## 6.2. Stakeholder Engagement Tracking

### 6.2.1. Existing Processes

Due to the fact that wave energy is a relatively new technology, there has been considerable interest in Carnegie Wave Energy Limited as a company (i.e., corporate identity), as well as interest in specific projects, including, but not limited to the PWEF.

Carnegie already has a formal tracking process for corporate and stakeholder engagement. Generally, incoming calls with comments or concerns relating to the company's activities have to date been logged in a spread sheet, and passed on to members of the senior management team as appropriate. This was extended during the CETO 3 deployment to record stakeholder communications, queries and responses, expanded on for the PWEF and subsequently submitted to the WA State government to support approvals and permits.

Any shareholder enquiries received via telephone, email, fax or letters are currently recorded on the Carnegie Shareholder Enquires Log. Written response to communications received from shareholders are drafted by the CEO or CFO and emailed from the [enquires@carnegiwave.com](mailto:enquires@carnegiwave.com) email address. Calls may be forwarded as appropriate to members of the senior management team.

Any formal correspondence or negotiations between Carnegie and Government representatives or departments regarding project funding or partnerships must be approved by a nominated officer of the company. Any formal correspondence or negotiations between Carnegie and Government representatives or departments regarding project licensing or site development must be approved by Carnegie's Project Development Officer and, where appropriate, by an appointed officer of the company.

As Carnegie's operating footprint expands, the number of interactions and potential issues requiring attention will likely increase. Consequently a more formalised community consultation database, Darzin, was established by Carnegie to provide structure to the tracking and logging of communication and engagement activities. This process is under review and adaptive management update.

Potential scenarios most likely to generate complaints or the need for feedback may include:

- Feedback regarding closure/exclusion zones (for both professional and recreational sea users, especially fisheries)
- Concerns about emergency response procedures
- Concerns regarding maritime safety issues during project construction and operation
- Concerns over impacts to marine fauna and benthic habitat
- Incorrect perceptions or assumptions regarding the C6GI.

The company website will include responses to frequently asked questions (FAQs) and provide information on management and/or mitigation practices to the most commonly-lodged complaints. Furthermore, Carnegie's website will detail its community consultation processes in relation to the various C6GI phases, as well provide details on how to lodge a complaint, enquiry or provide general feedback to the company.

### 6.2.2. Recording of Community Consultation

As with the PWEF, ensuring timely responsiveness and feedback to stakeholders during the engagement program will be critical in building trust and developing effective key community relationships. In engaging community, Carnegie understands the importance of documenting stakeholder contact, issue identification, project impacts and opportunities, information requests, information requirements and associated C6GI team actions in an effective community consultation database/management system. These processes can be captured in a formalised system, e.g., Darzin. Such systems have the ability to record community consultation contacts over time and

document community issues. They can be developed further to highlight relevant information requirements and actions arising from the engagement process to afford effective community management and assessment reporting.

Carnegie undertakes to:

- use a tracking mechanism in an effort to align the community consultation process (Darzin database at present)
- assign tracking of community consultation activities and designate a Carnegie employee to regularly update the database as a central job responsibility. The community consultation tracking process will be streamlined so multiple people are not attempting to speak to the same contact, to prevent inefficiencies, frustration and potential for communication breakdown

### 6.3. Monitoring and Evaluation

Evaluation is a critical component of effective engagement practice. Relevant process indicators will be developed to track progress of the CCP against its defined objectives. Carnegie recognises that such evaluation is important to ensure that engagement mechanisms are meeting the C6GI CCP's objectives and affording the collection of relevant data to inform the CCP. Examples of this can be seen in the *PWEP Community Consultation Report* (Carnegie Wave Energy Ltd, 2012).

Furthermore, it is important to assess whether the engagement mechanisms are facilitating meaningful participation and involvement of key stakeholders. Evaluation is also a useful tool to identify any significant changes or unexpected impacts associated with the C6GI as it progresses, affording early identification and management of impacts. The C6GI CCP will be updated, according to the monitoring and evaluation results, to ensure the ongoing improvement of community consultation.

### 6.4. Reporting

Regular reporting of the community consultation process, management, issues and responses will be provided, as appropriate, to the:

- Carnegie Board of Directors
- Project Steering Committee
- Key government stakeholders (including funding groups, DoD).

Summary of issues and responses will also be communicated to the wider community via emails, newsletters, etc.

This C6GI CCP will be directly fed into the environmental impacts assessment and management plans that support key approvals and permits for the C6GI.

## 7. COMMUNICATIONS/INFORMATION MANAGEMENT

Carnegie is an ASX-listed company with a multitude of stakeholders, developing an innovative renewable technology. As such, Carnegie and its related projects generate significant public and media interest. Carnegie's project locations and funding partnerships require interaction with all levels of government, necessitating awareness and understanding of stakeholder issues and regulatory requirements.

As an ASX-listed company, Carnegie must ensure it complies with all communication requirements under *ASX Rules and Guidance Notes*. It is the responsibility of the Company Secretary and CEO to ensure compliance in relation to the timely release of all market sensitive information to the ASX. Once released to the market, ASX announcements will be added to the company's website.

### 7.1. Information for Public Release

As a public company, Carnegie is required to release information subject to *ASX Listing Rules Guidance Note 8: Continual Disclosure*. ASX Guidelines require that Carnegie disclose information to the market that may have a material effect on the price or value of its securities.

In addition, the C6GI is subject to confidentiality provisions from the DoD, C6GI partners and the terms of any Funding Agreement (e.g., as with the PWEF and ERP, see Appendix B).

Carnegie will release information as appropriate via mechanisms such as the company website, information sheets, newsletters and media releases. Information about the C6GI that can be released into the public arena includes information such as C6GI description and basic project information, project activities, announcements regarding completed C6GI milestones achieved, environmental monitoring results and general C6GI performance.

### 7.2. Information Retained as Confidential

In line with Carnegie's strategic priority to protect its proprietary CETO Intellectual Property and commercial-in-confidence know-how, certain details about the C6GI and its performance will be kept confidential. This includes, but is not limited to:

- Detailed Project Engineering Design
- Detailed CETO Unit and Component Design
- Detailed C6GI Array and Infrastructure Design
- Detailed Performance Data
- Detailed Resource Data
- Detailed Budgets and Costings
- System know-how.

## 8. KEY MESSAGES

A key element of an effective community consultation plan is the development of targeted communications around key messages. Alignment on how the C6GI will be presented and discussed across various key stakeholders is essential.

The proposed community consultation mechanisms for the C6GI (outlined in Section 5.1) will be complemented by the development of a range of materials/C6GI resources with Project messages that are consistent and coordinated across the various delivery mechanisms. Carnegie will develop and maintain consistent key C6GI and operational messages structured around a number of key themes, such as:

- Corporate messages relating to investor relations, research and development and existing operations
- Project messages relating to key project features, timeframes, technology, funding
- Process and timing messages
- Approvals process messages
- Assessment (outcome) messages.

Carnegie recognises that the development of key messages is important to ensure that clear and concise information about the C6GI is provided to key stakeholders and the general community.

### 8.1. Project Materials

Key messages developed during the C6GI will be used to inform the development of relevant materials and to guide direct dialogue with key stakeholders. Materials and resources that could be developed as part of the C6GI include:

- C6GI information sheets and newsletters
- C6GI FAQ information sheets (including general, technical, environmental and social impact questions)
- PowerPoint and animation presentations
- C6GI-specific page on Carnegie website
- C6GI maps
- C6GI posters and display materials
- Media releases.

### 8.2. Assessment materials

Appropriate survey/interview guides will be developed to structure community consultation and ensure the comprehensive collection of assessment data. Survey/interview guides will be designed to meet the objectives of the C6GI CCP and will be informed by the various assessment and engagement methods applied throughout the C6GI CCP and previous projects.

### 8.3. Managing Stakeholder Expectations

It is important that key stakeholders are clear as to how they will be involved in the C6GI and understand their level of input at key activities/milestones in the C6GI implementation process. Through the development of appropriate C6GI materials, clarity will be provided as to when and how key stakeholders may be involved to provide input and feedback to the C6GI implementation process. This should involve clear articulation of negotiable and non-negotiable aspects of the C6GI.

### 8.4. Next Steps

The next steps include the tasks listed below. These tasks have been prioritised according to issues of importance identified in the CCP.

**Table 11 - Priority Engagement Activities**

<p><b>Short-term Priority Activities (next 2 months)</b></p>	<p>Finalise the detailed schedule of activities and implementation          Identify roles and responsibility between Carnegie and external consultants          Implement and input comprehensive key stakeholder database          Develop consultation materials/tools, e.g., PowerPoint presentations, CISs, newsletters, survey/interview guides          Review content of website for relevance/accessibility          In addition to current regulator discussions re approvals and permitting, initiate first round of community-based/key stakeholder engagement re issue scoping, e.g., face-to-face meetings and intercept surveys</p>
<p><b>Medium Term Priority Activities (3–6 months)</b></p>	<p>Continue community consultation program. Feedback results of technical studies and involve stakeholders in management measure development if required</p>
<p><b>Long Term Priority Activities (&gt;6 months)</b></p>	<p>Ongoing engagement program as required during project construction and operation activities</p>

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## Appendix A. Knowledge Scan: Understanding the Context

A community's response to change is driven by elements of the social context in which people live. Social context is best conceptualised as a series of interacting social systems, such as families, neighbourhoods, workplaces, and institutions (e.g., health and education) in which changes to one social system can influence other systems.

Given this interaction, community impacts associated with the Project are likely to be driven by the functional and affective relationship that the community has with the area. For C6GI, the functional relationships relate to both terrestrial and marine areas, particularly with regard to public recreational activities onshore and offshore, naval operations (both onshore and offshore) and uses of the area by the wider community. It is a small expansion as with that produced for PWEF, as the onshore and nearshore location is the same as PWEF, with the offshore location slightly further offshore. As such this Knowledge Scan is based upon the Australian 2011 census and updated and expanded from the PWEF CCP Knowledge Scan (Sheridan Coakes Consulting Pty Ltd, 2012).

Profiling of communities is an important part of any social assessment and engagement program, as it:

- Provides background of the key attributes of an area and its communities, upon which potential impacts can be predicted and measured
- Ascertains key stakeholders who may have an interest in the Project
- Identifies salient issues that may have Project implications.

The social profile outlined below provides the core data set needed to obtain a better appreciation of:

- Project location
- Governance structures and relevant strategies
- Elements of community capitals (Refer to Section 1.3)
- Public perception of the project.

Data used to inform this analysis has been sourced from:

- Relevant social statistics and indicator datasets, particularly Census data
- Government websites
- Media sources
- Internal Carnegie sources
- Relevant secondary data sources including company reports, assessments and stakeholder registers.

### A.1. Project Location

#### A.1.1. Offshore site

The C6GI Project will be located off the Perth metropolitan coast at a site that has a higher wave energy resource than the PWEF, which will allow for the demonstration of CETO technology in higher sea states. The potential offshore site, located approximately 10.2 km (5.5 nm) off the coast of Garden Island just beyond Five Fathom Bank, is being selected following a comprehensive review of suitable demonstration sites, together with technical surveys and analysis, including with geophysical and benthic habitat mapping surveys. The site is also close to supporting manufacturing and service industries and the Project in this location will have minimal environmental impact.

### **A.1.2. Garden Island**

Garden Island is a slender island about 10 km long and 0.5 km wide, lying approximately 5 km off the Western Australian coast and connected to the mainland by a man-made causeway. It is the home of the Royal Australian Navy's (RAN) fleet base, HMAS Stirling; however, limited public access is also permitted via boat and during daylight hours.

The following sections describe the Garden Island's naval base (HMAS Stirling) as well as the publically accessible section of the island.

#### **A.1.2.1 HMAS Stirling Naval Base**

HMAS Stirling is located on the shores of Careening Bay, on the south-eastern section of Garden Island, facing Cockburn Sound.

HMAS Stirling's primary purpose is to provide operational and logistics support to the RAN ships, submarines and aircraft based in WA. It is the largest base in the RAN and is home to more than 2,300 service personnel, 600 Defence civilians and 500 long-term contractors.

The planning of Stirling began in 1969 after the discussion of a feasibility study into the use of Garden Island as a naval base. The 4.2 km causeway linking the island with the mainland was completed in June 1973, and the island was formally commissioned in July 1978.

Since its 1978 commissioning, HMAS Stirling has expanded enormously within its existing boundaries. For example, the Submarine Escape Training Facility is one of six in the world and the only one in the southern hemisphere. HMAS Stirling was developed further under the Two-Ocean policy to become the main naval base on the west coast of Australia. Today, Stirling is home port to 12 fleet units: five frigates, six Collins Class submarines and a replenishment vessel. A Clearance Diving Team is also based at Stirling.

The 314-m long two-level "Diamantina Pier" and the redeveloped small ships harbour have vastly increased the wharf and berthing space available to surface ships and submarines at Stirling. Other major additions are the helicopter support facility located on the southern end of Garden Island, extensions to the RAN submarine Training and Systems Centre, the Training Centre-West complex and a trials, research and support facility (Royal Australian Navy, 2015).

#### **A.1.2.2 Public Access to Garden Island**

The public is welcome on Garden Island, but access is by private boat only and visitors must leave the island before nightfall. Visitors can picnic, swim, fish, surf, sail and anchor their boats. Approximately two-thirds of this Commonwealth-owned island is open to the public in daylight hours, with a Department of Parks and Wildlife Ranger patrolling the coastline and providing assistance to visitors.

The east coast is typically protected from bad weather and therefore safe for small craft except during stormy conditions. Visitors can surf on the more exposed west coast which also affords better fishing, but those wishing to cross the island, to take advantage of the surf and the better fishing, must stay on the paths as the scrub is thick, prickly and abounds with highly venomous tiger snakes ( (Royal Australian Navy, 2015).

## **A.2. Governance**

### **A.2.1. Commonwealth/Federal Governance**

Garden Island and the City of Rockingham lie within the boundary of the Australian Government Electoral Division of Brand. The Brand electorate covers an area of 411 km<sup>2</sup> and shares its boundaries with the divisions of Canning and Fremantle, spanning from Rowley Road in the north to the northern suburbs of the City of Mandurah in the south (see Figure A.1: The two largest local government areas (LGAs) in the division are the Town of Kwinana and the City of Rockingham. Currently under redistribution, new boundaries will apply for next federal election held after 19 January 2016. If an election was called and the writs issued

before this date, a mini-redistribution would be required. Enrolment in December 2014 was 106,310, with a projected 7.33 % increase by February 2017. The proposed modification to the Division of Brand is to transfer that portion of the Mandurah LGA that previously formed part of the Division of Brand into the Division of Canning. The proposed Division of Brand would then be contained wholly within the boundaries of the Kwinana and Rockingham LGAs and include Garden Island. The augmented Electoral Commission will make a final determination of boundaries and names of the electoral divisions for Western Australia by way of notice published in the Gazette on 19 January 2016 (Redistribution Committee for Western Australia, 2015).

At present, Brand is a diverse division with significant industrial operations, alumina refining, residential property developments, tourism and defence facilities including the HMAS Stirling Base. The Labor Party has successfully held the division of Brand in the Lower House since its proclamation in 1984, represented by Fatin (1984–96), Beazley (1996–2007) and, most recently, Gary Gray since 2007 (Australian Electoral Commission, 2015).



Source: Australian Electoral Commission, 2009

Figure A.1: Commonwealth Electoral Division of Brand

**A.2.2. State Governance**

The Project site is located in the WA State Electoral District of Rockingham (Lower House), and is one of 14 districts contained within the South Metropolitan Region (Upper House) (Western Australian Electoral Commission, 2013).

**A.2.2.1 WA State Electoral District of Rockingham**

The Rockingham electoral district is 48 km<sup>2</sup> and contained 25,134 electors in July 2013 from a total population of 37,140 (Western Australian Electoral Commission, 2014). In the Lower House, the Rockingham Member of the Legislative Assembly (MLA) is the Hon. Mark McGowan. From the 2011 census the median age was 42 years, with a median total weekly personal income of \$535.00. The top five Industries of Employment by Occupation are: Manufacturing, Construction, Public administration and safety, Retail trade, and Health care and social assistance. (Western Australian Electoral Commission, 2014).

The Rockingham District includes the following localities (See Figure A.2)

- Cooloongup
- East Rockingham
- Garden Island
- Hillman
- Peron
- Rockingham
- Safety Bay
- Shoalwater
- Waikiki.

**A.2.2.2 WA State South Metropolitan Region**

The South Metropolitan Region is 781 km<sup>2</sup>, contained 351,927 electors in July 2013 from a total population of 557,002 and includes the following districts (See Figure A.2):

- Alfred Cove
- Bateman
- Cannington
- Cockburn
- Fremantle
- Jandakot
- Kwinana
- Riverton
- Rockingham
- South Perth
- Southern River
- Victoria Park
- Warnbro
- Willagee.

In the Upper House, the elected Members of the Legislative Council (MLC) for the South Metropolitan Region are: Simon O'Brien, Liberal Party; Sue Ellery, WA Labor; Nicolas Goiran, Liberal Party; Kate Doust, WA Labor; Phil Edman, Liberal Party; and Lynn MacLaren, The Greens (WA). The top five Industries of Employment by Occupation for this region are: Health care and social assistance, Retail trade, Construction, Manufacturing, and Education and training. From the 2011 census the median age was 35 years, with a median total weekly personal income of \$664.00 (Western Australian Electoral Commission, 2014).



Source: Office of the Electoral Distribution Commissioners, 2011(Electoral Distribution Commissioners, 2011)

Figure A.2: Electoral District of Rockingham



### A.2.3. Local Governance

The City of Rockingham encompasses a total land area of about 260 km<sup>2</sup>, including significant areas of coastline and parkland. The local government area (LGA) is a rapidly developing residential area, with substantial industrial and commercial areas and a naval area on Garden Island. It has a total population of 104,336 in the 2011 census, now estimated to be 125,889 (City of Rockingham, 2012). The Council is represented by a Mayor (Barry Sammels) and nine councillors who represent one of the City's four wards and look after the interests of the community.

Over the last decade the City of Rockingham has been the fourth fastest growing municipality in Perth and is located in one of the nation's fastest growth corridors the City is one of Western Australia's future strategic metropolitan centres. (City of Rockingham, 2014)

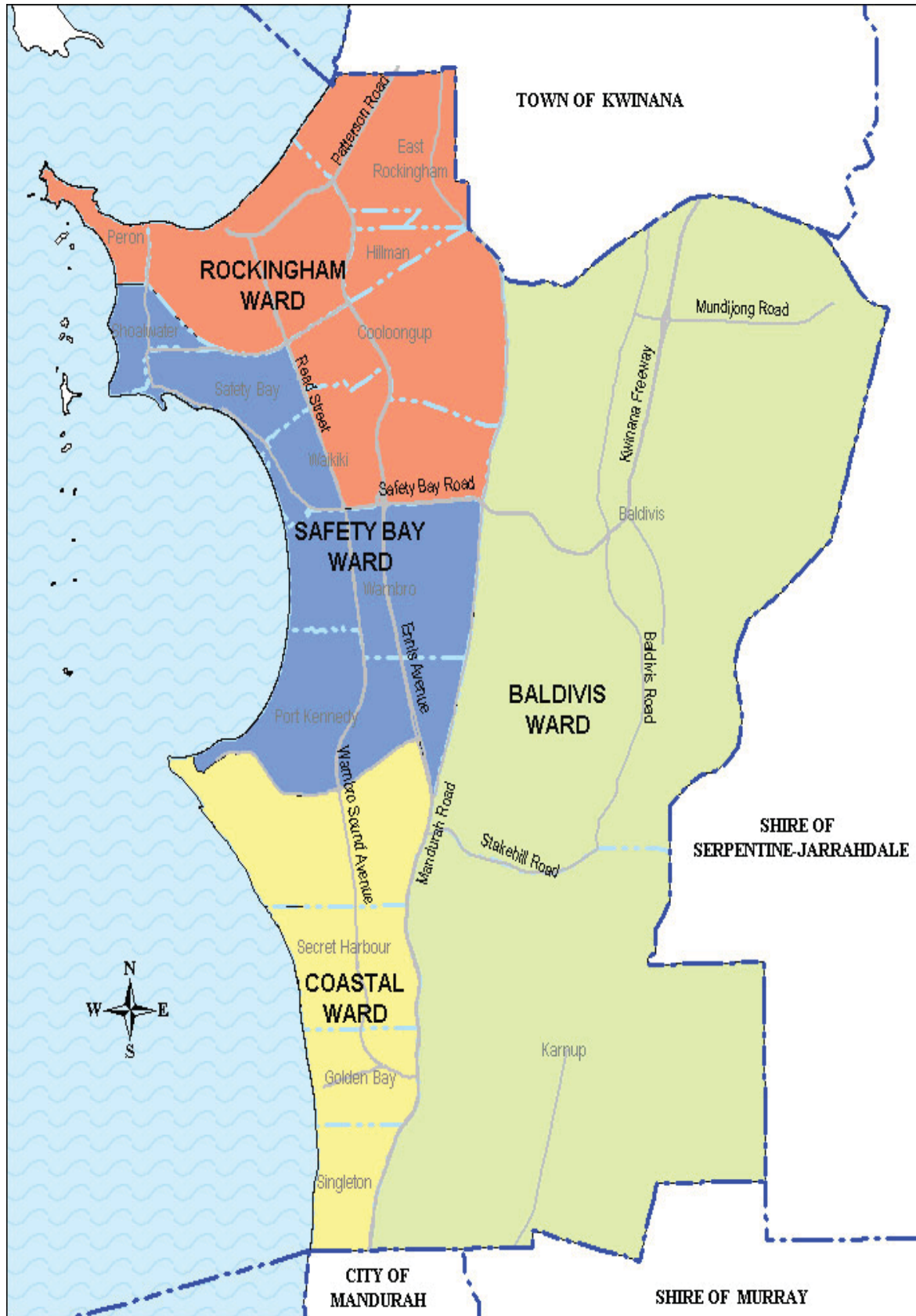
The LGA is located in Perth's outer southern suburbs, about 40 km south-west of the Perth CBD. The City of Rockingham is bound by the Town of Kwinana in the north, the Serpentine-Jarrahdale Shire in the east, the Shire of Murray and the City of Mandurah in the south and the Indian Ocean in the west (See Figure A.3) (City of Rockingham, 2012). Suburbs in the City of Rockingham include:

- Baldivis
- Cooloongup
- East Rockingham
- Garden Island
- Golden Bay
- Hillman
- Karnup
- Peron
- Port Kennedy
- Rockingham
- Safety Bay
- Secret Harbour
- Shoalwater
- Singleton
- Waikiki
- Warnbro

The Peron Naturalist Partnership (PNP) is a partnership between the local governments of Bunbury, Busselton, Capel, Dardanup, Harvey, Mandurah, Murray, Rockingham and Waroona and the State and Federal Government which aims to build resilience in regional coastal communities, reduce risks and optimise opportunities associated with climate change risks and climate vulnerability.

Whilst coastal vulnerability to climate change will continue to be of high importance, the City is continuing to develop an understanding of what other risks climate change might pose to the City, and the mitigation and adaptation actions required to prepare the City and its operations for the potential impacts. The Climate Change Response Plan, currently being prepared, will cover the next 60 years and will be reviewed annually to ensure new knowledge is incorporated, and to update assumptions and actions.

In addition to planning for climate change adaptation, the City continues to identify actions to reduce its carbon footprint. The Corporate Local Action Plan guides mitigation (reducing greenhouse gas emissions) activities across the City and its operations and is reviewed annually. The Corporate Local Action Plan builds on the City's previous participation in the Cities for Climate Protection Program and ClimateWise program (City of Rockingham, 2014)



Source: City of Rockingham, 2012 (City of Rockingham, 2012g)

**Figure A.3: Rockingham Wards**



### A.3. Capitals Framework

According to a number of sustainable society theorists (e.g. Beckley *et al.* 2008; DFID 1999; Ellis 2000; Hart 1999) there are five key capital areas that should be assessed to define levels of community resilience.

The following section of the report presents a baseline of key socio-economic and demographic data using a Community Capitals Framework which include the five capital areas (i.e., natural, economic, physical, human, and social). These capitals form the fundamental building blocks of a community’s resilience and sustainability and are critical in:

- informing the “state of health” at a community level;
- assessing the potential community socio-economic impacts associated with the Project;
- establishing the overall wellbeing and socio-economic status of the locality; and
- assisting in identifying potential stakeholders and the best means with which to engage with them.

Figure A.4 illustrates some of the key elements that are assessed within each of the capital areas, with more detail of each capital provided in the proceeding sub-sections.

The following sections of the report present a baseline of key relevant socio-economic and demographic data using the Community Capitals Framework.



Figure A.4: Elements of the five capital areas

### **A.3.1. Natural Capital**

Natural capital, or environmental assets within a locality, is defined as any stock or natural resource such as oceans, forests, oil and gas, or agricultural land that generate sustainable economic and commercial activities. For instance, farming communities are directly dependent on soil productivity and land availability whereas mining communities have dependencies on continued access to the mined resource.

#### **A.3.1.1 Garden Island**

Garden Island in Western Australia is Commonwealth land, owned and managed by the Department of Defence. It has been identified on the Commonwealth Heritage List as a place with Commonwealth and other heritage values (Godden Mackay Logan Pty Ltd, 2011). These heritage values largely derive from the natural values of the physical environments, remaining historic structures from World War II and the fact that the island is a secure Navy Base with restricted public access (consequently these values have not been adversely impacted by human actions, deliberate or otherwise). Other cultural values arise from the archaeology and history associated with the first settlement in Western Australia by Captain James Stirling in 1829, use of the island in the twentieth century by holiday-makers and ongoing use of the site by the Navy at HMAS Stirling which has been designed with a distinctive architectural and landscape style. Indigenous mythological beliefs associated with sites on the island also make a contribution to the heritage values (Godden Mackay Logan Pty Ltd, 2011).

Garden Island WA sites also features on the State legislation heritage database and the local city of Rockingham's Municipal Heritage Inventory.

The coast of Garden Island WA consists of sandy beaches, many backed by high and steep sand dunes, and limestone cliffs with dangerous overhangs and caves. One of the many natural heritage values of Garden Island WA is its success as a habitat for Tiger Snakes and Carpet Pythons among the prickly lily undergrowth. The inaccessibility of the bush, natural dangers of cliffs, snakes and thick inhospitable bush cover are not conducive to public (or Defence personnel) access penetrating into the island away from the beaches. The island fauna is virtually free of disturbance by humans or feral animals; rabbits are absent and there are no resident foxes or feral cats; thus, the island provides a refuge for species threatened by fox or cat predation on the mainland (Godden Mackay Logan Pty Ltd, 2011).

Garden Island is an important habitat for several species that have declined in the Perth metropolitan area, including the lined skink (*Lerista lineata*), brush bronzewing (*Phaps elegans*), tiger snake (*Notechis scutatus*), and King's skink (*Egernia kingii*).

The site includes some of the best preserved parabolic dunes of the Quindalup soil unit.

Garden Island supports 30 waterbird species that are listed on international migratory bird agreements (Japan-Australia and China-Australia Migratory Bird Agreements and the Bonn Convention). The island is a breeding site for bridled tern (*Sterna anaethetus*), rainbow bee-eaters (*Merops ornatus*) and osprey (*Pandion haliaetus*), which nest on the rocks surrounding the island. Sandy beaches on the west coast of the island provide important feeding habitat for the Sanderling (*Calidris alba*). The island also provides nesting habitat on beaches for the breeding migrant Fairy Tern (*Sterna nereis*), which requires undisturbed nesting periods (Godden Mackay Logan Pty Ltd, 2011).

There are three taxa of flora with disjunct populations on Garden Island. This is the only known population in the Perth region for *Amyema melaleucae* (a Mistletoe otherwise found at Dongara) and for the peppercress *Lepidium puberulum*; *Myosotis australis*, also occurs on Rottnest and at Margaret River.

The populations of the 14 species of terrestrial reptiles and the population of Tammar wallabies (*Macropus eugenii*) have all been isolated from mainland populations for some 6000–7000 years. Their gene pools are of evolutionary importance; the populations of Tammars, Lined Skink (*Lerista*

*lineata*), Carpet Python (*Morelia spilota*), and Tiger Snake (*Notechis scutatus*) being of particular interest.

The Tammar wallabies on Garden Island show distinct morphological and biochemical differences from other populations on the Abrolhos Islands and Kangaroo Island. Garden Island Tammar wallabies have a distinctive russet coat colour, and may be a different sub-species, but this has not yet been determined genetically.

The Lined Skink (*Lerista lineata*) has a very small geographic range on the coastal plain from Perth to Mandurah and on Rottnest and Garden Islands. The species may now be extinct on Rottnest Island, as it has not been collected there since 1930 (Godden Mackay Logan Pty Ltd, 2011).

The main attractions of Garden Island are its white beaches, foreshores and bays. Garden Island is covered with dense communities of Rottnest cypress, Rottnest tea-tree and honey-myrtle. Some parts are forested, and others have impenetrable thickets of coastal shrub. These areas are home to many birds and rare tammar wallabies. The sandy soils of the island are porous with dense vegetation and no wetlands. As there are no introduced pest and no rubbish, Garden Island is free of the disease salmonella. The fragility of Garden Island and its environment had been recognised and some 50,000 trees and shrubs were planted to stabilise the soil and enhance the wildlife’s habitat (Royal Australian Navy, 2015).

Public access to Garden Island WA is by boat only, to about 25 km of the coastline. Public picnic areas with basic facilities of toilets, water and gas BBQs are provided, and there are two northern bays with private boat moorings. Visitors must arrive after sunrise and leave the land by sunset. Likewise, Defence personnel have limited access to the areas ‘outside the fence’, governed by the same rules of access, i.e., only by boat.

**A.3.1.2 Local Beaches**

The City of Rockingham’s slogan is “where the coast comes to life”. Rockingham LGA contains some of the finest coastline and parks in Perth’s metropolitan area. This was confirmed when Rockingham Beach won the 2010 WA Clean Beaches Award which is judged on the level of beach and foreshore maintenance and cleanliness, the quality and accessibility of beachside amenities and adaptability to growing environmental changes.

Rockingham Beach also won the Water Conservation and the Heritage and Culture category awards at the 2010/2011 National Clean Beaches Awards, and was runner up in the Energy Innovation and the Environmental Innovation and Protection categories.

The following are major beaches located along the City’s 29 km of coastline:

- Rockingham Beach
- Palm Beach
- Mangles Bay
- Waikiki Beach
- Warnbro Beach
- Secret Harbour Beach
- Golden Bay Beach
- Singleton Beach.

Throughout the LGA, a number of recreational and tourist activities are undertaken which include snorkelling, sailing, surfing, recreational fishing and crabbing, as well as observing marine fauna.

**A.3.1.3 Parks and Nature Reserves**

In addition to the coastal areas, there are also a number of nature reserves in the area, which include bushlands containing woodlands and wetlands. Rockingham abounds with native wildlife such as seals on Seal Island, Fairy Penguins on Penguin Island and dolphins in and around the Rockingham Coast. There are opportunities to swim with wild dolphins through the tourism group, Rockingham Wild Encounters Western Australia.

Table 12 lists local parks and nature reserves.

**Table 12 - Parks and Nature Reserves**

Parks and Nature Reserves	
<b>Rockingham LGA</b>	
Centennial Park	Charthouse Road, Safety Bay
Don Cuthbertson Reserve	Elanora Drive, Woodbridge
Tuart Park	Anstey Road, Secret Harbour
City Park	Leghorn Street, Rockingham
Trusty Park	Huxtable Terrace, Baldivis
Lagoon Park	Secret Harbour Foreshore
<b>Kwinana LGA</b>	
Kwinana Beach	Kwinana Beach Road

Source: (City of Rockingham, 2014)

**A.3.1.4 West Coast Bioregion**

The West Coast Bioregion is characterised by exposed sandy beaches and limestone reef system that creates surface reef lines, about 5 km off the coast. Further offshore, the continental shelf habitats are typically composed of coarse sand interspersed with low limestone reef associated with old shorelines. There are few areas of protected water along the west coast, but a few exceptions include Rottnest and Garden Islands in the Perth Metropolitan area. One of the major significant embayments of the West Coast is Cockburn Sound (WA Department of Fisheries, 2012).

**A.3.1.5 Fisheries**

Coastal waters in the vicinity of the Project area are home to diverse fish and crustacean species. This natural asset has been recognised through the establishment of managed fisheries. Table 13 lists licences of Commonwealth and state-managed fisheries authorised to operate in the area in addition to state-managed fisheries permitted to operate in waters within and adjacent and to the Project area. Commercial fishing for western rock lobster, abalone, and range of scale-fish occurs throughout the general area.

**Table 13 - Commonwealth and WA State-Managed Fisheries in the Project Area**

Fisheries	
Commonwealth	Western Australia
Western Deepwater Trawl (AFMA)	West Coast Rock Lobster Fishery
Western Tuna and Billfish Fishery (AFMA)	Roe’s Abalone Managed Fishery
Southern Bluefin Tuna Fishery (AFMA)	South West Trawl Fishery: scallops and prawns
Small Pelagic Fishery (AFMA)	West Coast Deep Sea Crab Managed Fishery
Western Skipjack Tuna Fishery (AFMA)	West Coast Purse Seine Fishery
Joint Authority Southern Demersal Gillnet and Demersal Longline Managed Fishery (Joint Authority WA DoF/AFMA)	West Coast Demersal Scalefish Fishery.
Joint Authority West Coast Demersal Gillnet and Demersal Longline [Interim] Managed Fishery (Joint Authority WA DoF/AFMA)	

**A.3.1.6 Economic Capital**

Economic capital is defined as the extent of financial or economic resources within a town or community (Black & Hughes, 2001). The status of a town’s economic resources has significant implications in relation to its resilience and adaptive capacity. For instance, a town lacking in economic capital, but which is also predominantly reliant on a specific industry sector such as mining,

is likely to be more vulnerable to change and consequently more likely to experience greater difficulties in adapting to these changes, given this dependence.

**Table 14 - Economic capital for Rockingham LGA and WA State**

Demographic factor	City of Rockingham	WA State	LGA comparison to state*
<b>Employment</b>			
Unemployment rate	3,022 (5.9 %)	54,320 (3.0 %)	↑
	<b>HMAS Stirling (City of Rockingham, 2015)</b>	<b>Australia (Department of Defence, 2014)</b>	
Employed in Defence	3,000 + 500 contractors	76,910 + 77,218 contractors	—
Demographic factor	City of Rockingham	WA State	LGA comparison to state*
<b>Income</b>			
Median individual income (AUS\$/week)	\$620	\$662	↓
Median household income (AUS\$/week)	\$1,410	\$1,415	↓
Proportion of total adult population earning weekly household income of less than \$600	6,652 (18.4 %)	146,824 (18.5 %)	↓
<b>Top Industries of Employment</b>			
1	Construction	Healthcare & Social Assistance	—
2	Manufacturing	Construction	—
3	Retail trade	Retail Trade	—
<b>Top Occupations of Employment</b>			
1	Technicians & trades workers	Professionals	—
2	Clerical & administration workers	Technicians & trades workers	—
3	Professionals	Clerical & administration workers	—

Source: (Australian Bureau of Statistics, 2011a, 2011b)

\*Note: The 'State and LGA comparison' arrow indicates a basic community profile (2011a) for the City of Rockingham LGA compared to the basic community profile (2011b) for WA State.

When comparing the LGA to the State, some key findings found in Table 14 include (Australian Bureau of Statistics, 2011)

- The top three industries of employment in the City of Rockingham are construction, manufacturing, and retail trade
- The City of Rockingham has a slightly lower though similar workforce population than WA State (63.4 % compared with 64.0 %)
- The median household income is slightly lower in Rockingham LGA than the State (\$1,410 compared to \$1,415 per week).



- The proportion of the total adult population earning a weekly household income of less than \$600 is slightly lower in the LGA (18.4 %) than in the State of WA (18.5 %).

The City of Rockingham is a foundation member of the South West Group, a collective of southern metropolitan Local Governments focussed upon regional economic development initiatives. It is not proposed to review or change the City’s involvement with this organisation (City of Rockingham, 2015).

**A.3.1.7 Commercial Fishing**

Given the nature of the Project, a key industry of relevance is that of commercial fishing. In the West Coast Bioregion of Western Australia, the principal commercial fishery is the western rock lobster fishery, which is Australia’s most valuable, single-species, wild-capture fishery. Western Australian commercial fishers also take a range of finfish species including sharks, dhufish, snapper, baldchin groper and emperors using demersal line and net methods (WA Department of Fisheries, 2012).

In regard to Commonwealth fisheries the Australian Fisheries Management Authority manage the Western Deepwater Trawl, the Western Tuna and Billfish Fishery, the Southern Bluefin Tuna Fishery, the Small Pelagic Fishery, and the Western Skipjack Tuna Fishery. The Southern Demersal Gillnet and Demersal Longline Managed Fishery and West Coast Demersal Gillnet and Demersal Longline [Interim] Managed Fishery are managed under a Joint Authority with the WA Department of Fisheries (Australian Fisheries Management Authority, 2015).

**A.3.1.8 Industry and Manufacturing**

Within the Rockingham LGA is the Rockingham Industry Zone, which is situated within the Western Trade Coast (Western Trade Coast Industries Committee, 2014) along with other key industrial precincts, including the Kwinana Industrial Area, Latitude 32 Industry Zone and the Australian Marine Complex in Henderson. The Rockingham Industrial Zone covers an area of 1,150 ha which will be used for medium–large fabricators, warehousing, transport, logistics and marine related industries. It is strategically located with access to the regional transport including the Kwinana Freeway and Forrest Highway and plays a critical role in supporting the economic growth of the south west trade corridor (Landcorp, 2015). Some of the key manufacturing companies in the Rockingham LGA include Australian Fused Materials and Millennium Performance Chemicals (Landcorp (N Beattie), 2012).

**A.3.1.9 Human Capital**

Human capital refers to the health and welfare of human beings, their knowledge and skills, as well as their overall capacities to contribute to ongoing community sustainability. A community that is heavily dependent on a particular industry, but which has low levels of human capital, is likely to face greater challenges in embracing socio-economic change as a result of change or disruption. Human capital is typically assessed by a number of distinct yet inter-related indicators including education and skills, as well as the prevalence of at-risk/highly vulnerable groups in the community.

Table 15 outlines the human capital for the Rockingham LGA in comparison with the State of WA and shows:

**Table 15 - Human Capital Profile for City of Rockingham and WA**

Demographic factor	City of Rockingham	WA State	LGA comparison to WA state*
<b>Age structure</b>			
Total Persons	104,105	2,239,170	--
Median Age	34	36	↓
Population aged 14 and below	23,687 (22.8 %)	440,072 (19.6 %)	↑

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Demographic factor	City of Rockingham	WA State	LGA comparison to WA state*
Population aged 15-64 (workforce)	68,411 (65.7 %)	1,524,221 (68.1 %)	↓
Population aged 65 and above	12,007 (11.5 %)	274,877 (12.3 %)	↑
Child dependency**	49 %	40 %	↑
Indigenous persons as a % of the population	1.6 %	3.0 %	↓
<b>Family Composition</b>			
Couple family with children	13,320 (47.0 %)	262,885 (44.9 %)	↑
Couple family without children	10,346 (36.5 %)	226,879 (38.8 %)	-
One parent family	4,341 (15.3 %)	85,067 (14.5 %)	↓
<b>Dwellings</b>			
Separate house	31,990 (78.6 %)	638,768 (20.7 %)	↑
Semi-detached	1,984 (4.9 %)	84,334 (9.3 %)	↓
Flat, unit or apartment	1,617 (4.0 %)	62,990 (7.0 %)	↓
Other, including caravan	349 (0.9 %)	7,382 (0.8 %)	↑
<b>Housing tenure</b>			
Fully owned	8,931 (24.7 %)	234,626 (29.5 %)	↓
Being purchased	16,070 (44.4 %)	300,335 (38.8 %)	↑
Rented	10,191 (28.2 %)	231,825 (29.2 %)	↓
Proportion renting from government or co-operative/community organisations	945 (2.6 %)	36,947 (4.7 %)	↓
Other tenure type	220 (0.6 %)	8,881 (1.1 %)	↓

Source: (Australian Bureau of Statistics, 2011a, 2011b)

\*Note: The 'State and LGA comparison arrow indicates a basic community profile (2011a) for the City of Rockingham LGA compared to the basic community profile (2011b) for WA State.

\*\*Note: Child dependency is the number of dependent aged children as a proportion of employed people.

Note: Due to rounding, data may not add to 100 per cent.



- The Rockingham LGA has a total population of 104,105 persons
- The Rockingham LGA has only a slightly higher proportion of couple families with children (47.0 % versus 44.9 %).

Table A.5 outlines some education indicators for the City of Rockingham and WA State. Specifically the Rockingham LGA has:

- A slightly higher proportion (20.3 %) of those persons attending secondary school than compared to WA State (18.2 %).
- A significantly lower proportion (40.6 %) of those who attained a Year 12 or equivalent diploma when compared to WA State (49.2 %)
- A significantly lower (12.9 %) proportion of those awarded a Bachelor degree compared to those in WA State (23.0 %).

#### **A.3.1.10 Physical Capital**

Physical capital is broadly defined as a town or community's built infrastructure and services. This may include public amenities and infrastructure (e.g., roads, energy, networks), social infrastructure (e.g., hospitals, schools) as well as soft infrastructure/service provision (e.g., health care, aged care, child care). A sound level of physical capital is important in optimising a community's other key capital areas.

The Rockingham LGA has a wide range of social infrastructure and community services including:

- Aged care facilities
- Arts and culture
- Rockingham Chamber of Commerce
- Childcare facilities
- Community halls/community centres
- Community support centres
- Education and training facilities
- Emergency and safety services
- Employment centres
- Health and medical (clinics and hospitals)
- Libraries
- Museums and tourist sites
- Sports and recreation centres and clubs and youth support services.

For a complete listing of the social infrastructure and community services in the Rockingham LGA, refer to Appendix B.

Table 16 - Education Indicators

	City of Rockingham	WA State	LGA comparison to WA State*
<b>Educational Institutions Attending</b>			
Pre-school	1,664 (5.3 %)	32,429 (4.8 %)	↑
Primary school	10,296 (33.1 %)	188,625 (27.8 %)	↑
Secondary school	6,334 (20.3 %)	123,683 (18.2 %)	↑
TAFE	2,300 (7.4 %)	48,758 (7.2 %)	↑
University	2,484 (8.0 %)	91,938 (13.5 %)	↓
Other institution	579 (1.9 %)	13,527 (2.0 %)	↓
<b>Highest Education Level Attained</b>			
Year 12 or equivalent	31,303 (40.6 %)	852,585 (49.2 %)	↓
Year 11 or equivalent	10,416 (13.5 %)	173,629 (10.0 %)	↑
Year 10 or equivalent	21,737 (28.2 %)	387,427 (22.3 %)	↑
Year 9 or equivalent	4,002 (5.2 %)	75,748 (4.4 %)	↑
Year 8 or below	2,584 (3.4 %)	70,405 (4.1 %)	↓
Did not go to school	216 (0.3 %)	10,741 (0.6 %)	↓
<b>Highest Non-School Qualification</b>			
Postgraduate degree	771 (1.8 %)	51,631 (5.1 %)	↓
Graduate diploma/certificate	767 (1.8 %)	29,481 (2.9 %)	↓
Bachelor degree	5,516 (12.9 %)	234,400 (23.0 %)	↓
Diploma/advanced diploma	6,200 (14.5 %)	146,284 (14.3 %)	↑
Certificate	20,244 (47.5 %)	350,094 (34.3 %)	↑

Source: (Australian Bureau of Statistics, 2011a, 2011b)

\*Note: The 'State and LGA comparison' arrow indicates a basic community profile (2011a) for the City of Rockingham LGA compared to the basic community profile (2011b) for WA State.

\*\*Note: Child dependency is the number of dependent aged children as a proportion of employed people.

Note: Due to rounding, data may not add to 100 per cent.

**(a) Boat Ramps and Parks**

Due to the geographical location of the Project, marine recreation users are an important stakeholder group. Table 17 lists local coastal boat launching facilities near the Project area.

**Table 17 - Boat Launching Facilities (Coastal)**

Name	Location	Information
<b>Rockingham LGA</b>		
Bent St Boat Launching Facility	Located on Safety Bay Rd, Safety Bay (opposite Bent St, Safety Bay)	Access to Cockburn Sound and deep water west of the Murray Reef System (Toilet Facilities)
Carlisle St Boat Ramp (over sand ramp)	Located on Arcadia Dr, Shoalwater (opposite Carlisle St, Shoalwater)	Access to waters in Warnbro Sound
Donald Drive/June Rd Boat Ramp (over sand ramp)	Located on Safety Bay Rd, Safety Bay (between Donald Dr & June Rd, Safety Bay)	Access to waters in Warnbro Sound
Palm Beach Boat Launching Facilities (3)	Located on The Esplanade, Rockingham	Access to waters in Cockburn Sound (Shower/Toilet Facilities)
Port Kennedy Boat Launching Facility	Located on Port Kennedy Drive, Port Kennedy	Access to waters in Warnbro Sound and deeper waters west of the Murray Reef System (Toilet/Shower Facilities)
Point Peron Boat Launching Facility (2)	Located on Point Peron Rd, Point Peron (West of the Garden Island Causeway)	Access to Cockburn Sound and deep water west of the Murray Reef System (Toilet/Shower Facilities). NOTE: Rockingham Volunteer Rescue Service (RVSR) provides rescue services from Point Peron and interacts with those launching boats from the ramp.
<b>Kwinana</b>		
Wells Park	Kwinana Beach Road, Kwinana	Currently being upgraded and will be available in October 2012
Challenger Beach	Sutton Road, Naval Base	Heavy industrial suburb in the Town of Kwinana

Source: City of Rockingham and City of Kwinana, Coastal Engineering Officers, 2012 (City of Rockingham, 2012b) (Department of Transport, 2012)

**A.3.1.11 Social Capital**

Social capital is a multi-faceted concept that could broadly be defined as the dynamics and strength of relationships and/or interactions within a given community (Lochner, Kawachi, & Kennedy, 1999). Social capital may also be referred to as the degree of social cohesion and inter-connectedness between community members.

A key indicator of social capital is the degree of community participation, or level of community involvement in processes aimed at maintaining or enhancing community well-being. These processes may include participation in community groups or not-for-profit voluntary activities in addition to professional commitments. One such measure of this variable is the Census data on persons undertaking voluntary work for an organisation. In 2011, 13.4 % of the persons in the City of Rockingham undertook voluntary work for an organisation, a figure slightly lower as compared to persons in WA (16.9 %).

The mobility of a population is also a strong indicator of social capital; this measures who lived at the same address five years ago. In 2011, 46.2 % of the persons in the City of Rockingham said

they lived at the same address five years previously. This number is slightly lower when compared to the WA State figure of 50.3 %.

Another indicator of social capital is cultural diversity; this can be measured by the proportion of immigrants who do not speak English, as a high proportion of non-English speakers are likely to reduce social cohesion. In the City of Rockingham, the proportion of migrants who do not speak English is 1.4 per cent, which is the lower than the proportion of WA (5.2 %). Another measure of cultural diversity is the percentage of residents born outside Australia; in 2011 this is at 31.4 % for the City of Rockingham which is only slightly higher than the proportion for the State (30.7 %). See Table 18

**Table 18 - Indicators of Social Capital**

	City of Rockingham	WA State	LGA comparison to State*
<b>Volunteering</b>			
Volunteer work for a group	10,780 (13.4%)	304,622 (16.9%)	↓
<b>Population Mobility</b>			
Same address 1 year ago	77,874 (76.0%)	1,702,575 (77.0%)	↓
Same address 5 years ago	44,253 (46.2%)	1,049,604 (50.3%)	↓
<b>Country of Birth</b>			
Australia	65,430 (62.8%)	1,407,807 (62.9%)	↓
Outside Australia	32,727 (31.4%)	688,216 (30.7%)	↑
<b>English proficiency of immigrants</b>			
Does not speak English well/ not at all	441 (1.4%)	35,522 (5.2%)	↓

Source: (Australian Bureau of Statistics (ABS), 2011a, 2011b)

\*Note: The 'State and LGA comparison' arrow indicates a basic community profile (2011a) for the City of Rockingham LGA compared to the basic community profile (2011b) for WA State.

Note: Due to rounding and some data not stated, data may not add to 100 per cent.

#### A.4. References

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**Appendix B. Rockingham LGA Social Infrastructure and Community Services**

Community Infrastructure	
<i>Aged Care</i>	<ul style="list-style-type: none"> <li>• Autumn Centre</li> <li>• Bethanie Waters</li> <li>• Southern Cross Care Bert England Lodge Nursing Home</li> <li>• Brightwater The Oakes Care Facility Nursing Home</li> <li>• Brightwater Warnbro</li> <li>• Challenger Court Retirement Village</li> <li>• Challenger Lodge Retirement Village</li> <li>• Baptistcare Gracehaven Nursing Home</li> <li>• Lakeside Villas Nursing Home</li> <li>• Hall &amp; Prior Rockingham Aged Care Home</li> <li>• Serenity Lodge Nursing Home</li> <li>• Aegis Shoalwater Nursing Home</li> <li>• Springfield Retirement Village</li> <li>• Belrose Tanby Hall Aged Care.</li> </ul>
<i>Arts &amp; Culture</i>	<ul style="list-style-type: none"> <li>• Rockingham Arts Centre</li> <li>• Rockingham Historical Society and Museum</li> <li>• Gary Holland Community Centre Exhibition Spaces</li> <li>• Rockingham Theatre.</li> </ul>
<i>Business &amp; Industry</i>	<ul style="list-style-type: none"> <li>• Rockingham Kwinana Chamber of Commerce</li> </ul>
<i>Childcare</i>	<ul style="list-style-type: none"> <li>• Buggles Early Learning and Kindy, Baldivis</li> <li>• Camp Australia OSHC, Rockingham Beach</li> <li>• Camp Australia Makybe Rise OSHC, Baldivis</li> <li>• Camp Australia Tuart Rise Primary School OSHC, Baldivis</li> <li>• Charthouse OSHC, Waikiki</li> <li>• Chuckles Childcare Centre, Warnbro</li> <li>• CYC Camp Cooloongup</li> <li>• East Waikiki OSHC, Cooloongup</li> <li>• Fun-A-Rama OSHC Comet Bay, Secret Harbour</li> <li>• Giggles Day Care Centre, Cooloongup</li> <li>• Golden Bay OSHC, Golden Bay</li> <li>• Goodstart Early Learning, Baldivis</li> <li>• Goodstart Early Learning, Port Kennedy</li> <li>• Goodstart Early Learning, Rockingham</li> <li>• Goodstart Early Learning, Secret Harbour</li> <li>• Goodstart Early Learning, Warnbro</li> <li>• Harmony Park Child Care Centre, Singleton</li> <li>• Helmshore Way Child Care Centre, Port Kennedy</li> <li>• Kids Fun Early Learning, Waikiki</li> <li>• Koorana OSHC, Warnbro</li> <li>• Living Waters OSHC, Warnbro</li> <li>• Little Rascals Childcare Centre</li> <li>• Maranatha Christian College Early Learning Childcare Centre OSHC, Waikiki</li> <li>• Mission Australia Warnbro South Early Learning Centre</li> <li>• Mothers Teresa OSHC, Baldivis</li> <li>• My World Child Care, Waikiki</li> <li>• Nippers Shoalwater Child Care Centre, Safety Bay</li> <li>• Nippers St Clair Childcare Centre, Port Kennedy</li> <li>• Nippers Vacation Care, Warnbro</li> <li>• Oasis Outside School Hours Centre, Secret Harbour</li> <li>• Rockingham Child Care Centre</li> <li>• Rockingham Early Learning &amp; Child Care Centre, Rockingham</li> <li>• South Coast Baptist College School of Early Learning Childcare, Waikiki</li> <li>• Small Friends Playschool, Singleton</li> <li>• Star of the Sea Out of School Hours Care, Rockingham</li> <li>• Sunshine Child Care Centre Out of School Care, Cooloongup</li> <li>• Sunshine Child Care Centre, Shoalwater</li> <li>• Tiny Tots Child Care &amp; Education Centre, Rockingham</li> </ul>

Community Infrastructure	
	<ul style="list-style-type: none"> <li>• Tranby College Child Care Centre, Baldivis</li> <li>• Waikiki Playschool, Coo loongup</li> <li>• Waikiki Parklands Childcare Centre, Coo loongup</li> <li>• Wanslea Early learning and Development Centre, Rockingham</li> <li>• YMCA St Bernadette's Out of School Care, Port Kennedy.</li> </ul>
<i>Community Hall/Centre</i>	<ul style="list-style-type: none"> <li>• Autumn Centre</li> <li>• Baldivis Recreation Community Centre</li> <li>• Coastal Community Centre, Golden Bay</li> <li>• Gary Holland Community Centre</li> <li>• Golden Bay Coastal Community Centre</li> <li>• Hillman Hall</li> <li>• Mary Davies Library and Community Centre</li> <li>• Masonic Centres</li> <li>• McLarty Hall</li> <li>• Port Kennedy Community Centre</li> <li>• Rockingham Arts Centre</li> <li>• Rockingham Masonic Centre</li> <li>• Rockingham PCYC</li> <li>• Secret Harbour Community Centre</li> <li>• Singleton Community Centre</li> <li>• Singleton Hall</li> <li>• St Nicholas Community Centre</li> <li>• Waikiki Community &amp; Family Centre</li> <li>• Warnbro Community YMCA</li> <li>• Westerly Family Centre</li> <li>• Warnbro Community &amp; Family Centre</li> </ul>
<i>Community Support</i>	<ul style="list-style-type: none"> <li>• Rockingham Lotteries House</li> <li>• Waikiki Community and Family Centre</li> <li>• Warnbro Community Y Recreation and Family Centre</li> <li>• Westerly Family Centre</li> <li>• Port Kennedy Family Centre.</li> </ul>
<i>Education &amp; Training</i>	<ul style="list-style-type: none"> <li>• Baldivis Primary School</li> <li>• Baldivis Secondary College</li> <li>• Bungaree Primary School</li> <li>• Charthouse Primary School</li> <li>• Challenger Institute of Technology, Rockingham Campus</li> <li>• Comet Bay College</li> <li>• Comet Bay Primary School</li> <li>• Coo loongup Primary School</li> <li>• East Waikiki Primary School</li> <li>• Endeavour Primary School</li> <li>• Endeavour Primary School Education Support Centre</li> <li>• Hillman Primary School</li> <li>• Kolbe Catholic College</li> <li>• Koorana Primary School</li> <li>• Koorana Primary School Education Support Centre</li> <li>• Living Waters Lutheran College</li> <li>• Makybe Rise Primary School</li> <li>• Malibu School</li> <li>• Marahatha Christian College, Waikiki</li> <li>• Mission Australia Warnbro South Early Learning Centre</li> <li>• Murdoch University Rockingham Campus</li> <li>• Polytechnic West</li> <li>• Port Kennedy Primary School</li> <li>• Rockingham Beach Primary School</li> <li>• Rockingham Beach Education Support Centre</li> <li>• Rockingham Early Learning &amp; Child Care Centre</li> <li>• Rockingham John Calvin School</li> <li>• Rockingham Lakes Primary School</li> <li>• Rockingham Montessori School</li> </ul>



Community Infrastructure	
	<ul style="list-style-type: none"> <li>• Rockingham Senior High</li> <li>• Safety Bay Primary School</li> <li>• Safety Bay Senior High School</li> <li>• Secret Harbour Primary School</li> <li>• Settlers Hills Primary School</li> <li>• Singleton Primary School</li> <li>• SMYL Community College</li> <li>• South Coast Baptist College</li> <li>• St Bernadette's Catholic Primary School</li> <li>• Star Of The Sea Pre-Primary School</li> <li>• Tranby College</li> <li>• Waikiki Primary School</li> <li>• Wanslea Early Learning &amp; Development Centre, Rockingham</li> <li>• Warnbro Community High School</li> <li>• Warnbro Community High School Education Support Centre</li> <li>• Warnbro Primary School.</li> </ul>
<i>Emergency &amp; Safety</i>	<ul style="list-style-type: none"> <li>• Advance Life Ambulance Service</li> <li>• Baldivis Fire Station</li> <li>• Baldivis Volunteer Bush Fire Brigade</li> <li>• Cockburn State Emergency Service Unit</li> <li>• Cockburn Volunteer Sea Search and Rescue</li> <li>• Cockburn Voluntary Emergency Service</li> <li>• Cooloongup Ambulance Station</li> <li>• Department of Fire and Emergency Services</li> <li>• Sea Rescue Fremantle</li> <li>• Poison Information Centre</li> <li>• Rockingham Baliff</li> <li>• Rockingham Community Safety Service</li> <li>• Rockingham Fire Station</li> <li>• Rockingham Police Station</li> <li>• Rockingham State Emergency Service Unit</li> <li>• Rockingham Volunteer Fire and Rescue Service</li> <li>• Rockingham Volunteer Sea Rescue Group (RVSR)</li> <li>• Secret Harbour Volunteer Fire and Rescue Service</li> <li>• Singleton Volunteer Bush Fire Brigade</li> <li>• Volunteer Marine Rescue WA</li> <li>• WA Water Police.</li> </ul>
<i>Employment</i>	<ul style="list-style-type: none"> <li>• Activ Business Services</li> <li>• Bridging the Gap</li> <li>• Centrelink</li> <li>• Community First International</li> <li>• Forest Personnel</li> <li>• Soundworks for Employment Service Inc. (Soundworks Rockingham)</li> </ul>
<i>Health &amp; Medical*</i>	<ul style="list-style-type: none"> <li>• Ameer Street Child Health Centre (1 and 2)</li> <li>• Brightwater At Home Services – South</li> <li>• Brightwater The Oaks</li> <li>• Child Development Service Rockingham/Kwinana</li> <li>• PathWest Rockingham Laboratory</li> <li>• Peel and Rockingham/Kwinana Adult Mental Health Services</li> <li>• Peel and Rockingham/Kwinana Community Health Service</li> <li>• Peel and Rockingham/Kwinana Mental Health Services</li> <li>• Peel and Rockingham/Kwinana Mental Health Services for Older People</li> <li>• Port Kennedy Child Health Centre</li> </ul>

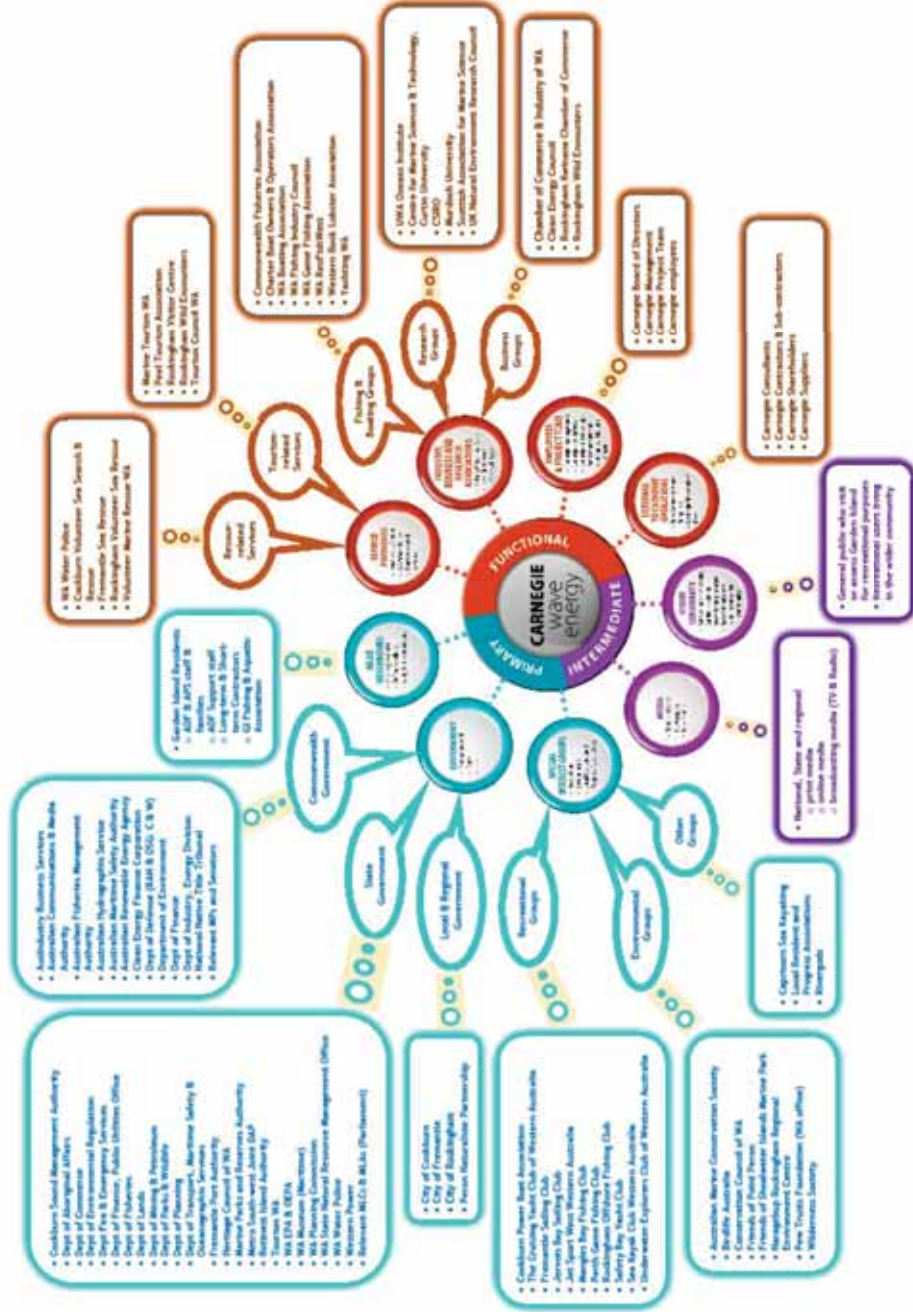
Community Infrastructure	
	<ul style="list-style-type: none"> <li>• Red Cross Blood Donor Centre, Rockingham</li> <li>• Rockingham Early Intervention Centre</li> <li>• Port Kennedy General Practice</li> <li>• Rockingham Dental Clinic</li> <li>• Rockingham General Hospital</li> <li>• Rockingham Kwinana District Hospital, Cooloongup</li> <li>• Rockingham After Hours GP Clinic</li> <li>• Rockingham Kwinana Child and Adolescent Mental Health Services (CAMHS)</li> <li>• Safety Bay Child Health Clinic</li> <li>• Secret Harbour Child Health Clinic</li> <li>• South Coastal Women's Health Services</li> <li>• Waikiki Private Hospital</li> <li>• Warnbro Sound Dental</li> </ul>
<i>Library</i>	<ul style="list-style-type: none"> <li>• Mary Davies Library and Community Centre, Baldivis</li> <li>• Rockingham Regional Campus Community Library</li> <li>• Rockingham Toy Library</li> <li>• Safety Bay Public Library</li> <li>• Secret Harbour Community Library</li> <li>• Warnbro Community Library.</li> </ul>
<i>Museum/Memorial &amp; Tourism</i>	<ul style="list-style-type: none"> <li>• Catalpa Memorial</li> <li>• City of Rockingham RSL Remembrance Wall</li> <li>• East Rockingham Pioneer Cemetery</li> <li>• Garden Island Monument/Rockingham Pioneer Monument</li> <li>• HMAS Derwent Monument</li> <li>• HMAS Perth Monument</li> <li>• Peelhurst Monument 1860-1893</li> <li>• Rockingham Memorial Wall</li> <li>• Rockingham Museum</li> <li>• Rockingham Regional Memorial Park</li> <li>• Rockingham Visitors Centre</li> <li>• Rockingham World War II Memorial</li> <li>• Services Recon Dept "Z" Force Memorial, Rockingham</li> <li>• Waikiki Memorial Wall</li> <li>• World War I Centenary Memorial</li> </ul>
<i>Sport &amp; Recreation</i>	<ul style="list-style-type: none"> <li>• Achiever Oval, Port Kennedy</li> <li>• A.M.F. Bowling Club - Ten Pin</li> <li>• Anniversary Park, Rockingham</li> <li>• Aqua Jetty, Warnbro</li> <li>• Baldivis Archery Club</li> <li>• Baldivis Children's Forest</li> <li>• Baldivis Equestrian &amp; Pony Club</li> <li>• Baldivis Little Athletics Club</li> <li>• Baldivis Oval</li> <li>• Baldivis Recreation Centre</li> <li>• Baldivis Tennis Club</li> <li>• Body Prep</li> <li>• Bungaree Little Athletics</li> <li>• Bungaree Oval, Rockingham</li> <li>• Careeba Park Reserve, Rockingham</li> <li>• Coastal Community Centre, Golden Bay</li> </ul>

Community Infrastructure	
	<ul style="list-style-type: none"> <li>• Comet Bay Bowling Club</li> <li>• Croquet at the Autumn Centre</li> <li>• Cruising Yacht Club</li> <li>• Currie Street Reserve, Warnbro</li> <li>• Georgetown Reserve, Safety Bay</li> <li>• Golden Bay Social Badminton</li> <li>• Half-Court Basketball</li> <li>• Hillman Cricket Club</li> <li>• Hourglass Reserve, Cooloongup</li> <li>• Jeans Blue Badminton</li> <li>• June Road Reserve, Rockingham</li> <li>• Kennedy Bay Golf Links</li> <li>• K Star</li> <li>• Koorana Reserve, Warnbro</li> <li>• Lark Hill Sports Complex, Port Kennedy</li> <li>• Laurie Stanford Reserve, Singleton</li> <li>• Mike Barnett Sports Complex</li> <li>• Paul Garnett Oval, Woodbridge</li> <li>• Peel Cricket Association</li> <li>• Peel Junior Cricket Association</li> <li>• Port Kennedy Little Athletics Club</li> <li>• Port Kennedy Indoor Cricket Centre</li> <li>• Port Kennedy RSL &amp; Service Social Club</li> <li>• Rhonda Scarrott Reserve, Golden Bay</li> <li>• Rockingham Aquatic Centre</li> <li>• Rockingham Basketball Recreation Association</li> <li>• Rockingham Beach Cricket Club</li> <li>• Rockingham BMX Club</li> <li>• Rockingham Bowling Club</li> <li>• Rockingham Bridge Club</li> <li>• Rockingham Calisthenics</li> <li>• Rockingham Coastal Sharks Rugby League and Sporting Club</li> <li>• Rockingham City Football and Social Club</li> <li>• Rockingham and Districts Softball Association</li> <li>• Rockingham District Hockey Club</li> <li>• Rockingham Districts Netball Association</li> <li>• Rockingham Flames Basketball</li> <li>• Rockingham Golf Club</li> <li>• Rockingham Golf Driving Range</li> <li>• Rockingham/Mandurah District Cricket Club</li> <li>• Rockingham PCYC Air Rifles</li> <li>• Rockingham PCYC Boxing</li> <li>• Rockingham Rams Baseball Club</li> <li>• Rockingham Rugby Union Football Club</li> <li>• Rockingham Tennis Club</li> <li>• Safety Bay Bowling Club</li> <li>• Safety Bay Cricket Club Juniors</li> <li>• Safety Bay Cricket Club Senior</li> <li>• Safety Bay Tennis Club</li> <li>• Safety Bay Yacht Club</li> <li>• Sandgroppers Land Yacht Club</li> </ul>

Community Infrastructure	
	<ul style="list-style-type: none"> <li>• Secret Harbour Dockers Cricket Club</li> <li>• Secret Harbour Golf Links</li> <li>• Secret Harbour Little Athletics Club</li> <li>• Secret Harbour Oval, Secret Harbour</li> <li>• Secret Harbour Stateswim Swimming Pool</li> <li>• Secret Harbour Surf Life Saving Club</li> <li>• Settlers Hills Little Athletics Club</li> <li>• Settlers Hills Oval</li> <li>• Shoalwater Bay Cricket Club</li> <li>• Shoalwater Oval, Shoalwater</li> <li>• Singleton Irwinians Cricket Club</li> <li>• Singleton Little Athletics Club</li> <li>• Stan Twight Reserve, Rockingham</li> <li>• Tranby College Oval Shared Use</li> <li>• Waikiki Badminton</li> <li>• Waikiki Dragons</li> <li>• Warnbro Bowling Club</li> <li>• Warnbro Community Y Recreation Centre</li> <li>• Warnbro Oval, Warnbro</li> <li>• Warnbro Swans Athletics</li> <li>• White Knights Baldivis Cricket Club</li> </ul> <p>Above is a selection: more can be found at <a href="http://www.rockingham.wa.gov.au/getattachment/Community/What-s-on/Activity-guide/Activity-Guide-Updated-July-2015.pdf.aspx">http://www.rockingham.wa.gov.au/getattachment/Community/What-s-on/Activity-guide/Activity-Guide-Updated-July-2015.pdf.aspx</a></p>
<i>Youth Support</i>	<ul style="list-style-type: none"> <li>• Baldivis Brumby Girl Guides</li> <li>• Rockingham PCYC</li> <li>• Baldivis Scout Group</li> <li>• 1st Secret Harbour Scout Group</li> <li>• 1st Rockingham Sound Scout Group</li> <li>• 1st Warnbro Sound Scout Group</li> <li>• Warnbro Community Y</li> <li>• Rockingham Youth Strategy</li> <li>• Station Youth Health Centre</li> </ul>

COMMUNITY CONSULTATION PLAN CETO 6 GARDEN ISLAND PROJECT

Appendix C. Stakeholders Map (after Sheridan Coakes Consulting Pty Ltd, 2012)



## Appendix D. Example CETO 6 ARENA ERP Funding Agreement Requirements for Community Consultation

### Clause 4.5 Community consultation

- (a) During the Agreement Period, the Recipient must develop, implement and update a Community Consultation Plan for the Project which includes the following features:
- (i) identification of all key stakeholder groups, including local communities that are potentially affected by the Project;
  - (ii) an outline of the proposed community consultation processes to be undertaken that includes the following:
    - (A) public notification of meetings;
    - (B) itinerary of meetings to be conducted, groups involved and agenda for meetings;
    - (C) provision of information at meetings and local information sites;
    - (D) documentation of attendees, questions and answers and follow-up issues required arising from meetings; and
    - (E) an outline for stakeholders on how to access the latest information in respect of community consultation matters;
  - vi) an outline of how community consultation activities align with Milestones;
  - vii) a process for maintaining an up-to-date record of complaints and questions arising from community consultations and the responses provided to these complaints and questions; and
  - viii) a process for regularly:
    - (A) monitoring and updating the Community Consultation Plan and the community consultations undertaken; and
    - (B) reporting to the Recipient's internal management, board, Project Participants, joint venture partners (if applicable) and other key groups (whether government or non-government) as required by ARENA to ensure the ongoing improvement of community engagement,
- and is consistent with relevant industry standards and best practice for this type of project and the types of community consultation to be undertaken.
- (b) By the date specified in item 10 of Schedule 1, the Recipient must provide to ARENA certification for the benefit of ARENA from an independent, responsible and qualified person that the Community Consultation Plan is appropriate and consistent with best practice for this type of project and the types of community consultation to be undertaken, and that it is being implemented.



- (c) The person appointed to provide the certification under clause 4.5(b) must not be an employee, shareholder, director, other officeholder or related entity of the Recipient, a Project Participant or any other person having (or having had) a significant involvement in the Project, the Application, or any Report submitted under this Agreement.
- (d) The Recipient must make the Community Consultation Plan available to any person on request. The Recipient may make the Community Consultation Plan available by publishing it on its website.
- (e) By the date specified in item 10 of Schedule 1, the Recipient must provide to ARENA evidence that the Recipient has engaged in initial community consultation in relation to the Project to ARENA's satisfaction, including that the Recipient has:
  - i) conducted a public forum in the affected community;
  - ii) advertised the public forum (including in any prominent local newspaper) at least seven days in advance of the forum;
  - iii) provided attendees with the opportunity to raise any issues concerning the Project;
  - iv) responded in writing to any submissions made to it; and
  - v) provided to ARENA notification of any adverse community reaction to the Project to date.
- (f) By the date specified in item 10 of Schedule 1, the Recipient must provide to ARENA notification of responses by the Recipient to adverse community reaction to the Project.





## **Appendix F**

### **CETO 6 Community Consultation Unresponsive Stakeholders**



**Table 1 Stakeholder groups contacted by BMT Oceanica on behalf of Carnegie and no comment was received**

Stakeholder category	Stakeholder Type	Stakeholder
Wider stakeholders	State Government	Department of Lands
	Local Government	Fremantle Chief Executive Officer (CEO)
		Rockingham Chief Executive Officer (CEO)
		City of Rockingham Coastal Engineers
		City of Rockingham Emergency Services
		City of Rockingham Environment Officer/Community Officer
		City of Rockingham Planning Officer
		Fremantle Chief Executive Officer (CEO)
	Special Interest Groups: Environmental	Conservation Council of WA
	Industry, Business and Research Associations: Fishing and Boating Associations	Western Rock Lobster Association

**Table 2 Stakeholder groups contacted by BMT Oceanica on behalf of Carnegie that declined the invitation for comment**

Stakeholder category	Stakeholder Type	Stakeholder
Wider Stakeholders	Australian Federal Government	Australian Fisheries Management Authority
		Department of Industry, Innovation and Science
	State Government	Department of Parks and Wildlife
	Local Government	City of Rockingham Mayor
		Fremantle Chief Executive Officer (CEO)
		City of Fremantle Mayor
		City of Fremantle Councillors
		City of Fremantle Senior Management Group
	Industry, Business and Research Associations: Fishing and Boating Associations	City of Fremantle Planning Officer
		RecFishWest
		WA Fishing Industry Council
	Western Rock Lobster Council	

## **Appendix G**

### **CETO 6 Community Consultation Summary**





CETO 6 Garden Island Community Consultation Key Issues and Views

Carnegie Wave Energy CETO 6 Early Community Consultation Summary

Date		Stakeholder/Event	Opportunities	Main Issues	Potential Solutions
11-Jun-14	WA Dept of Transport		Discussion of Carnegie possible future projects and implications Happy to go along in same manner as with PWEP. Let us know when you wish to employ wave buoy in new position and any other future works, so can issue TNTMs, etc.	TNTMs Charting of cable and exclusion zone Markers for exclusion zone	Keep in contact appropriately
02-Dec-14	AG AFMA Gullia Porro, Paul Ryan		Consult with WA State fisheries and Commonwealth Fisheries Association Good we've attended community events; Fishermen struggle to consult given demands from petroleum, etc. Appreciated feedback	Commercial fishing vessel transiting Very low fishing effort area	Consult with WA State fisheries and Commonwealth Fisheries Association Also with WAFC & RecFishWest Obtain AMSA vessel movement for area Work with WA Dept Transport also
02-Dec-14	AG Dept of Industry Gary James, Matt Deady		<ul style="list-style-type: none"> <li>• Deed of licence being signed off. By Christmas.</li> <li>• Tenure? Can't do / own seabed. No exclusive occupation. Issue?</li> <li>• If want tenure, need legislative basis.</li> <li>• Sea Installation Act not repealed, only the levy element. DoE planning to scrap as don't use. But had no regulatory structure.</li> <li>• Gary will send draft licence &amp; deed responses. Arena gave input re tenure, 3 years with option for extension. Exclusive.</li> <li>• UXOs: include in docs (airforce vs navy)</li> <li>• No provision for bank guarantees... Can Arena cover? Gary understands don't want money tied up for a demo project. Commonwealth wants to see project succeed, hence may take risk.</li> <li>• Pragmatic and supportive. Likes subsea, electricity &amp; water, modular aspects.</li> <li>• IEA representation was Oceanlink. Ocean implementing agreement?</li> </ul> <p>Actions</p> <ol style="list-style-type: none"> <li>1. EDW include Uxo consideration in EMP docs and risk register. Note airforce and navy may have differing opinions.</li> <li>2. Gary send stakeholder responses and draft licence to EDW</li> <li>3. Carnegie to review legal requirements for tenure and requirement for referral</li> </ol>	<p>Licence: appropriate? Tenure process? UXOs (low but include)</p>	<p>Include UXOs in risk assessment and geophysical survey Review Licence and Deptal responses Speak with Minister re tenure arrangements (TS)</p>
02-Dec-14	AG Dept of Defence Steve Coles		<p>CN good: former and present.</p> <p><b>Biofouling:</b> DSTO in Melbourne re biofouling, Biofoul release coating trials, etc. Richard Piola and Lynn Fletcher: Head of Signatures Management and emissions. 03 8626 8422. Section deals with waste management, sonar/radio emissions, biofouling and hull coatings, anti-fouling efficiency. Possible scope for collaborative projects</p> <p><b>Australian Marine Mammal Centre:</b> Steve member and presented on PWEP. Show array to scale to show mammals don't see as a wall. Group also concerned re entanglement risk, but tether thick and taught.</p> <p>Stack lines to Dynamic Positioning solution (rather than ketch anchor).</p> <p>Formal proposal to Steve to make vessel available. Projections of requirements. Too late to influence build but can consider access. Can explore options, including rates. Time share? Plus joint approach re UWTR.</p> <p><b>Notes</b></p> <p>Yirra biofouling. Observe biofouling at Yirra, compare to PWEP. Look at other options for power use, e.g., Can we get desal plant ready to produce now with power, get tanker full to deliver to a ship? e.g. ship with green energy, desal water and pwr batteries with wave energy, electrically-charged vehicles UXO very low. Possibility of mis-fire. Generally recover UXO. +Pricing of electricity in favour as generation capacity increased. Plus approvals president means less impost/cost to defence. CWE can renegotiate. +Look at other options re grid connection. Can we design system to use HSF? Load shed or use desalination plant? +Announcement, need long lead time. Minister of Defence will bring others, CN, TS slated first week Feb. • Keen on PR pop to fill naval vessel. Angela would be keen... Underwater training facility... Drinking water... Charge base electrical vehicles? Drive CO to plant.. • Keen on Harold E Holt... Likely solar. Tidal??? • Other bases - HMAS Creswell, Jarvis Bay, Two-Fold Bay armouring facility at Eden...got wharf, south side. • Radar on base, see Angela. Offer feed to base?? Use lower. Standard systems already evaluated. • Can Carnegie do inexpensive noise monitoring of PWEP to compare with other marine noise? Get source levels? Off vessel? Cheap hydrophone on PWEP comms system? But C3 not so different from C5. Baseline noise and SPP ID with CMST. Most impact during instal. • Shock mount PTO to reduce vibration • Underwater noise, DSTO.</p>	<p>Biofouling Underwater noise Cetaceans behaviour/interaction</p>	<p>Biofouling assessment of C6GI and compare with PWEP Possible maximum PWEP Underwater noise measurement for comparison with other marine sounds and compare with C6GI Create and use scale map of area with CETO units both for PWEP &amp; C6GI</p>

CETO 6 Garden Island Community Consultation Key Issues and Views

<p>02-Dec-14</p>	<p>AG Dept Environment Michael Ward, Felicity McLean, Lauren</p>	<p><b>To discuss</b> 1. Underwater noise 2. EMF 3. Collision and entanglement <b>Notes</b> • Will offer some advice today, then seek responses from subject matter experts • Agrees with strategy for consultation and referral (MW) • Appreciate MFO for PWEF foundations. If driven would require MFO and turtle exclusion (MW) • Asked re trawling risk and pipes (MW) • Interested in maritime safety measures (FM) • Clearly explain entanglement risks, partic with dynamic cable (MW) • Key areas: o Cetaceans: interaction with migration o Entanglement o Blasting, piling, trenching, etc. o Behavioural interactions, noise, sharks (EMF) o Persistent Organic pollutants and heavy metals. Leakage impacts potential, including unplanned for under EPBC. • Whole of environment scope, including "other users". Referral cannot consider beneficial impacts. Definition of environment very broad • Fishing industry, tourism, etc. • Refer to EPA and EPBC. If both agree needs assess, then bilateral • Conservation values atlas... (FM) • Need to change DoI licence to ensure referral as opposed to approval. (TS, MW) • Underwater noise... Agree with C6 noise monitoring (MW, FM) • Refer Geotech if have enough information. Max envelope. (FM). Timing key. Don't want to delay geophysical if uncertainty around Geotech. Don't refer if don't need to. Surveys stages component of larger project and valid to separate. • Cost recovery, hence saving if refer all surveys. Includes pre-referral meeting. If controlled, formal process for consultation (Client Service Charter). • Decommissions. If left behind, mention items inert, so no leaching, etc. General: • Proof of effectiveness of maritime safety measures?</p>	<p>Key areas: • Cetaceans: interaction with migration • Entanglement • Blasting, piling, trenching, etc. • Behavioural interactions, noise, sharks (EMF) • Persistent Organic pollutants and heavy metals. Leakage impacts potential, including unplanned for example collision. Hydraulic fluids. • Introduced marine pests, ballast water etc. • EPBC referral (bilateral if EPA referral also)</p>	
<p>08-Dec-14</p>	<p>WA Dept Parks &amp; Wildlife</p>	<p><b>Re PWEF</b> Generally happy with processes to date. No formal reporting required, as not in a marine reserve; however, are keen to remain informed and would like the opportunity to visit the project on Garden Island. Carnegie happy to take DPaW staff to see the project on Garden Island; just let EDW know of possible dates <b>Re CETO 6</b> Matters of potential concern in particular noted are: • Potential issues with underwater noise and possible behaviour interference with marine fauna should be investigated. • Issues with EMF should be investigated, as can cause issues for marine fauna • Entanglement with the CETO 6 Unit's cable's mid-water arch arrangement with mooring ropes. o DPaW mentioned a project in Geographie Bay with fisheries using a 'pinger' with fishing equipment: not proving very successful. o Concern re marine turtles getting stuck between the mooring ropes (can't swim backwards; had similar issues in the past which have caused marine turtle death) o Keen for Carnegie to meet with Doug Cochran, DPaW's expert with marine fauna and entanglement Please keep DPaW informed as project progresses</p>		
<p>08-Jun-15</p>	<p>ReFishWest Matt Gillett</p>	<p>Carnegie overview with PWEF update and C6G introduction <b>Re CETO 6</b> Matters of potential concern in particular noted are: • visibility of exclusion zone. Hard to see present Pew exclusion zone cardinal markers when sea not flat calm. Is it possible to have more cardinal markers in place to manage the larger size of exclusion zone, e.g., special side markers?</p>	<p>Maritime safety and visibility of exclusion zone</p>	<p>Work with WA Dept Transport also</p>
<p>08-Jun-15</p>	<p><b>Dept of Fisheries</b> Victoria Alken (Biossecurity Section Leader) Brett Harrison (Geospatial Information Services Leader) Fiona Rowland (Environmental Impact Assessment Manager) Carli Teller (Biodiversity Senior Manager) Helen Rice (Aquatic Environment Executive Assistant) Tom Nottage (Marine Biossecurity Officer) Marianne Cochran (GIS Senior Manager) Nikki Sarginson (Maine Parks Senior Manager) Jessica Ngeh (Biossecurity Stakeholder Engagement Officer) <b>Carnegie:</b> Angus Nichols &amp; EHR Davies Ward</p>	<p>Carnegie overview with PWEF update and C6G introduction <b>Re CETO 6</b> Matters of potential concern in particular noted are: • entanglement issues with NES species, especially with cable mooring ropes • seabed conditions and how lay the cable; what is disturbed or destroyed or changed, anchoring issues • submerged dimensions of infrastructure • what's the minimum power. If it's calm, does it still work? • how will you prevent fauna going into submerged infrastructure and can anything get trapped inside? Can you put mesh in to stop some fauna access • biofouling: how will you manage biofouling and movement of marine pests?</p>	<p>Entanglement issues maritime safety with commercial and recreational fishing boats biofouling</p>	

### BMT Oceanica Summary of CETO 6 Community Consultation

Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
18 November 2015	Office of the Environmental Protection Authority (OEPA)	Gordon Motherwell Senior Environmental Officer Infrastructure Assessments Branch	<ul style="list-style-type: none"> <li>OEPA requested the provision of the Environmental Impact Assessment (EIA) and Environmental Management Plans (EMPs) associated with the CETO 6 Wave Technology including the associated environmental approvals timeframe.</li> <li>Upon review of these documents, OEPA will indicate if formal assessment will be required.</li> <li>OEPA stated the main environmental factors of OEPAs concern would include ,benthic primary producer habitats (BPPH), coastal processes, marine fauna, marine environmental quality</li> </ul>	<ul style="list-style-type: none"> <li>Carnegie and BMT Oceanica will provide copies of the EIA and EMPs to OEPA upon completion.</li> <li>BMT Oceanica requested further information from OEPA on the bilateral agreement process between State and Commonwealth and whether the Project would also require referral to the Commonwealth under the EPBC Act (1999).</li> <li>BMT Oceanica requested further clarification from OEPA on whether a native vegetation clearing permit is required for BPPH.</li> </ul>	N/A subject to provision of requested documents
18 November 2015	Department of Defence (DoD)	Georgia Davies Regional Environment Officer Estate Services - Central and West Defence Estate and Infrastructure Group	<ul style="list-style-type: none"> <li>As a general comment DoD considered the overall Project to present less environmental risk than PWEF.</li> <li>DoD stated the deepwater tracking cable has been removed up until the bank at Broun Bay. The cable may be removed further on terrestrial land and therefore suggested Carnegie consult with Susan Eagan in Canberra regarding CETO 6 construction/operations.</li> <li>DoD stated there are two future Projects, namely, 3 offer base re-development and HSF Air 9000 re-development in which timing may occur concurrently with CETO 6 construction/operations.</li> <li>DoD stated the seed collectors for flora restoration on the Garden Island may be in demand with proposed future Projects and Carnegie may wish to supply seed collectors to</li> </ul>	<ul style="list-style-type: none"> <li>DoD and Carnegie to consult regarding proposed timings for future Projects on Garden Island.</li> </ul>	Refer to TEMP

Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
			<p>pass seed material onto Transfield Environment Manager for propagation.</p> <ul style="list-style-type: none"> <li>DoD suggested Carnegie place nursery orders in advance for routine restoration surveys due to high demand with future projects.</li> <li>Carnegie queried the process for transition of the existing PWEP Environmental Clearance Certificate (ECC) for CETO 6.</li> <li>DoD stated the Project ECC should be a variation of the existing PWEP ECC and submitted for approval.</li> <li>DoD suggested Carnegie may wish to consider a bushfire management system for Carnegie infrastructure which may include vent, meshing and seals on existing and new infrastructure associated with the Project.</li> <li>DoD suggested Carnegie may wish to develop heritage fact sheets for contractors to be aware of potential heritage items that may be discovered during contradiction of the onshore trench.</li> <li>Other minor textual changes to key management and mitigation actions within the risk register were suggested for completeness.</li> </ul>		
18 November 2015	Dr Boyd Wykes	Independent Consultant	<ul style="list-style-type: none"> <li>As a general comment Dr Boyd considered the overall Project to present low environmental risk.</li> <li>PWEP operation to date has presented low environmental risk based on results of flora and fauna monitoring.</li> <li>Dr Boyd with DoD and Carnegie suggested removal of reference to onshore cable laying for impacts to fauna as a result of terrestrial construction. As such, the residual risk reduced to low as opposed to medium residual risk.</li> <li>Other minor textual changes to key management and mitigation actions within the risk register were suggested for completeness.</li> </ul>	<ul style="list-style-type: none"> <li>DoD, Dr Boyd and Carnegie to consult regarding proposed timings for future Projects on Garden Island to minimise cumulative Project impacts should Project timings coincide.</li> </ul>	Refer to TEMP

Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
26 November 2015	Department of Fisheries (DoF)	<p>Dr Justin McDonald Principal Research Scientist</p> <p>Marine Biosecurity Research, Western Australian Fisheries &amp; Marine Research Laboratories</p>	<ul style="list-style-type: none"> <li>DoF provided the following suggestions for management and mitigation associated with introduced marine pests and biofouling during construction. DoF stated the source of risk for vessels and to consider: <ul style="list-style-type: none"> <li>domestic vessels as source vessels only</li> <li>biofouling of vessels and;</li> <li>feeder vessels from State waters leaving and re-entering State waters</li> </ul> </li> <li>Refer to Department of Agriculture (DoA) for biofouling guidelines for commercial vessels. AQIS provides guidelines for topside. Consider the use of the State-wide vessel tool checklist. The impact in offshore waters is likely to be low to negligible with good forethought and planning. DoF recommend clearing vessels 4-6 weeks or longer in advance to organise vessels for DOF clearance. This allows for more time should a vessel be assessed as high risk and delays with cleaning the vessel due to traffic in the dry-dock and as a result Project timeframes are affected. An advance notice is more time and cost efficient in the long run.</li> </ul>	<ul style="list-style-type: none"> <li>BMTO/Carnegie thankful for suggestions, noted and considered</li> </ul>	Refer to MEMP
			<ul style="list-style-type: none"> <li>DoF stated the risks presented for marine construction are the same for decommissioning and, as such, the management/mitigation measures mentioned for marine construction above apply for decommissioning. The vessel is the risk factor. If Carnegie implement the aforementioned management measures, the risk is primarily low, with a likelihood of 1, particularly in offshore waters.</li> </ul>	<ul style="list-style-type: none"> <li>BMTO/Carnegie thankful for suggestions, noted and considered</li> </ul>	Refer to MEMP
26 November 2015	Department of Transport-Navigational Safety(DoT)	Sam Carrello Project Officer Marine Safety	<ul style="list-style-type: none"> <li>DoT Navigational Safety queried what is the weight of BA full of seawater</li> </ul>	<ul style="list-style-type: none"> <li>Carnegie stated the weight is 400 t buoyancy and 200 t mass with diameter of ~21 m and 3.5 m depth. The mass is the unit itself, the Project design differs</li> </ul>	N/A

Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
				with CETO6 in comparison to PWEF, as it operates based on buoyancy and therefore not filled with seawater.	
			<ul style="list-style-type: none"> <li>DoT Navigational Safety queried how far below the surface will the BA be? Is it the same as PWEF?</li> </ul>	<ul style="list-style-type: none"> <li>Carnegie stated the unit follows the wave trough and will sit ~1–2 m below surface. At a very low tide and wave conditions it can be seen nearer the surface.</li> </ul>	N/A
			<ul style="list-style-type: none"> <li>DoT Navigational Safety queried during low tide and waves, there is increased vessel activity. How will the unit be submersed to avoid collisions?</li> </ul>	<ul style="list-style-type: none"> <li>Carnegie stated if there is an extreme low tide, the BA can be optimised to sit lower in the water column. The difference with CETO 6 is there will be no mast: it's not required. When there's no waves it's more conducive to vessel activity</li> </ul>	N/A
			<ul style="list-style-type: none"> <li>DoT Navigational Safety queried whether there is any infrastructure at the site at present?</li> <li>Is the wave buoy AMSA permitted? AMSA approval is required for any infrastructure in the lease area, including the BA, wave buoy, marker buoys, seabed foundations, etc. The Australian Hydrographic Office (AHO) are responsible for promulgating any required TNTMs &amp; chart corrections to AUS Charts. DoT Cartography is responsible for promulgating any chart corrections to DoT charts.</li> </ul>	<ul style="list-style-type: none"> <li>Carnegie stated no, only the wave monitoring buoy for oceanographic data and that the wave buoy was permitted and sent to DoT and through to AMSA for AMASA approval.</li> </ul>	N/A
			<ul style="list-style-type: none"> <li>DoT Navigational Safety: in terms of marking the site with navigational aids for CETO6, DoT Navigational Safety suggests the international standards &amp; recommendations, namely International Association of Lighting Authorities (IALA) Maritime Buoyage System, IALA Recommendation O-131-on the Marking of Offshore Wave and Tidal Energy Devices &amp; IALA Recommendation O-139-on the Marking of Man Made Offshore Structures for</li> </ul>	<ul style="list-style-type: none"> <li>BMTO/Carnegie thankful for suggestions, noted and considered</li> </ul>	Refer to MEMP and subsequent maritime navigational safety plan

Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
			<p>recommendations on lighting and marking for wave farms. DoT Navigational Safety suggest marking the corners of the lease area with cardinal marker buoys as per PWEF for fishermen/boaters that do not read the navigational charts and TNTMs.</p>		
			<ul style="list-style-type: none"> <li>DoT Navigational Safety stated feedback received from current PWEF site is that recreational fisherman may use the site as a FAD and moor off navigational aids to catch fish. These moored vessels may swing into the confines of the lease area. As such, DoT Navigational Safety suggests positioning the units with a buffer of at least 20 metres to the perimeter of the lease area to avoid boats nearing the units should recreational fisherman moor off navigational aids at the CETO 6 site. DoT Navigational Safety recommends that Carnegie obtains a legal exclusion zone which legally prevents access to the lease area and is issued the AHO. DoT Navigational Safety's primary involvement will be in State waters associated with marine works and laying of the cable. The AHO will issue the TNTMs as well as chart corrections for affected AUS charts. DoT Cartography will issue chart corrections for affected DoT charts. Visible marking and lighting is also considered to be essential by DoT Navigational Safety.</li> </ul>	<ul style="list-style-type: none"> <li>BMTO/Carnegie thankful for suggestions, noted and considered</li> </ul>	MEMP and subsequent maritime navigational safety plan
			<ul style="list-style-type: none"> <li>DoT Navigational Safety: to avoid confusion amongst stakeholders, suggest implementing an exclusion zone for the entire timeline of all Project phases as opposed to implementing an exclusion zone only when works are occurring.</li> <li>Carnegie queried whether the same types of cardinal markers types as the PWEF are suitable for CETO 6 and are any other</li> </ul>	<ul style="list-style-type: none"> <li>BMTO/Carnegie thankful for suggestions, noted and considered</li> <li>DoT Navigational Safety recommends guardian buoys as these are highly visible during day time. Carnegie used</li> </ul>	MEMP subsequent planning approvals (when approved)  MEMP and subsequent maritime navigational safety plan



Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
			<p>navigation safety aids required?</p>	<p>guardian buoys and these worked well for PWEF. Signage required on the marker buoys as per PWEF as well as an information plaque with Carnegie contact details. Carnegie should also consider equipping the marker buoys with adequate radar reflectors.</p>	
			<ul style="list-style-type: none"> <li>DoT stated one of the issues that presents with the operational risk to maritime safety from the CETO6 Project is the detachment of the units from the tether. An Emergency Response Plan, similar to PWEF would be required including: <ul style="list-style-type: none"> <li>The use of GPS beacon tracking on the unit</li> <li>Activation of a flashing white light on top of the unit (with a group flash rate same as an isolated danger mark F(2) as per IALA Maritime Buoyage System).</li> </ul> </li> <li>A Communications Plan is also required documenting what to do, an email notification list, how to provide updates of the BA's current position in real time, and which agencies to contact if detachment was to occur. Agencies to contact should include relevant stakeholders such as DoT Navigational Safety, Fremantle Ports, RVSRG, Water Police, HMAS Stirling etc., as with PWEF</li> </ul>	<ul style="list-style-type: none"> <li>BMTO/Carnegie thankful for suggestions, noted and considered</li> </ul>	<p>MEMP and subsequent maritime navigational safety/communications plan</p>
			<ul style="list-style-type: none"> <li>DoT Navigational Safety stated it is difficult to predict whether vessel anchors will come into contact with the cable and result in dragging. Cannot prohibit anchoring for safety reasons. Advise Carnegie to inform state (Dot Cartography) &amp; national (AHO) charting agencies so that the cable can be added to affected navigation charts</li> </ul>	<ul style="list-style-type: none"> <li>BMTO/Carnegie thankful for suggestions, noted and considered</li> </ul>	<p>MEMP and subsequent maritime navigational safety plan</p>

Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
			<ul style="list-style-type: none"> <li>DoT Navigational Safety: query when infrastructure is decommissioned, will the exclusion zone remain in place</li> <li>DoT Navigational Safety: Note: marine works for decommissioning will require TNTMs and the exclusion zone will need to be cancelled upon cessation of decommissioning</li> <li>DoT Navigational Safety queried when the Project timeframes are proposed for commencement of marine works? DoT will require 3–4 weeks' notice to issue notifications in State waters. AMSA &amp; the AHO will need to be contacted to ascertain how long they need for their approvals &amp; notifications</li> <li>DoT Navigational Safety: an extra item for consideration is procedures for reporting vessels that enter into the exclusion zone as the Project area is too far away for marine safety compliance. Suggest to liaise with AMSA @: nauticaladvice@amsa.gov.au to develop reporting procedure. It would be appropriate to note the vessel number and registration, date &amp; time of incursion (&amp; also take photos / videos if possible) and send to AMSA</li> </ul>	<ul style="list-style-type: none"> <li>Carnegie stated the CETO 6 unit(s) will be removed, however; considering the options of leaving subsea infrastructure depending on regulatory requirements</li> <li>Carnegie noted</li> <li>Carnegie stated Project construction scheduled for Dec 16 and noted for the time required to issue notices</li> <li>BMTO/Carnegie thankful for suggestions, noted and considered</li> </ul>	<p>N/A</p> <p>MEMP and subsequent maritime navigational safety plan</p> <p>N/A</p> <p>MEMP and subsequent maritime navigational safety plan for proposed management of exclusion areas</p> <p>N/A</p>
26 November 2015	Rockingham Volunteer Sea Rescue Group (RVSRG)	Rod Smith, Commander and Chris Aleman, Vice Commander	<ul style="list-style-type: none"> <li>RVSRG stated little vessel movement is seen at the proposed site and only local fishing vessels access the area. Vessels will generally navigate around the units. There are many commercial crayfishers within the area who know the area well, with many of them out there during peak season.</li> <li>RVSRG queried if there will be any night works as with PWEF? There are many fishing pots out during peak season for crays</li> </ul>	<ul style="list-style-type: none"> <li>Carnegie stated no night works, the barge will remain on site, but all vessel transfers will occur at first light and end of daylight. There are no active works at night.</li> </ul>	<p>N/A</p> <p>Refer MEMP</p>

Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
			<ul style="list-style-type: none"> <li>RVSRG stated it is important to have visible marking when dealing with small boating bodies</li> </ul>	<ul style="list-style-type: none"> <li>NB: Later information says that there is a possibility of 24-h drilling during foundation installation to be confirmed nearer the time.</li> </ul>	
	Department of the Environment	Matt Whitting Assistant Director, Project Assessments West Section  Assessment and Air Branch	<ul style="list-style-type: none"> <li>RVSRG queried how big the cable that runs to the shoreline is? Is it armoured and how deep is it? (in terms of anchor dragging and damage)</li> <li>RVSRG stated the vessels that frequent the waters of the proposed Project area are not very large and, as such, the anchors are not large. There is an unpredictable risk associated with anchoring on the cable and possible cable dragging. Fisherman will anchor where it looks good for fishing.</li> <li>DotE advised there have been a few changes to sectors within the Department. Denis Snowden is now the Director of the Project Assessments West Section.</li> <li>DotE have a large volume of developments for assessment and resourcing with the Department to provide advice to Proponents is currently challenging to meet the volume of enquires. The DotE focus is on advising on matters of national environmental significance (MNES) and EPBC Act processes, however; DotE appreciate the opportunity and time Carnegie has taken to contact and advise DotE of the proposed CETO6 Project</li> </ul>	<ul style="list-style-type: none"> <li>Carnegie noted</li> <li>Carnegie stated the cable is ~80 mm diameter armoured with a ~3 mm steel outer casing with 30-40 t breaking strain. It is unlikely the cable can be dragged by the size of boats' anchors using the area.</li> </ul>	MEMP and subsequent maritime navigational safety plan  N/A
03 December 2015			<ul style="list-style-type: none"> <li>BMTO queried whether there were any queries</li> </ul>	<ul style="list-style-type: none"> <li>DotE felt the information provided was</li> </ul>	N/A

Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
			<p>DotE had in regards to the supporting information/ presentation material provided and if further discussion of the Project background information was required</p>	<p>comprehensive and that the topic of conversation should be to Carnegie/BMTO greatest value surrounding MNES and EPBC Act assessment processes. Within the DotE, there are various line areas that collate and compile advice for delegates as to whether a matter is controlled or not.</p>	
			<ul style="list-style-type: none"> <li>BMTO discussed the remaining marine environmental residual risks associated with maritime safety</li> </ul>	<ul style="list-style-type: none"> <li>DotE suggested consultation with ASMA, the Australian Hydrographic Office (AHO) as well as DoT and other sea users to obtain navigational advice as DotE primarily receive input and advice from these associations when assessing Projects</li> </ul>	Refer MEMP
			<ul style="list-style-type: none"> <li>BMTO advised DotE there was a residual risk rating of medium for Introduced Marine Pests (IMPs) in the preliminary assessment, however; subsequent advice and suggested management options received from Justin McDonald from Department of Fisheries reduced the risk to low with good forethought and planning of vessels</li> </ul>	<ul style="list-style-type: none"> <li>DotE advised that a new Act had recently been introduced, namely, the <i>Biosecurity Act 2016</i>.</li> <li>DotE suggested Carnegie contact Kylie Higgins, Department of Agriculture, in regards to collating and compiling advice regarding IMPs and will provide contact information for Kylie.</li> </ul>	N/A
			<ul style="list-style-type: none"> <li>Carnegie queried who is administering the [Biodiversity] Act</li> </ul>	<ul style="list-style-type: none"> <li>DotE advised the Department of Agriculture and that the conditions once managed under EPBC Act 1999 in relation to IMPs is now administered under the Biosecurity Act 2015</li> </ul>	N/A
			<ul style="list-style-type: none"> <li>DotE queried the timing and Project resourcing</li> </ul>	<ul style="list-style-type: none"> <li>Carnegie provided Project timings with proposed foundation and cable installation scheduled to commence by 31 Dec 2016. Carnegie is seeking all environmental approvals to be completed by 30 Jun 2016 for financial investment decisions. Referrals will be</li> </ul>	N/A

Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
				submitted by 11 Jan 2016.	
			<ul style="list-style-type: none"> <li>Carnegie, EDW queried whether referral is required given the small Project footprint, significant work to date in development of environmental risk register, impact assessment and marine/terrestrial management plans with BMT0 and the likelihood of little impact to MNES</li> </ul>	<ul style="list-style-type: none"> <li>DotE are unable to advise on level of assessment as this in itself is the delegates job to assess and make that decision. Provision of the best sources of information and assessment against the Act and obligations is advisable for streamlined approval</li> </ul>	N/A
			<ul style="list-style-type: none"> <li>Carnegie, EDW understands Wave Technology is an innovative industry and, as such, Carnegie have and will continue to introduce regulators to the industry and continue to be open and transparent throughout all Project phases</li> </ul>	<ul style="list-style-type: none"> <li>DotE acknowledge and appreciate Carnegies consultation to date</li> </ul>	N/A
			<ul style="list-style-type: none"> <li>BMT0 queried whether DotE have any further items for discussion based on information presented</li> </ul>	<ul style="list-style-type: none"> <li>DotE matter of consideration is entanglement risk to marine fauna and suggested careful consideration of management options. Computer generated diagrams detailing mooring lines and cables are useful</li> </ul>	Refer MEMP
			<ul style="list-style-type: none"> <li>Carnegie EDW, stated the mooring lines have been designed out of the Project design by engineers and the umbilical to the junction box is a floating mooring system. As the Project is still in preliminary design phase, the choice of foundation installation is still pending, however, should pile driving be the chosen option Carnegie will have a dedicated Marine Fauna Observers and an exclusion zone.</li> </ul>	<ul style="list-style-type: none"> <li>DotE these mitigation measures continue to reduce the risk for Carnegie</li> </ul>	Refer MEMP
			<ul style="list-style-type: none"> <li>DotE stated cost recovery is now part of DotE policy's' and procedures. Provision of as much information as possible upfront reduces the need for additional cost recovery charges (should additional information be required from the Proponent by DotE). In the event a controlled action decision is made, a fee estimate will be provided. If a Project is a controlled action (meaning further assessment</li> </ul>	<ul style="list-style-type: none"> <li>BMT0/Carnegie thankful for the information provided</li> </ul>	N/A

Date	Organisation	Contact Name and Position	Comment	Response	Evidence of implementation (if required)
			<p>will be required before an action can proceed), greater costs will be incurred by the Proponent.</p> <ul style="list-style-type: none"> <li>DotE stated there is a new draft Outcome Based Conditions Policy which is adapted from policy's of the WA EPA and Victoria EPA. The policy is in DRAFT format and to date has been implemented with willing proponents from over the last 6 months. The policy is less prescriptive in terms of management conditions and allows industry to decide appropriate management measures to achieve desired environmental outcomes. The policy is most effective with willing Proponents and DotE work with proponents to advise on how outcomes can be achieved. DotE will provide a link to the policy documents</li> </ul>		
			<ul style="list-style-type: none"> <li>Carnegie queried how the bilateral agreement process and whether State can advise Commonwealth on Projects with cross jurisdictions</li> </ul>	<ul style="list-style-type: none"> <li>DotE will cooperate with the State to the maximum amount possible to enable Proponents to submit one set of paperwork, though this collaboration normally occurs in later stages, for the assessment of a controlled action only. At the referral stage it generally is too early to conceive this cooperation to occur.</li> </ul>	N/A
			<ul style="list-style-type: none"> <li>DotE will review again supporting Project information provided especially in relation to scheduling and timing and bring any matters worthy of consideration to attention. DotE will be available for assistance over the next month should Carnegie/BMTO require further information</li> </ul>	<ul style="list-style-type: none"> <li>BMTO/Carnegie thankful for the information provided and assistance from DotE</li> </ul>	N/A

Note:  
N/A- Not applicable









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## **Appendix B**

### **Hydraulic Fluid Safety Data Sheet**



## Safety Data Sheet

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### SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

#### 1.1 Product Identifier

**Material Name** : Shell Tellus S3 M 68

**Product Code** : 001D7760

#### 1.2 Relevant identified uses of the substance or mixture and uses advised against

**Product Use** : Hydraulic oil.

**Uses Advised Against** : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.

#### 1.3 Details of the Supplier of the safety data sheet

**Manufacturer/Supplier** : Shell UK Oil Products Limited

Shell Centre  
London  
SE1 7NA  
United Kingdom

**Telephone** : (+44) 08708500939

**Email Contact for Safety Data Sheet** : If you have any enquiries about the content of this SDS please email lubricantSDS@shell.com

#### 1.4 Emergency Telephone Number

: +44-(0) 151-350-4595

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### SECTION 2. HAZARDS IDENTIFICATION

#### 2.1 Classification of the substance or mixture

1999/45/EC	
Hazard Characteristics	R-phrases(s)
Not classified as dangerous under EC criteria.;	

#### 2.2 Label Elements

**Safety Data Sheet****Labeling according to Directive 1999/45/EC**

EC Symbols : No Hazard Symbol required

EC Classification : Not classified as dangerous under EC criteria.

EC Risk Phrases : Not classified.

EC Safety Phrases : Not classified.

**2.3 Other Hazards**

**Health Hazards** : Not expected to be a health hazard when used under normal conditions. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis. High-pressure injection under the skin may cause serious damage including local necrosis. Used oil may contain harmful impurities.

**Safety Hazards** : Not classified as flammable but will burn.

**Environmental Hazards** : Not classified as dangerous for the environment.

**SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS****3.1 Substance**

**Material Name** : Not applicable.

**3.2 Mixtures**

**Mixture Description** : Highly refined mineral oils and additives.

**Hazardous Components****Classification of components according to Regulation (EC) No 1272/2008**

Chemical Name	CAS No.	EC Number	REACH Registration No.	Conc.
Interchangeable low viscosity base oil (<20,5 cSt @40°C) *	*	*	*	0.00 - 90.00%

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Chemical Name	Hazard Class & Category	Hazard Statement
Interchangeable low viscosity base oil (<20,5 cSt @40°C) *	Asp. Tox., 1;	H304;

**Additional Information** : The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

Refer to Ch 16 for full text of H phrases.

\* contains one or more of the following CAS-numbers (REACH registration numbers): 64742-53-6 (01-2119480375-34), 64742-54-7 (01-2119484627-25), 64742-55-8 (01-2119487077-29), 64742-56-9 (01-2119480132-48), 64742-65-0 (01-2119471299-27), 68037-01-4 (01-2119486452-34), 72623-86-0 (01-2119474878-16), 72623-87-1 (01-2119474889-13), 8042-47-5 (01-2119487078-27), 848301-69-9 (01-0000020164-80).

This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

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**SECTION 4. FIRST AID MEASURES**
**4.1 Description of First Aid Measures**

- General Information** : Not expected to be a health hazard when used under normal conditions.
- Inhalation** : No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.
- Skin Contact** : Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention. When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop. Obtain medical attention even in the absence of apparent wounds.
- Eye Contact** : Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
- Ingestion** : In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.
- Self-protection of the first aider** : When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the incident, injury and surroundings.



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- 4.2 Most important symptoms and effects, both acute and delayed** : Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Local necrosis is evidenced by delayed onset of pain and tissue damage a few hours following injection. Ingestion may result in nausea, vomiting and/or diarrhoea.
- 4.3 Indication of any immediate medical attention and special treatment needed** : Notes to doctor/physician:  
Treat symptomatically.  
High pressure injection injuries require prompt surgical intervention and possibly steroid therapy, to minimise tissue damage and loss of function.  
Because entry wounds are small and do not reflect the seriousness of the underlying damage, surgical exploration to determine the extent of involvement may be necessary. Local anaesthetics or hot soaks should be avoided because they can contribute to swelling, vasospasm and ischaemia. Prompt surgical decompression, debridement and evacuation of foreign material should be performed under general anaesthetics, and wide exploration is essential.

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### SECTION 5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

- 5.1 Extinguishing Media** : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
- Unsuitable Extinguishing Media** : Do not use water in a jet.
- 5.2 Special hazards arising from the substance or mixture** : Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.
- 5.3 Advice for firefighters** : Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

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### SECTION 6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Observe the relevant local and international regulations.

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- 6.1 Personal Precautions, Protective Equipment and Emergency Procedures** : 6.1.1 For non emergency personnel: Avoid contact with skin and eyes.  
6.1.2 For emergency responders: Avoid contact with skin and eyes.
- 6.2 Environmental Precautions** : Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.
- 6.3 Methods and Material for Containment and Cleaning Up** : Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.
- Additional Advice** : Local authorities should be advised if significant spillages cannot be contained.
- 6.4 Reference to other sections** : For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet.

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## SECTION 7. HANDLING AND STORAGE

- General Precautions** : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
- 7.1 Precautions for Safe Handling** : Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers.
- Product Transfer** : This material has the potential to be a static accumulator. Proper grounding and bonding procedures should be used during all bulk transfer operations.
- 7.2 Conditions for safe storage, including any incompatibilities** : Store at ambient temperature.

Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.

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- The storage of this product may be subject to the Control of Pollution (Oil Storage) (England) Regulations. Further guidance may be obtained from the local environmental agency office.
- Recommended Materials** : For containers or container linings, use mild steel or high density polyethylene.
- Unsuitable Materials** : PVC.
- 7.3 Specific end use(s)** : Not applicable
- Additional Information** : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion. Exposure to this product should be reduced as low as reasonably practicable. Reference should be made to the Health and Safety Executive's publication "COSHH Essentials".

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### SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

#### 8.1 Control Parameters

##### Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA(Inhalable fraction.)		5 mg/m3	

#### Biological Exposure Index (BEI)

No biological limit allocated.

**PNEC related information** : Data not available

**Monitoring Methods** : Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory. Examples of sources of recommended exposure measurement methods are given

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below or contact the supplier. Further national methods may be available.

National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods <http://www.cdc.gov/niosh/>

Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods <http://www.osha.gov/>

Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances <http://www.hse.gov.uk/>

Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany. <http://www.dguv.de/inhalt/index.jsp>

L'Institut National de Recherche et de Sécurité, (INRS), France <http://www.inrs.fr/accueil>

### 8.2 Exposure Controls General Information

: The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

Define procedures for safe handling and maintenance of controls. Educate and train workers in the hazards and control measures relevant to normal activities associated with this product. Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation. Drain down system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that

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cannot be cleaned. Practice good housekeeping.

### Occupational Exposure Controls

- Personal Protective Equipment** : The provided information is made in consideration of the PPE directive (Council Directive 89/686/EEC) and the CEN European Committee for Standardisation (CEN) standards. Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
- Eye Protection** : Wear safety glasses or full face shield if splashes are likely to occur. Approved to EU Standard EN166.
- Hand Protection** : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same, but recognise that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time may be acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material.
- Body protection** : Skin protection not ordinarily required beyond standard issue work clothes.
- Respiratory Protection** : No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate

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combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)] meeting EN14387.

**Thermal Hazards** : Not applicable.

**Environmental Exposure Controls**

**Environmental exposure control measures** : Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation. Information on accidental release measures are to be found in section 6.

**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

Appearance : Amber. Liquid at room temperature.  
 Odour : Slight hydrocarbon.  
 Odour threshold : Data not available  
 pH : Not applicable.  
 Initial Boiling Point and Boiling Range : > 280 °C / 536 °F estimated value(s)  
 Pour point : Typical -30 °C / -22 °F  
 Flash point : Typical 222 °C / 432 °F (PMCC / ASTM D93)  
 Upper / lower Flammability or Explosion limits : Typical 1 - 10 %(V) (based on mineral oil)  
 Auto-ignition temperature : > 320 °C / 608 °F  
 Vapour pressure : < 0.5 Pa at 20 °C / 68 °F (estimated value(s))  
 Relative Density : Typical 0.880 at 15 °C / 59 °F  
 Density : Typical 880 kg/m<sup>3</sup> at 15 °C / 59 °F  
 Water solubility : Negligible.  
 Solubility in other solvents : Data not available

n-octanol/water partition coefficient (log Pow) : > 6 (based on information on similar products)  
 Dynamic viscosity : Data not available  
 Kinematic viscosity : Typical 68 mm<sup>2</sup>/s at 40 °C / 104 °F  
 Vapour density (air=1) : > 1 (estimated value(s))  
 Evaporation rate (nBuAc=1) : Data not available  
 Decomposition : Data not available  
 Temperature  
 Flammability : Data not available  
 Oxidizing Properties : Data not available

Explosive Properties : Not classified

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### 9.2 Other Information

- Electrical conductivity : This material is not expected to be a static accumulator.
- Other Information : not a VOC
- Volatile organic compound : 0 %

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## SECTION 10. STABILITY AND REACTIVITY

- 10.1 Reactivity** : The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.
- 10.2 Chemical stability** : No hazardous reaction is expected when handled and stored according to provisions.
- 10.3 Possibility of Hazardous Reactions** :  
: Reacts with strong oxidising agents.
- 10.4 Conditions to Avoid** : Extremes of temperature and direct sunlight.
- 10.5 Incompatible Materials** : Strong oxidising agents.
- 10.6 Hazardous Decomposition Products** : Hazardous decomposition products are not expected to form during normal storage.

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## SECTION 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on Toxicological effects

- Basis for Assessment** : Information given is based on data on the components and the toxicology of similar products.  
Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).
- Likely Routes of Exposure** : Skin and eye contact are the primary routes of exposure although exposure may occur following accidental ingestion.
- Acute Oral Toxicity** : Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat
- Acute Dermal Toxicity** : Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit
- Acute Inhalation Toxicity** : Not considered to be an inhalation hazard under normal conditions of use.
- Skin corrosion/irritation** : Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
- Serious eye damage/irritation** : Expected to be slightly irritating.
- Respiratory Irritation** : Inhalation of vapours or mists may cause irritation.



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**Respiratory or skin sensitisation** : For respiratory and skin sensitisation: Not expected to be a sensitiser.  
**Aspiration Hazard** : Not considered an aspiration hazard.

**Germ cell mutagenicity** : Not considered a mutagenic hazard.  
**Carcinogenicity** : Not expected to be carcinogenic. Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC).

Material	Carcinogenicity Classification
Highly refined mineral oil (IP346 <3%)	ACGIH Group A4: Not classifiable as a human carcinogen.
Highly refined mineral oil (IP346 <3%)	IARC 3: Not classifiable as to carcinogenicity to humans.
Highly refined mineral oil (IP346 <3%)	GHS / CLP: No carcinogenicity classification

**Reproductive and Developmental Toxicity** : Not expected to be a hazard.

**Summary on evaluation of the CMR properties**

**Carcinogenicity** : This product does not meet the criteria for classification in categories 1A/1B.,

**Mutagenicity** : This product does not meet the criteria for classification in categories 1A/1B.

**Reproductive Toxicity (fertility)** : This product does not meet the criteria for classification in categories 1A/1B.

**Specific target organ toxicity - single exposure** : Not expected to be a hazard.

**Specific target organ toxicity - repeated exposure** : Not expected to be a hazard.

**Additional Information** : Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. High pressure injection of product into the skin may lead to local necrosis if the product is not surgically removed. Classifications by other authorities under varying regulatory frameworks may exist.

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### SECTION 12. ECOLOGICAL INFORMATION

- Basis for Assessment** : Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).
- 12.1 Toxicity**  
**Acute Toxicity** : Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract. Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.
- 12.2 Persistence and degradability** : Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
- 12.3 Bioaccumulative Potential** : Contains components with the potential to bioaccumulate.
- 12.4 Mobility in Soil** : Liquid under most environmental conditions. If it enters soil, it will adsorb to soil particles and will not be mobile. Floats on water.
- 12.5 Result of PBT and vPvB assesment** : This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.
- 12.6 Other Adverse Effects** : Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

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### SECTION 13. DISPOSAL CONSIDERATIONS

#### 13.1 Waste Treatment Methods

- Material Disposal** : Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper

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- waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
- Container Disposal** : Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
- Local Legislation** : Disposal should be in accordance with applicable regional, national, and local laws and regulations.  
EU Waste Disposal Code (EWC): 13 01 10 mineral based non-chlorinated hydraulic oils. Classification of waste is always the responsibility of the end user.

**SECTION 14. TRANSPORT INFORMATION****Land transport (ADR/RID):****ADR**

This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

**RID**

This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

**Inland waterways transport (ADN):**

This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

**Sea transport (IMDG Code):**

This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

**Air transport (IATA):**

This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

**14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**

- Pollution Category : Not applicable.  
Ship Type : Not applicable.  
Product Name : Not applicable.

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Special Precaution : Not applicable.

Additional Information : MARPOL Annex 1 rules apply for bulk shipments by sea.

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### SECTION 15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

#### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

##### Other regulatory Information

Authorisations and/or restrictions on use : Product is not subject to Authorisation under REACH.

Recommended Restrictions on Use (Advice Against) : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.

##### Chemical Inventory Status

EINECS : All components listed or polymer exempt.

TSCA : All components listed.

Other Information : Environmental Protection Act 1990 (as amended).  
Health and Safety at Work etc. Act 1974.  
Consumers Protection Act 1987.  
Pollution Prevention and Control Act 1999.  
Environment Act 1995.  
Factories Act 1961.  
The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment (Amendment) Regulations 2011.  
Chemicals (Hazard Information and Packaging for Supply) Regulations 2009.  
Control of Substances Hazardous to Health Regulations 2002 (as amended).  
Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997.  
Reporting of Injuries, Diseases and Dangerous Occurrences

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Regulations 1995 (as amended).  
 Personal Protective Equipment Regulations 2002.  
 Personal Protective Equipment at Work Regulations 1992.  
 Hazardous Waste (England and Wales) Regulations 2005(as amended).  
 Control of Major Accident Hazards Regulations 1999 (as amended).  
 Renewable Transport Fuel Obligations Order 2007 (as amended).  
 Energy Act 2011.  
 Environmental Permitting (England and Wales) Regulations 2010 (as amended).  
 Waste (England and Wales) Regulations 2011 (as amended).  
 Planning (Hazardous Substances) Act 1990 and associated regulations.  
 The Environmental Protection (Controls on Ozone-Depleting Substances) Regulations 2011.

**15.2 Chemical Safety Assessment** : No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

**SECTION 16. OTHER INFORMATION**

Not classified.

**CLP Hazard Statements**

H304 May be fatal if swallowed and enters airways.

**Additional Information** : No Exposure Scenario annex is attached to this safety data sheet. It is a non-classified mixture containing hazardous substances as detailed in Section 3; relevant information from Exposure Scenarios for the hazardous substances contained have been integrated into the core sections 1-16 of this SDS.

**Other Information****Abbreviations and Acronyms**

: Acute Tox. = Acute toxicity  
 Asp. Tox. = Aspiration hazard  
 Aquatic Acute = Acute hazards to the aquatic environment  
 Aquatic Chronic = Hazardous to the aquatic environment - Long-term Hazard  
 Eye Dam. = Serious eye damage/eye irritation  
 Flam. Liq. = Flammable liquids  
 Skin Corr. = Skin corrosion/irritation  
 Skin Sens. = Skin sensitizer

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STOT SE = Specific target organ toxicity - single exposure  
STOT RE = Specific target organ toxicity - repeated exposure

The standard abbreviations and acronyms used in this document can be looked up in reference literature (e.g. scientific dictionaries) and/or websites.

ACGIH = American Conference of Governmental Industrial Hygienists  
ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road  
AICS = Australian Inventory of Chemical Substances  
ASTM = American Society for Testing and Materials  
BEL = Biological exposure limits  
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes  
CAS = Chemical Abstracts Service  
CEFIC = European Chemical Industry Council  
CLP = Classification Packaging and Labelling  
COC = Cleveland Open-Cup  
DIN = Deutsches Institut für Normung  
DMEL = Derived Minimal Effect Level  
DNEL = Derived No Effect Level  
DSL = Canada Domestic Substance List  
EC = European Commission  
EC50 = Effective Concentration fifty  
ECETOC = European Center on Ecotoxicology and Toxicology Of Chemicals  
ECHA = European Chemicals Agency  
EINECS = The European Inventory of Existing Commercial Chemical Substances  
EL50 = Effective Loading fifty  
ENCS = Japanese Existing and New Chemical Substances Inventory  
EWC = European Waste Code  
GHS = Globally Harmonised System of Classification and Labelling of Chemicals  
IARC = International Agency for Research on Cancer  
IATA = International Air Transport Association  
IC50 = Inhibitory Concentration fifty  
IL50 = Inhibitory Level fifty  
IMDG = International Maritime Dangerous Goods  
INV = Chinese Chemicals Inventory  
IP346 = Institute of Petroleum test method N° 346 for the

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determination of polycyclic aromatics DMSO-extractables  
 KECI = Korea Existing Chemicals Inventory  
 LC50 = Lethal Concentration fifty  
 LD50 = Lethal Dose fifty per cent.  
 LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading  
 LL50 = Lethal Loading fifty  
 MARPOL = International Convention for the Prevention of  
 Pollution From Ships  
 NOEC/NOEL = No Observed Effect Concentration / No  
 Observed Effect Level  
 OE\_HPVC = Occupational Exposure - High Production Volume  
 PBT = Persistent, Bioaccumulative and Toxic  
 PICCS = Philippine Inventory of Chemicals and Chemical  
 Substances  
 PNEC = Predicted No Effect Concentration  
 REACH = Registration Evaluation And Authorisation Of  
 Chemicals  
 RID = Regulations Relating to International Carriage of  
 Dangerous Goods by Rail  
 SKIN\_DES = Skin Designation  
 STEL = Short term exposure limit  
 TRA = Targeted Risk Assessment  
 TSCA = US Toxic Substances Control Act  
 TWA = Time-Weighted Average  
 vPvB = very Persistent and very Bioaccumulative

- SDS Distribution** : The information in this document should be made available to all who may handle the product.
- SDS Version Number** : 2.1
- SDS Effective Date** : 12.12.2012
- SDS Revisions** : A vertical bar (|) in the left margin indicates an amendment from the previous version.
- SDS Regulation** : Regulation 1907/2006/EC as amended by Regulation (EU) 453/2010
- Disclaimer** : This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.





## **Appendix C**

### **Marine Fauna Observation Log Sheet**







## **Appendix D**

### **Antifoulant Safety Data Sheet**





## Jotacote Universal Comp A

### 1. Identification of the material and supplier

<b>Product name</b>	: Jotacote Universal Comp A
<b>Label No.</b>	: 478
<b>Supplier/Manufacturer</b>	: Jotun Australia 9 Cawley Road Brooklyn 3012 Australia  Telephone + 61 39314 0722 Fax + 61 39314 0423  SDSJotun@jotun.com
<b>Emergency telephone number</b>	: Medical Emergencies 24 hours: Poisons Information Centre (Australia) 131 126
<b>Area of application</b>	: Industrial applications, Professional applications, Used by spraying.
<b>Product description</b>	: Paint.
<b>Product type</b>	: Liquid.

### 2. Hazards identification

The preparation is classified in accordance with NOHSC as follows:

<b>Classification</b>	: R10 Xn; R20/21 Xi; R36/38 R43 N; R51/53
<b>Risk phrases</b>	: R10- Flammable. R20/21- Harmful by inhalation and in contact with skin. R36/38- Irritating to eyes and skin. R43- May cause sensitisation by skin contact. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
<b>Safety phrases</b>	: S23- Do not breathe vapour / spray. S36/37- Wear suitable protective clothing and gloves. S38- In case of insufficient ventilation, wear suitable respiratory equipment. S61- Avoid release to the environment. Refer to special instructions/safety data sheet.
<b>Statement of hazardous/dangerous nature</b>	: HAZARDOUS SUBSTANCE. DANGEROUS GOODS.

### 3. Composition/information on ingredients

**Mixture** : Yes.

Ingredient name	CAS number	Concentration
fatty acids, c18-unsatd., dimers, polymers with bisphenol a and epichlorohydrin	67989-52-0	25 - 50
xylene	1330-20-7	10 - 25
epoxy resin (MW ≤ 700)	25068-38-6	2.5 - 10
glycidyl ether of 3-alkyl phenol	68413-24-1	2.5 - 10
butan-1-ol	71-36-3	1 - 2.5
ethylbenzene	100-41-4	1 - 2.5
aluminium powder (stabilised)	7429-90-5	1 - 2.5
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% Benzene)	64742-82-1	0 - 1
2,6-dimethylheptan-4-one	108-83-8	0 - 1
Naphtha (petroleum), hydrotreated light (<0.1% Benzene)	64742-49-0	0 - 1

## Jotacote Universal Comp A

Other ingredients, determined not to be hazardous according to Safe Work Australia criteria, and not dangerous according to the ADG Code, make up the product concentration to 100%.

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

## 4 . First-aid measures

### First-aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
- Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

## 5 . Fire-fighting measures

### Extinguishing media

- Suitable** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Not suitable** : Do not use water jet.
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. This material is toxic to aquatic organisms. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.
- Flammable liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
- Hazchem code** : 3[Y]

## 6 . Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).
- Environmental precautions** : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.
- Methods for cleaning up** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.
- Contain and collect spillage with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

## 7 . Handling and storage

- Handling** : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapour or mist. Avoid release to the environment. Refer to special instructions/safety data sheet. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.
- The handle provided on the package is for manual handling only. Transport and transfer should be carried out with appropriate equipment and carriage devices.
- Storage** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

## 8 . Exposure controls/personal protection

### Ingredient name

xylene

### Exposure limits

**Safe Work Australia (Australia, 1/2014).**

STEL: 655 mg/m<sup>3</sup> 15 minutes.

STEL: 150 ppm 15 minutes.

TWA: 350 mg/m<sup>3</sup> 8 hours.

TWA: 80 ppm 8 hours.

butan-1-ol

**Safe Work Australia (Australia, 1/2014). Absorbed through skin.**

TWA: 152 mg/m<sup>3</sup> 8 hours.

TWA: 50 ppm 8 hours.

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ethylbenzene

**Safe Work Australia (Australia, 1/2014).**

STEL: 543 mg/m<sup>3</sup> 15 minutes.

STEL: 125 ppm 15 minutes.

TWA: 434 mg/m<sup>3</sup> 8 hours.

TWA: 100 ppm 8 hours.

Naphtha (petroleum), hydrodesulfurized heavy

**NOHSC (Australia, 11/2004). Notes: Substance requiring review**

: 790 mg/m<sup>3</sup> 8 hours. Form: All forms

**Safe Work Australia (Australia, 1/2014).**

TWA: 145 mg/m<sup>3</sup> 8 hours.

TWA: 25 ppm 8 hours.

di-isobutyl ketone

### Recommended monitoring procedures

: If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

### Engineering measures

: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

### Hygiene measures

: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

### Personal protection

#### Eyes

: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

#### Hands

: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

#### Respiratory

: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

#### Skin

: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

### Environmental exposure controls

: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

## 9 . Physical and chemical properties

### Physical state

: Liquid.

### Colour

: Various colours.

### Odour

: Characteristic.

### Density

: 1.46 g/cm<sup>3</sup>

### Flash point

: Closed cup: 35°C (95°F)  
Not applicable.

### Solubility

: Insoluble in the following materials: cold water and hot water.

## 10 . Stability and reactivity

- Stability** : Stable under recommended storage and handling conditions (see Section 7).
- Hazardous decomposition products: carbon monoxide, carbon dioxide, smoke, oxides of nitrogen.
- Keep away from the following materials to prevent strong exothermic reactions: oxidising agents, strong alkalis, strong acids.
- Hazardous decomposition products** : Decomposition products may include the following materials: carbon monoxide, carbon dioxide, smoke, oxides of nitrogen.
- Materials to avoid/ Hazardous Reactions** : Keep away from the following materials to prevent strong exothermic reactions: oxidising agents, strong alkalis, strong acids.
- Conditions to avoid** : Keep away from heat, sparks and flame.

## 11 . Toxicological information

There are no data available on the mixture itself. The mixture has been assessed following the conventional method of the Dangerous Preparations Directive 1999/45/EC and classified for toxicological hazards accordingly. See Sections 2 and 3 for details.

Exposure to component solvent vapour concentrations in excess of the stated occupational exposure limit may result in adverse health effects such as mucous membrane and respiratory system irritation and adverse effects on the kidneys, liver and central nervous system. Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and, in extreme cases, loss of consciousness.

Solvents may cause some of the above effects by absorption through the skin. Repeated or prolonged contact with the mixture may cause removal of natural fat from the skin, resulting in non-allergic contact dermatitis and absorption through the skin.

If splashed in the eyes, the liquid may cause irritation and reversible damage.

Ingestion may cause nausea, diarrhea and vomiting.

This takes into account, where known, delayed and immediate effects and also chronic effects of components from short-term and long-term exposure by oral, inhalation and dermal routes of exposure and eye contact.

Based on the properties of the epoxy constituent(s) and considering toxicological data on similar mixtures, this mixture may be a skin sensitiser and an irritant. It contains low molecular weight epoxy constituents which are irritating to eyes, mucous membrane and skin. Repeated skin contact may lead to irritation and to sensitisation, possibly with cross-sensitisation to other epoxies. Skin contact with the mixture and exposure to spray mist and vapour should be avoided.

Contains 4,4'-Isopropylidenediphenol, oligomeric reaction products with 1-chloro-2,3-epoxypropane, reaction products with fatty acids, C18-unsatd., dimers, epoxy resin (MW ≤ 700), Cashew, nutshell liq., oligomeric reaction products with 1-chloro-2,3-epoxypropane. May produce an allergic reaction.

### Potential acute health effects

- Inhalation** : Harmful by inhalation.
- Ingestion** : Irritating to mouth, throat and stomach.
- Skin contact** : Harmful in contact with skin. Irritating to skin. May cause sensitisation by skin contact.
- Eye contact** : Irritating to eyes.

### Acute toxicity

- Toxicity data** : Not available.

### Potential chronic health effects

#### Carcinogenicity

Ingredient name	ACGIH	EPA	OSHA	IARC	NIOSH	NTP
xylene	A4	-	-	3	-	-
aluminium stabilized	A4	-	-	-	-	-

- Mutagenicity** : No known significant effects or critical hazards.

- Reproductive toxicity** : No known significant effects or critical hazards.

### Over-exposure signs/symptoms

- Inhalation** : No known significant effects or critical hazards.
- Ingestion** : No known significant effects or critical hazards.
- Skin** : No known significant effects or critical hazards.



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**Target organs** : Contains material which may cause damage to the following organs: lungs, the nervous system, mucous membranes, upper respiratory tract, skin, central nervous system (CNS), ears, eye, lens or cornea.

## 12 . Ecological information

There are no data available on the mixture itself.  
Do not allow to enter drains or watercourses.

The preparation has been assessed following the conventional method of the Dangerous Preparations Directive 1999/45/EC and is classified for eco-toxicological properties accordingly. See Sections 2 and 3 for details.

**Ecotoxicity** : Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Water polluting material. May be harmful to the environment if released in large quantities.

### Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
epoxy resin (MW ≤ 700)	Acute EC50 1,4 mg/l Acute LC50 3,1 mg/l	Daphnia Fish - fathead minnow	48 hours 96 hours
ethylbenzene	Acute EC50 7,2 mg/l Acute EC50 2,93 mg/l Acute LC50 4,2 mg/l	Algae Daphnia Fish	48 hours 48 hours 96 hours
aluminium powder (stabilised)	Acute LC50 38000 µg/l  Acute LC50 120 µg/l Fresh water  Chronic NOEC 9 mg/l Fresh water	Daphnia - Daphnia magna  Fish - Oncorhynchus mykiss - Embryo Aquatic plants - Ceratophyllum demersum	48 hours  96 hours 3 days
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% Benzene)	Acute EC50 <10 mg/l  Acute IC50 <10 mg/l Acute LC50 <10 mg/l	Daphnia  Algae Fish	48 hours  72 hours 96 hours

**Conclusion/Summary** : Not available.

### Other ecological information

#### Persistence/degradability

**Conclusion/Summary** : Not available.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
xylene	-	-	Readily
epoxy resin (MW ≤ 700)	-	-	Not readily
ethylbenzene	-	-	Readily
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% Benzene)	-	-	Not readily

### Bioaccumulative potential

Product/ingredient name	LogP <sub>ow</sub>	BCF	Potential
xylene	3,12	8.1 to 25.9	low
epoxy resin (MW ≤ 700)	>3	31	low
butan-1-ol	0,88	-	low
ethylbenzene	3,15	-	low
Naphtha (petroleum), hydrodesulfurized heavy (<0.1% Benzene)	-	10 to 2500	high
2,6-dimethylheptan-4-one	3,71	130	low
Naphtha (petroleum), hydrotreated light (<0.1% Benzene)	2.2 to 5.2	10 to 2500	high

**Other adverse effects** : No known significant effects or critical hazards.

## 13 . Disposal considerations

**Methods of disposal** : The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapour from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

## 14 . Transport information

**Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

### International transport regulations

**Proper shipping name** : Paint  
**Marine pollutant substances** : fatty acids, c18-unsatd., dimers, polymers with bisphenol a and epichlorohydrin, epoxy resin (MW ≤ 700)  
**UN Number** : 1263  
**Class** : 3  
**Packing group** : III  
**Label** :



**Marking** : The environmental hazardous / marine pollutant mark is only applicable for packages containing more than 5 litres for liquids and 5 kg for solids.

### Additional information

**ADG Proper shipping name** : Paint  
**ADG Label** :



**ADG Hazchem code** : 3[Y]  
**ADR / RID** : Tunnel restriction code: (D/E)  
 Hazard identification number: 30  
 Special provisions: 640E  
**IMDG** : Emergency schedules (EmS): F-E, S-E  
 Marine pollutant: Yes.

Transport in accordance with ADR/RID, IMDG/IMO and ICAO/IATA and national regulation.

## 15 . Regulatory information

### National regulations

#### Standard Uniform Schedule of Medicine and Poisons

5

#### Control of Scheduled Carcinogenic Substances

##### Ingredient name

No listed substance

##### Schedule

**Australia inventory (AICS)** : All ingredients are listed on AICS or are exempt.



## EU regulations

: The product is classified and labelled for supply in accordance with the Directive 1999/45/EC as follows:

Hazard symbol or symbols



Contains

: fatty acids, c18-unsatd., dimers, polymers with bisphenol a and epichlorohydrin epoxy resin (MW ≤ 700)  
glycidyl ether of 3-alkyl phenol

Risk phrases

: R10- Flammable.  
R20/21- Harmful by inhalation and in contact with skin.  
R36/38- Irritating to eyes and skin.  
R43- May cause sensitisation by skin contact.  
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety phrases

: S23- Do not breathe vapour / spray.  
S36/37- Wear suitable protective clothing and gloves.  
S51- Use only in well-ventilated areas.

Additional warning phrases

: Contains epoxy constituents. May produce an allergic reaction.

## US regulations

HCS Classification

: Flammable liquid  
Target organ effects

## 16 . Other information

Full text of R-phrases referred to in sections 2 and 3

: R11- Highly flammable.  
R10- Flammable.  
R20- Harmful by inhalation.  
R22- Harmful if swallowed.  
R20/21- Harmful by inhalation and in contact with skin.  
R48/20- Harmful: danger of serious damage to health by prolonged exposure through inhalation.  
R65- Harmful: may cause lung damage if swallowed.  
R41- Risk of serious damage to eyes.  
R38- Irritating to skin.  
R36/38- Irritating to eyes and skin.  
R37/38- Irritating to respiratory system and skin.  
R43- May cause sensitisation by skin contact.  
R67- Vapours may cause drowsiness and dizziness.  
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Notice to reader

History

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Prepared by

: Jotun Group Product Safety Department

Disclaimer

*The information in this document is given to the best of Jotun's knowledge, based on laboratory testing and practical experience. Jotun's products are considered as semi-finished goods and as such, products are often used under conditions beyond Jotun's control. Jotun cannot guarantee anything but the quality of the product itself. Minor product variations may be implemented in order to comply with local requirements. Jotun reserves the right to change the given data without further notice.*

*Users should always consult Jotun for specific guidance on the general suitability of this product for their needs and specific application practices.*

*If there is any inconsistency between different language issues of this document, the English (United Kingdom) version will prevail.*

## Jotacote Universal Comp B

### Section 1. Identification

<b>GHS product identifier</b>	: Jotacote Universal Comp B
<b>Product code</b>	: 479
<b>Product description</b>	: Hardener.
<b>Other means of identification</b>	: Not available.
<b>Product type</b>	: Liquid.

#### Relevant identified uses of the substance or mixture and uses advised against

##### Identified uses

Uses in Coatings - Industrial use  
Uses in Coatings - Professional use

<b>Supplier's details</b>	: Jotun Paints, Inc. 9203 Highway 23 Belle Chasse, LA 70037 Telephone: (800) 229-3538 or +1 504-394-3538 SDSJotun@jotun.com
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<b>Emergency telephone number (with hours of operation)</b>	: 1-800-424-9300 (Staffed 24/7)
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### Section 2. Hazards identification

<b>OSHA/HCS status</b>	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
<b>Classification of the substance or mixture</b>	: FLAMMABLE LIQUIDS - Category 3 SKIN CORROSION/IRRITATION - Category 2 SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2

#### GHS label elements

##### Hazard pictograms



**Signal word** : Danger.

**Hazard statements** : Flammable liquid and vapor.  
Causes serious eye damage.  
Causes skin irritation.  
May cause damage to organs through prolonged or repeated exposure.

#### Precautionary statements

##### Prevention

: Wear protective gloves. Wear eye or face protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Do not breathe vapor or spray. Wash hands thoroughly after handling.

## Section 2. Hazards identification

- Response** : Get medical attention if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.
- Storage** : Store in a well-ventilated place. Keep cool.
- Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.
- Hazards not otherwise classified** : None known.

## Section 3. Composition/information on ingredients

- Substance/mixture** : Mixture
- Other means of identification** : Not available.
- CAS number/other identifiers**
- CAS number** : Not applicable.
- Product code** : 479

Ingredient name	%	CAS number
xylene	≥10 - <25	1330-20-7
butan-1-ol	≥5 - <10	71-36-3
ethylbenzene	≥3 - <5	100-41-4
ethylenediamine; 1,2-diaminoethane	≥0,3 - <1	107-15-3

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

Occupational exposure limits, if available, are listed in Section 8.

## Section 4. First aid measures

### Description of necessary first aid measures

- Eye contact** : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.
- Inhalation** : Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Skin contact** : Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

## Section 4. First aid measures

- Ingestion** : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

### Most important symptoms/effects, acute and delayed

#### Potential acute health effects

- Eye contact** : Causes serious eye damage.  
**Inhalation** : No known significant effects or critical hazards.  
**Skin contact** : Causes skin irritation.  
**Ingestion** : No known significant effects or critical hazards.

#### Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
pain  
watering  
redness
- Inhalation** : No specific data.
- Skin contact** : Adverse symptoms may include the following:  
pain or irritation  
redness  
blistering may occur
- Ingestion** : Adverse symptoms may include the following:  
stomach pains

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

**Specific hazards arising from the chemical** : Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide

## Section 5. Fire-fighting measures

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

### Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

## Section 7. Handling and storage

**Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

Ingredient name	Exposure limits
xylene	<p><b>ACGIH TLV (United States, 4/2014).</b>            STEL: 651 mg/m<sup>3</sup> 15 minutes.            STEL: 150 ppm 15 minutes.            TWA: 434 mg/m<sup>3</sup> 8 hours.            TWA: 100 ppm 8 hours.</p> <p><b>OSHA PEL (United States, 2/2013).</b>            TWA: 435 mg/m<sup>3</sup> 8 hours.            TWA: 100 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b>            STEL: 655 mg/m<sup>3</sup> 15 minutes.            STEL: 150 ppm 15 minutes.            TWA: 435 mg/m<sup>3</sup> 8 hours.            TWA: 100 ppm 8 hours.</p>
butan-1-ol	<p><b>ACGIH TLV (United States, 4/2014).</b>            TWA: 20 ppm 8 hours.</p> <p><b>NIOSH REL (United States, 10/2013).</b>  <b>Absorbed through skin.</b>            CEIL: 150 mg/m<sup>3</sup>            CEIL: 50 ppm</p> <p><b>OSHA PEL (United States, 2/2013).</b>            TWA: 300 mg/m<sup>3</sup> 8 hours.            TWA: 100 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b>  <b>Absorbed through skin.</b>            CEIL: 150 mg/m<sup>3</sup>            CEIL: 50 ppm</p>
ethylbenzene	<p><b>OSHA PEL 1989 (United States, 3/1989).</b>            TWA: 100 ppm 8 hours.            TWA: 435 mg/m<sup>3</sup> 8 hours.            STEL: 125 ppm 15 minutes.            STEL: 545 mg/m<sup>3</sup> 15 minutes.</p> <p><b>NIOSH REL (United States, 10/2013).</b>            TWA: 100 ppm 10 hours.            TWA: 435 mg/m<sup>3</sup> 10 hours.            STEL: 125 ppm 15 minutes.            STEL: 545 mg/m<sup>3</sup> 15 minutes.</p> <p><b>OSHA PEL (United States, 2/2013).</b>            TWA: 100 ppm 8 hours.            TWA: 435 mg/m<sup>3</sup> 8 hours.</p>
ethylenediamine; 1,2-diaminoethane	<p><b>ACGIH TLV (United States, 4/2014). Notes:</b>  <b>K</b>            TWA: 20 ppm 8 hours. Form:</p> <p><b>ACGIH TLV (United States, 4/2014).</b>  <b>Absorbed through skin.</b>            TWA: 10 ppm 8 hours.</p> <p><b>NIOSH REL (United States, 10/2013).</b>            TWA: 25 mg/m<sup>3</sup> 10 hours.            TWA: 10 ppm 10 hours.</p>



## Section 8. Exposure controls/personal protection

**OSHA PEL (United States, 2/2013).**

TWA: 25 mg/m<sup>3</sup> 8 hours.

TWA: 10 ppm 8 hours.

**OSHA PEL 1989 (United States, 3/1989).**

TWA: 25 mg/m<sup>3</sup> 8 hours.

TWA: 10 ppm 8 hours.

- Appropriate engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.
- Individual protection measures**
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard (NIOSH-approved P95) if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

- Physical state** : Liquid.
- Color** : Various colors.
- Odor** : Characteristic.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : Not available.



## Section 9. Physical and chemical properties

<b>Boiling point</b>	: Not available.
<b>Flash point</b>	: Closed cup: 28°C (82,4°F)
<b>Evaporation rate</b>	: Not available.
<b>Flammability (solid, gas)</b>	: Not available.
<b>Lower and upper explosive (flammable) limits</b>	: Not available.
<b>Vapor pressure</b>	: Not available.
<b>Vapor density</b>	: Not available.
<b>Relative density</b>	: 0.96 g/cm <sup>3</sup> 8.01 pounds/gallon
<b>Solubility</b>	: Insoluble in the following materials: cold water and hot water.
<b>Partition coefficient: n-octanol/water</b>	: Not available.
<b>Auto-ignition temperature</b>	: Not available.
<b>Decomposition temperature</b>	: Not available.
<b>Viscosity</b>	: Kinematic (40°C (104°F)): >0,225 cm <sup>2</sup> /s (>22,5 mm <sup>2</sup> /s)

## Section 10. Stability and reactivity

<b>Reactivity</b>	: No specific test data related to reactivity available for this product or its ingredients.
<b>Chemical stability</b>	: The product is stable.
<b>Possibility of hazardous reactions</b>	: Under normal conditions of storage and use, hazardous reactions will not occur.
<b>Conditions to avoid</b>	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
<b>Incompatible materials</b>	: Reactive or incompatible with the following materials: oxidizing materials
<b>Hazardous decomposition products</b>	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
xylene	LC50 Inhalation Gas. LD50 Oral	Rat Rat	6700 ppm 4300 mg/kg	4 hours -
ethylbenzene	LC50 Inhalation Gas. LD50 Dermal	Rabbit Rabbit	4000 ppm >5000 mg/kg	4 hours -
ethylenediamine; 1, 2-diaminoethane	LD50 Oral LD50 Oral	Rat Rat	3500 mg/kg 1200 mg/kg	- -

#### Irritation/Corrosion

Not available.

#### Sensitization

Not available.

#### Mutagenicity

Not available.

## Section 11. Toxicological information

### Carcinogenicity

Not available.

### Classification

Product/ingredient name	OSHA	IARC	NTP
xylene	-	3	-

### Reproductive toxicity

Not available.

### Teratogenicity

Not available.

### Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
butan-1-ol	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects

### Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
ethylbenzene	Category 2	Not determined	ears

### Aspiration hazard

Name	Result
ethylbenzene	ASPIRATION HAZARD - Category 1

**Information on the likely routes of exposure** : Not available.

### Potential acute health effects

- Eye contact** : Causes serious eye damage.  
**Inhalation** : No known significant effects or critical hazards.  
**Skin contact** : Causes skin irritation.  
**Ingestion** : No known significant effects or critical hazards.

### Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:  
 pain  
 watering  
 redness
- Inhalation** : No specific data.
- Skin contact** : Adverse symptoms may include the following:  
 pain or irritation  
 redness  
 blistering may occur
- Ingestion** : Adverse symptoms may include the following:  
 stomach pains

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

- Potential immediate effects** : Not available.  
**Potential delayed effects** : Not available.

## Section 11. Toxicological information

### Long term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Potential chronic health effects

Not available.

**General** : May cause damage to organs through prolonged or repeated exposure.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : No known significant effects or critical hazards.

### Numerical measures of toxicity

#### Acute toxicity estimates

Route	ATE value
Oral	4849,1 mg/kg
Dermal	5025,9 mg/kg
Inhalation (vapors)	41,71 mg/l

## Section 12. Ecological information

### Toxicity

Product/ingredient name	Result	Species	Exposure
ethylbenzene	Acute EC50 7,2 mg/l	Algae	48 hours
	Acute EC50 2,93 mg/l	Daphnia	48 hours
	Acute LC50 4,2 mg/l	Fish	96 hours

### Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
xylene	-	-	Readily
ethylbenzene	-	-	Readily

### Bioaccumulative potential

Product/ingredient name	LogP <sub>ow</sub>	BCF	Potential
xylene	3,12	8.1 to 25.9	low
butan-1-ol	0,88	-	low
ethylbenzene	3,15	-	low
ethylenediamine; 1, 2-diaminoethane	-2,04	-	low

### Mobility in soil

**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

## Section 13. Disposal considerations







### Disposal methods

: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

### United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Xylene 1-Butanol (I); n-Butyl alcohol (I)	1330-20-7 71-36-3	Listed Listed	U239 U031

## Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	ADR/RID	IMDG	IATA
UN number	1263	1263	1263	1263	1263	1263
UN proper shipping name	Paint	Paint	Paint	Paint	Paint	Paint
Transport hazard class(es)	3 	3 	3 	3 	3 	3 
Packing group	III	III	III	III	III	III
Environmental hazards	No.	No.	No.	No.	No.	No.

### Additional information

#### DOT Classification

: **Reportable quantity**

456,9 lbs / 207,43 kg [57,081 gal / 216,08 L]

Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

#### TDG Classification

: -

#### Mexico Classification

: -

#### ADR/RID

: Tunnel restriction code: (D/E)

Hazard identification number: 30

Special provisions: 640E

ADR/RID: Viscous substance. Not restricted, ref. chapter 2.2.3.1.5 (applicable to receptacles < 450 litre capacity).

#### IMDG

: Emergency schedules (EmS): F-E, S-E

Marine pollutant: No.

IMDG: Viscous substance. Transport in accordance with paragraph 2.3.2.5 (applicable to receptacles < 30 litre capacity).

#### IATA

: -

## Section 14. Transport information

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : **TSCA 8(a) CDR Exempt/Partial exemption:** Not determined  
Not determined.  
**Clean Water Act (CWA) 307:** ethylbenzene  
**Clean Water Act (CWA) 311:** xylene; 1,2-Diaminoethane; ethylbenzene

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Listed

**Clean Air Act Section 602 Class I Substances** : Not listed

**Clean Air Act Section 602 Class II Substances** : Not listed

**DEA List I Chemicals (Precursor Chemicals)** : Not listed

**DEA List II Chemicals (Essential Chemicals)** : Not listed

### SARA 302/304

#### Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
ethylenediamine; 1,2-diaminoethane	≥0,3 - <1	Yes.	10000	1334,1	5000	667

**SARA 304 RQ** : 584795,3 lbs / 265497,1 kg [73059,3 gal / 276559,5 L]

### SARA 311/312

**Classification** : Fire hazard  
Immediate (acute) health hazard  
Delayed (chronic) health hazard

#### Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
xylene	≥10 - <25	Yes.	No.	No.	Yes.	No.
butan-1-ol	≥5 - <10	Yes.	No.	No.	Yes.	No.
ethylbenzene	≥3 - <5	Yes.	No.	No.	Yes.	Yes.
ethylenediamine; 1, 2-diaminoethane	≥0,3 - <1	Yes.	No.	No.	Yes.	No.

### SARA 313

## Section 15. Regulatory information

	Product name	CAS number	%
Form R - Reporting requirements	xylene	1330-20-7	≥10 - <25
	butan-1-ol	71-36-3	≥5 - <10
	ethylbenzene	100-41-4	≥3 - <5
Supplier notification	xylene	1330-20-7	≥10 - <25
	butan-1-ol	71-36-3	≥5 - <10
	ethylbenzene	100-41-4	≥3 - <5

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

### State regulations

- Massachusetts** : The following components are listed: XYLENE; N-BUTYL ALCOHOL
- New York** : The following components are listed: Xylene (mixed); Butyl alcohol; 1-Butanol
- New Jersey** : The following components are listed: XYLENES; BENZENE, DIMETHYL-; n-BUTYL ALCOHOL; 1-BUTANOL
- Pennsylvania** : The following components are listed: BENZENE, DIMETHYL-; 1-BUTANOL

### California Prop. 65

**WARNING:** This product contains a chemical known to the State of California to cause cancer.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
ethylbenzene	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.

### International regulations

#### Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

#### Montreal Protocol (Annexes A, B, C, E)

Not listed.

#### Stockholm Convention on Persistent Organic Pollutants

Not listed.

#### Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

#### UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

### International lists

#### National inventory

- Australia** : All components are listed or exempted.
- Canada** : Not determined.
- China** : Not determined.
- Europe** : Not determined.
- Japan** : Not determined.
- Malaysia** : Not determined.
- New Zealand** : Not determined.
- Philippines** : Not determined.
- Republic of Korea** : Not determined.
- Taiwan** : Not determined.

## Section 16. Other information

### Procedure used to derive the classification

Classification	Justification
Flam. Liq. 3, H226 Skin Irrit. 2, H315 Eye Dam. 1, H318 STOT RE 2, H373	On basis of test data Calculation method Calculation method Calculation method

### History

**Date of printing** : 26.05.2015.

**Date of issue/Date of revision** : 26.05.2015.

**Date of previous issue** : 26.05.2015.

**Version** : 1.01

**Key to abbreviations** :

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- UN = United Nations

**References** : Not available.

✓ Indicates information that has changed from previously issued version.

### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



# SAFETY DATA SHEET



## Safeguard J niversal ES Uomp A

### Section 1. Identification

<b>GHS product identifier</b>	: Safeguard Universal ES Comp A
<b>Product code</b>	: 1055
<b>Product description</b>	: Paint.
<b>Other means of identification</b>	: Not available.
<b>Product type</b>	: Liquid.

#### Relevant identified uses of the substance or mixture and uses advised against

##### Identified uses

Uses in Coatings - Industrial use  
Uses in Coatings - Professional use

<b>Supplier's details</b>	: Jotun Paints, Inc. 9203 Highway 23 Belle Chasse, LA 70037 Telephone: (800) 229-3538 or +1 504-394-3538 SDSJotun@jotun.com
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<b>Emergency telephone number (with hours of operation)</b>	: 1-800-424-9300 (Staffed 24/7)
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### Section C. HaBards identification

<b>OSHA<del>H</del>US status</b>	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
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<b>Ulassification of the substance or mixture</b>	: FLAMMABLE LIQUIDS - Category 3 SKIN CORROSION/IRRITATION - Category 2 SKIN SENSITIZATION - Category 1 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2 AQUATIC HAZARD (LONG-TERM) - Category 3
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#### GHS label elements

##### HaBard pictograms



<b>Signal word</b>	: Warning.
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<b>HaBard statements</b>	: Flammable liquid and vapor. Causes skin irritation. May cause an allergic skin reaction. May cause damage to organs through prolonged or repeated exposure. Harmful to aquatic life with long lasting effects.
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#### Precautionary statements

## Section C. Hazards identification

- Prevention** : Wear protective gloves. Wear eye or face protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Avoid release to the environment. Do not breathe vapor or spray. Wash hands thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace.
- Response** : Get medical attention if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. If skin irritation or rash occurs: Get medical attention.
- Storage** : Store in a well-ventilated place. Keep cool.
- Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.
- Hazards not otherwise classified** : None known.

## Section z. Composition information on ingredients

- Substance mixture** : Mixture
- Other means of identification** : Not available.

### UAS number/other identifiers

- UAS number** : Not applicable.
- Product code** : 1055

Ingredient name	/	UAS number
xylene	≥10 - <25	1330-20-7
epoxy resin (MW ≤ 700)	≥5 - <5,01	25068-38-6
bisphenol A/F-epoxy resins (MW <700)	≥3 - <4,98	40216-08-8
1-methoxy-2-propanol	≥3 - <5	107-98-2
ethylbenzene	≥3 - <5	100-41-4

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

**There are no additional ingredients present which within the current knowledge of the supplier and in the concentrations applicable are classified as hazardous to health or the environment and hence require reporting in this section.**

Occupational exposure limits if available are listed in Section k.

## Section q. First aid measures

### Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention following exposure or if feeling unwell. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Skin contact** : Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

## Section q. First aid measures

**Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention following exposure or if feeling unwell. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

### Most important symptoms/effects/acute and delayed

#### Potential acute health effects

**Eye contact** : No known significant effects or critical hazards.  
**Inhalation** : No known significant effects or critical hazards.  
**Skin contact** : Causes skin irritation. May cause an allergic skin reaction.  
**Ingestion** : No known significant effects or critical hazards.

#### Overexposure signs/symptoms

**Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness  
**Inhalation** : No specific data.  
**Skin contact** : Adverse symptoms may include the following:  
irritation  
redness  
**Ingestion** : No specific data.

### Indication of immediate medical attention and special treatment needed if necessary

**Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.  
**Specific treatments** : No specific treatment.  
**Protection of first aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

## Section N. Firefighting measures

### Extinguishing media

**Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.  
**Unsuitable extinguishing media** : Do not use water jet.

**Specific hazards arising from the chemical** : Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard. This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

**Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide  
halogenated compounds  
metal oxide/oxides

## Section N Firefighting measures

- Special protective actions for firefighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Special protective equipment for firefighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section M Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

### Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 6. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

## Section 6. Handling and storage

**Conditions for safe storage** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section k. Exposure controls & personal protection

### Control parameters

#### Occupational exposure limits

Ingredient name	Exposure limits
xylene	<p><b>AUGIH T5L (J nited States 3q2C71q).</b>            STEL: 651 mg/m<sup>3</sup> 15 minutes.            STEL: 150 ppm 15 minutes.            TWA: 434 mg/m<sup>3</sup> 8 hours.            TWA: 100 ppm 8 hours.</p> <p><b>OSHA PE5 (J nited States 3C2C71z).</b>            TWA: 435 mg/m<sup>3</sup> 8 hours.            TWA: 100 ppm 8 hours.</p> <p><b>OSHA PE5 1VkV (J nited States 3z21VkV).</b>            STEL: 655 mg/m<sup>3</sup> 15 minutes.            STEL: 150 ppm 15 minutes.            TWA: 435 mg/m<sup>3</sup> 8 hours.            TWA: 100 ppm 8 hours.</p>
1-methoxy-2-propanol	<p><b>AUGIH T5L (J nited States 3q2C71q).</b>            STEL: 369 mg/m<sup>3</sup> 15 minutes.            STEL: 100 ppm 15 minutes.            TWA: 184 mg/m<sup>3</sup> 8 hours.            TWA: 50 ppm 8 hours.</p> <p><b>4 IO SH RE5 (J nited States 3172C71z).</b>            STEL: 540 mg/m<sup>3</sup> 15 minutes.            STEL: 150 ppm 15 minutes.            TWA: 360 mg/m<sup>3</sup> 10 hours.            TWA: 100 ppm 10 hours.</p> <p><b>OSHA PE5 1VkV (J nited States 3z21VkV).</b>            STEL: 540 mg/m<sup>3</sup> 15 minutes.            STEL: 150 ppm 15 minutes.            TWA: 360 mg/m<sup>3</sup> 8 hours.            TWA: 100 ppm 8 hours.</p>
ethylbenzene	<p><b>OSHA PE5 1VkV (J nited States 3z21VkV).</b>            TWA: 100 ppm 8 hours.            TWA: 435 mg/m<sup>3</sup> 8 hours.            STEL: 125 ppm 15 minutes.            STEL: 545 mg/m<sup>3</sup> 15 minutes.</p> <p><b>4 IO SH RE5 (J nited States 3172C71z).</b>            TWA: 100 ppm 10 hours.            TWA: 435 mg/m<sup>3</sup> 10 hours.            STEL: 125 ppm 15 minutes.            STEL: 545 mg/m<sup>3</sup> 15 minutes.</p> <p><b>OSHA PE5 (J nited States 3C2C71z).</b>            TWA: 100 ppm 8 hours.            TWA: 435 mg/m<sup>3</sup> 8 hours.</p> <p><b>AUGIH T5L (J nited States 3q2C71q). 4 otes:</b>  <b>0</b>            TWA: 20 ppm 8 hours. Form:</p>



## Section k. Exposure controls and personal protection

**Appropriate engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

**Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye and face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

### Skin protection

**Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

**Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard (NIOSH-approved P95) if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section V. Physical and chemical properties

### Appearance

**Physical state** : Liquid.

**Color** : Various colors.

**Odor** : Characteristic.

**Odor threshold** : Not available.

**pH** : Not available.

**Boiling point** : Not available.

**Freezing point** : Not available.

**Flash point** : Closed cup: 26°C (78,8°F)

**Evaporation rate** : Not available.

**Flammability (solid and gas)** : Not available.

**Lower and upper explosive (flammable) limits** : Not available.

## Section V. Physical and chemical properties

<b>Lapor pressure</b>	: Not available.
<b>Lapor density</b>	: Not available.
<b>Relative density</b>	: 1.54 g/cm <sup>3</sup> 12.85 pounds/gallon
<b>Solubility</b>	: Insoluble in the following materials: cold water and hot water.
<b>Partition coefficient: n8 octanol2water</b>	: Not available.
<b>Auto8gnition temperature</b>	: Not available.
<b>Decomposition temperature</b>	: Not available.
<b>Liscosity</b>	: Kinematic (40°C (104°F)): >0,225 cm <sup>2</sup> /s (>22,5 mm <sup>2</sup> /s)

## Section 17. Stability and reactivity

<b>Reactivity</b>	: No specific test data related to reactivity available for this product or its ingredients.
<b>Uhemical stability</b>	: The product is stable.
<b>Possibility of haBardous reactions</b>	: Under normal conditions of storage and use, hazardous reactions will not occur.
<b>Uonditions to avoid</b>	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
<b>Incompatible materials</b>	: Reactive or incompatible with the following materials: oxidizing materials
<b>HaBardous decomposition products</b>	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

Product2ngredient name	Result	Species	Dose	Exposure
xylene	LC50 Inhalation Gas.	Rat	6700 ppm	4 hours
	LD50 Oral	Rat	4300 mg/kg	-
1-methoxy-2-propanol	LD50 Dermal	Rabbit	13 g/kg	-
	LD50 Oral	Rat	6600 mg/kg	-
ethylbenzene	LC50 Inhalation Gas.	Rabbit	4000 ppm	4 hours
	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-

#### Irritation2Jorrosion

Product2ngredient name	Result	Species	Score	Exposure	Observation
1-methoxy-2-propanol	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	500 milligrams	-

#### SensitiBation

Not available.

#### - utagenicity

Not available.

#### Uarcinogenicity

Not available.



## Section 11. Toxicological information

### Classification

Product/Ingredient name	OSHA	IARU	4 TP
xylene	-	3	-

### Reproductive toxicity

Not available.

### Teratogenicity

Not available.

### Specific target organ toxicity (single exposure)

4 ame	Uategory	Route of exposure	Target organs
1-methoxy-2-propanol	Category 3	Not applicable.	Narcotic effects

### Specific target organ toxicity (repeated exposure)

4 ame	Uategory	Route of exposure	Target organs
ethylbenzene	Category 2	Not determined	ears

### Aspiration hazard

4 ame	Result
ethylbenzene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

### Potential acute health effects

- Eye contact** : No known significant effects or critical hazards.
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : Causes skin irritation. May cause an allergic skin reaction.
- Ingestion** : No known significant effects or critical hazards.

### Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness
- Inhalation** : No specific data.
- Skin contact** : Adverse symptoms may include the following:  
irritation  
redness
- Ingestion** : No specific data.

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

- Potential immediate effects** : Not available.
- Potential delayed effects** : Not available.

#### Long term exposure

- Potential immediate effects** : Not available.
- Potential delayed effects** : Not available.

#### Potential chronic health effects

## Section 11. Toxicological information

Not available.

<b>General</b>	: May cause damage to organs through prolonged or repeated exposure. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.
<b>Uarcinogenicity</b>	: No known significant effects or critical hazards.
<b>- utagenicity</b>	: No known significant effects or critical hazards.
<b>Teratogenicity</b>	: No known significant effects or critical hazards.
<b>Developmental effects</b>	: No known significant effects or critical hazards.
<b>Fertility effects</b>	: No known significant effects or critical hazards.

### 4 umerical measures of toxicity

#### Acute toxicity estimates

Route	ATE value
Oral	19038,5 mg/kg
Dermal	6095,9 mg/kg
Inhalation (vapors)	50,6 mg/l

## Section 1C. Ecological information

### Toxicity

Product2ngredient name	Result	Species	Exposure
epoxy resin (MW ≤ 700)	Acute EC50 1,4 mg/l Acute LC50 3,1 mg/l	Daphnia Fish - fathead minnow	48 hours 96 hours
ethylbenzene	Acute EC50 7,2 mg/l Acute EC50 2,93 mg/l Acute LC50 4,2 mg/l	Algae Daphnia Fish	48 hours 48 hours 96 hours

### Persistence and degradability

Product2ngredient name	A, uatic half8ife	Photolysis	9 iodegradability
xylene	-	-	Readily
epoxy resin (MW ≤ 700)	-	-	Not readily
ethylbenzene	-	-	Readily

### 9 ioaccumulative potential

Product2ngredient name	5ogP <sub>ow</sub>	9 UF	Potential
xylene	3,12	8.1 to 25.9	low
epoxy resin (MW ≤ 700)	>3	31	low
1-methoxy-2-propanol	<1	-	low
ethylbenzene	3,15	-	low

### - obility in soil

**Soil2water partition coefficient (0<sub>ou</sub>)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

## Section 1z. Disposal considerations







### Disposal methods

: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

### United States 8RURA Toxic hazardous waste KJ K5ist

Ingredient	UAS "	Status	Reference number
Xylene	1330-20-7	Listed	U239

## Section 1q. Transport information

	DOT Classification	TDG Classification	- exico Classification	ADR/RID	I- DG	IATA
J4 number	1263	1263	1263	1263	1263	1263
J4 proper shipping name	Paint	Paint	Paint	Paint	Paint	Paint
Transport hazard class(es)	3 	3 	3 	3 	3 	3 
Packaging group	III	III	III	III	III	III
Environmental hazards	No.	No.	No.	No.	No.	No.

### Additional information

#### DOT Classification

#### : Reportable quantity

554,17 lbs / 251,59 kg [43,158 gal / 163,37 L]

Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

#### TDG Classification

: -

#### - exico Classification

: -

#### ADR/RID

: Tunnel restriction code: (D/E)

Hazard identification number: 30

Special provisions: 640E

ADR/RID: Viscous substance. Not restricted, ref. chapter 2.2.3.1.5 (applicable to receptacles < 450 litre capacity).

#### I- DG

: Emergency schedules (EmS): F-E, S-E

Marine pollutant: No.

IMDG: Viscous substance. Transport in accordance with paragraph 2.3.2.5 (applicable to receptacles < 30 litre capacity).

#### IATA

: -

## Section 1q. Transport information

**Special precautions for user** : **Transport within user's premises**: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of - ARPO5 6z2k and the 19 U Uode** : Not available.

## Section 1N Regulatory information

**J.S. Federal regulations** : **TSUA k(a) PAIR**: 2-methoxy-1-methylethyl acetate  
**TSUA k(a) UDR Exempt/Partial exemption**: Not determined  
 Not determined.  
**Ulean ' ater Act (U' A) z76**: ethylbenzene  
**Ulean ' ater Act (U' A) z11**: xylene; ethylbenzene

**Ulean Air Act Section 11C (b) Hazardous Air Pollutants (HAPs)** : Listed

**Ulean Air Act Section 11C Class I Substances** : Not listed

**Ulean Air Act Section 11C Class II Substances** : Not listed

**DEA 5ist I Uchemicals (Precursor Uchemicals)** : Not listed

**DEA 5ist II Uchemicals (Essential Uchemicals)** : Not listed

### SARA z7Cz7q

#### Uomposition 2nformation on ingredients

No products were found.

**SARA z7q RW** : Not applicable.

### SARA z11z1C

**Ulassification** : Fire hazard  
 Immediate (acute) health hazard  
 Delayed (chronic) health hazard

#### Uomposition 2nformation on ingredients

4 ame	/	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
xylene	≥10 - <25	Yes.	No.	No.	Yes.	No.
epoxy resin (MW ≤ 700)	≥5 - <5,01	No.	No.	No.	Yes.	No.
bisphenol A/F-epoxy resins (MW <700)	≥3 - <4,98	No.	No.	No.	Yes.	No.
1-methoxy-2-propanol	≥3 - <5	Yes.	No.	No.	Yes.	No.
ethylbenzene	≥3 - <5	Yes.	No.	No.	Yes.	Yes.

### SARA z1z

	Product name	UAS number	/
<b>Form R 8 Reporting re, urements</b>	xylene ethylbenzene	1330-20-7 100-41-4	≥10 - <25 ≥3 - <5
<b>Supplier notification</b>	xylene ethylbenzene	1330-20-7 100-41-4	≥10 - <25 ≥3 - <5

## Section 1N Regulatory information

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

### State regulations

- Massachusetts** : The following components are listed: XYLENE; titanium dioxide; PROPYLENE GLYCOL METHYL ETHER
- New York** : The following components are listed: Xylene (mixed)
- New Jersey** : The following components are listed: XYLENES; BENZENE, DIMETHYL-; titanium dioxide; PROPYLENE GLYCOL MONOMETHYL ETHER; 1-METHOXY-2-PROPANOL
- Pennsylvania** : The following components are listed: BENZENE, DIMETHYL-; titanium dioxide; 2-PROPANOL, 1-METHOXY-

### California Prop. 65

**Prop. 65:** This product contains a chemical known to the State of California to cause cancer.

Ingredient name	Cancer	Reproductive	Developmental or significant risk level	Maximum acceptable dosage level
Not available.	Yes.	No.	No.	No.
Not available.	Yes.	No.	No.	No.
Not available.	Yes.	No.	No.	No.

### International regulations

#### Chemical Abstracts Convention Schedules I, II & III Chemicals

Not listed.

#### Montreal Protocol (Annexes A3, B, C, D, E)

Not listed.

#### Stockholm Convention on Persistent Organic Pollutants

Not listed.

#### Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

#### UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

### International lists

#### Global inventory

- Australia** : Not determined.
- Canada** : Not determined.
- China** : Not determined.
- Europe** : Not determined.
- Japan** : Not determined.
- Malaysia** : Not determined.
- New Zealand** : Not determined.
- Philippines** : Not determined.
- Republic of Korea** : Not determined.
- Taiwan** : Not determined.

## Section 1M Other information

### Procedure used to derive the classification

## Section 1M Other information

Classification	Justification
Flam. Liq. 3, H226 Skin Irrit. 2, H315 Skin Sens. 1, H317 STOT RE 2, H373 Aquatic Chronic 3, H412	On basis of test data Calculation method Calculation method Calculation method Calculation method

**History**

Date of printing : 27.05.2015.

Date of issue / Date of revision : 27.05.2015.

Date of previous issue : 26.05.2015.

Version : 1.02

**Key to abbreviations** : ATE = Acute Toxicity Estimate  
 BCF = Bioconcentration Factor  
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals  
 IATA = International Air Transport Association  
 IBC = Intermediate Bulk Container  
 IMDG = International Maritime Dangerous Goods  
 LogPow = logarithm of the octanol/water partition coefficient  
 MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)  
 UN = United Nations

**References** : Not available.

Indicates information that has changed from previously issued version.

**Notice to reader**

To the best of our knowledge the information contained herein is accurate. However, neither the above-named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

## JafeUuard v niCersal AJ 1 omp .

### : E Identification of the material and supplier

<b>Product name</b>	<b>g</b> Safeguard Universal ES Comp B
<b>LaSel NoE</b>	<b>g</b> 1063
<b>Jupplier/Manufacturer</b>	: Jotun Australia 9 Cawley Road Brooklyn 3012 Australia  Telephone + 61 39314 0722 Fax + 61 39314 0423  SDSJotun@jotun.com
<b>AmerUencb telephone numSer</b>	<b>g</b> Medical Emergencies 24 hours: Poisons Information Centre (Australia) 131 126
<b>yrea of application</b>	<b>g</b> Industrial applications, Used by spraying.
<b>Product description</b>	<b>g</b> Gardener.
<b>Product tbpe</b>	<b>g</b> Liquid.

### 2 E Hazards identification

The preparation is classified in accordance with NOHSC as follows:

<b>1 lassification</b>	<b>g</b> R10 Xn; R20/21/22 Xi; R38 R43 R52/53
<b>Risk phrases</b>	<b>g</b> R10- Flammable. R20/21/22- Harmful by inhalation, in contact with skin and if swallowed. R38- Irritating to skin. R43- May cause sensitisation by skin contact. R52/53- Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
<b>Jafetb phrases</b>	<b>g</b> S23- Do not breathe vapour / spray. S36/37- Wear suitable protective clothing and gloves. S38- In case of insufficient ventilation, wear suitable respiratory equipment.
<b>Jtatement of hazardous/ danUerous nature</b>	<b>g</b> HAZARDOUS SUBSTANCE. DANGEROUS GOODS.

### 3 E 1 omposition/information on inUredients

**Mixture** **g** Yes.

InUredient name	1yJ numSer	1 oncentration
Phenol, methylstyrenated	68512-30-1	50 - 100
benzyl alcohol	100-51-6	2.5 - 10
xylene	1330-20-7	2.5 - 10
2,4,6-tris(dimethylaminomethyl)phenol	90-72-2	2.5 - 10
3,6-diazaoctanethylenediamin	112-24-3	1 - 2.5
ethylbenzene	100-41-4	1 - 2.5

Other ingredients, determined not to be hazardous according to Safe Work Australia criteria, and not dangerous according to the ADG Code, make up the product concentration to 100%.

**8here are no additional inUredients present 0 hich50 ithin the current kno0 ledUe of the supplier and in the concentrations applica5le5are classified as hazardous to health or the enCronment and hence reTuire reportinU in this sectionE**



## 4 E First-aid measures

### First-aid measures

- Abe contact** **g** Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
- Jkin contact** **g** Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Inhalation** **g** Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- InUestion** **g** Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Protection of first-aiders** **g** No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

## 5 E Fire-fighting measures

### Extinguishing media

**Use** **g** Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.

**Not suitable** **g** Do not use water jet.

### Special exposure hazards

**g** Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. This material is harmful to aquatic organisms. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Flammable liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.

### Special protective equipment for fire-fighters

**g** Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

### Hazchem code

**g** 3[Y]

## 6 E Accidental release measures

### Personal precautions

**g** No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

### Environmental precautions

**g** Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material.

## Safeguard Universal ES Comp B

### Methods for cleaninU up

g Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Contain and collect spillage with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

## 7 E HandlinU and storaUe

### HandlinU

g Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapour or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

The handle provided on the package is for manual handling only. Transport and transfer should be carried out with appropriate equipment and carriage devices.

### J toraUe

g Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

## wE Axposure controls/personal protection

### InUredient name

Phenol, methylstyrenated

### Axposure limits

8RWJ ( qq yW) 0Vermanb54/2q: 49E

TWA: 490 mg/m<sup>3</sup> 8 hours.

PEAK: 980 mg/m<sup>3</sup> 15 minutes.

TWA: 100 ppm 8 hours.

PEAK: 200 ppm 15 minutes.

xylene

Jafe ) ork yustralia 9ustralia5: /2q: 49E

STEL: 655 mg/m<sup>3</sup> 15 minutes.

STEL: 150 ppm 15 minutes.

TWA: 350 mg/m<sup>3</sup> 8 hours.

TWA: 80 ppm 8 hours.

ethylbenzene

Jafe ) ork yustralia 9ustralia5: /2q: 49E

STEL: 543 mg/m<sup>3</sup> 15 minutes.

STEL: 125 ppm 15 minutes.

TWA: 434 mg/m<sup>3</sup> 8 hours.

TWA: 100 ppm 8 hours.

### Recommended monitorinU procedures

g If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

## Safeguard Universal ES Comp B

<b>Engineering measures</b>	<b>g</b> Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
<b>Hygiene measures</b>	<b>g</b> Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
<b>Personal protection</b>	
<b>Eyes</b>	<b>g</b> Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
<b>Hands</b>	<b>g</b> Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
<b>Respirator</b>	<b>g</b> Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
<b>Skin</b>	<b>g</b> Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
<b>Environmental exposure controls</b>	<b>g</b> Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

## ( E Physical and chemical properties

<b>Physical state</b>	<b>g</b> Liquid.
<b>Colour</b>	<b>g</b> Brown.
<b>Odour</b>	<b>g</b> Characteristic.
<b>Density</b>	: 1.01 g/cm <sup>3</sup>
<b>Flash point</b>	<b>g</b> Closed cup: 35°C (95°F) Not applicable.
<b>Solubility</b>	<b>g</b> Insoluble in the following materials: cold water and hot water.

## : g E J Stability and reactivity

<b>Stability</b>	<b>g</b> Stable under recommended storage and handling conditions (see Section 7).  Hazardous decomposition products: carbon monoxide, carbon dioxide, smoke, oxides of nitrogen.  Keep away from the following materials to prevent strong exothermic reactions: oxidising agents, strong alkalis, strong acids.
<b>Hazardous decomposition products</b>	<b>g</b> Decomposition products may include the following materials: carbon monoxide, carbon dioxide, smoke, oxides of nitrogen.
<b>Materials to avoid/ Hazardous Reactions</b>	<b>g</b> Keep away from the following materials to prevent strong exothermic reactions: oxidising agents, strong alkalis, strong acids.

**:: E8oxicoloUical information**

There are no data available on the mixture itself. The mixture has been assessed following the conventional method of the Dangerous Preparations Directive 1999/45/EC and classified for toxicological hazards accordingly. See Sections 2 and 3 for details.

Exposure to component solvent vapour concentrations in excess of the stated occupational exposure limit may result in adverse health effects such as mucous membrane and respiratory system irritation and adverse effects on the kidneys, liver and central nervous system. Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and, in extreme cases, loss of consciousness.

Solvents may cause some of the above effects by absorption through the skin. Repeated or prolonged contact with the mixture may cause removal of natural fat from the skin, resulting in non-allergic contact dermatitis and absorption through the skin.

If splashed in the eyes, the liquid may cause irritation and reversible damage.

Ingestion may cause nausea, diarrhea and vomiting.

This takes into account, where known, delayed and immediate effects and also chronic effects of components from short-term and long-term exposure by oral, inhalation and dermal routes of exposure and eye contact.

Contains Phenol, methylstyrenated, 3,6-diazaoctanethylenediamin. May produce an allergic reaction.

**Potential acute health effects**

- Inhalation** **g** Harmful by inhalation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- InUestion** **g** Harmful if swallowed. Irritating to mouth, throat and stomach.
- Jkin contact** **g** Harmful in contact with skin. Irritating to skin. May cause sensitisation by skin contact.
- Abe contact** **g** May cause eye irritation.

**ycute toxicitb**

- 8oxicitb data** **g** Not available.

**Potential chronic health effects**

**1 arcinoUenicitb**

InUredient name	y1 WH	APy	GJHy	lyR1	NIGJH	N8P
<input checked="" type="checkbox"/> ylene	A4	-	-	3	-	-

- MutaUenicitb** **g** No known significant effects or critical hazards.
- ReproductiCe toxicitb** **g** No known significant effects or critical hazards.

**GCer-exposure siUns/sbmptoms**

- Inhalation** **g** No known significant effects or critical hazards.
- InUestion** **g** No known significant effects or critical hazards.
- Jkin** **g** No known significant effects or critical hazards.
- 8arUet orUans** **g**  Contains material which may cause damage to the following organs: upper respiratory tract, skin, eyes.

**: 2 EAcoloUical information**

There are no data available on the mixture itself.  
Do not allow to enter drains or watercourses.

The preparation has been assessed following the conventional method of the Dangerous Preparations Directive 1999/45/EC and is classified for eco-toxicological properties accordingly. See Sections 2 and 3 for details.

- Acotoxicitb** **g** Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**yTuatic ecotoxicitb**

Product/inUredient name	Result	Jpecies	Axposure
<input checked="" type="checkbox"/> 6-diazaoctanethylenediamin	Acute EC50 3700 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
ethylbenzene	Acute LC50 33900 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute EC50 7,2 mg/l	Algae	48 hours
	Acute EC50 2,93 mg/l	Daphnia	48 hours
	Acute LC50 4,2 mg/l	Fish	96 hours

- 1 onclusion/Jummarb** **g** Not available.

# Safeguard Universal ES Comp B

## Other ecological information

### Persistence/degradation

1 conclusion/Jummarb g Not available.

Product/inredient name	Typical half-life	Photolysis	Biodegradability
benzyl alcohol	-	-	Readily
xylene	-	-	Readily
3,6-diazaoctanethylenediamine	-	-	Not readily
ethylbenzene	-	-	Readily

### Bioaccumulation potential

Product/inredient name	LoUP <sub>00</sub>	1 F	Potential
Phenol, methylstyrenated	3,627	-	low
benzyl alcohol	1,1	<100	low
xylene	3,12	8.1 to 25.9	low
2,4,6-tris(dimethylaminomethyl)phenol	0,219	-	low
3,6-diazaoctanethylenediamine	-1.66 to -1.4	-	low
ethylbenzene	3,15	-	low

Other adverse effects g No known significant effects or critical hazards.

## : 3 E Disposal considerations


### Methods of disposal

g The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.


## : 4 E Transport information

Transport information premises g always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

### International transport regulations

Proper shipping name g Paint  
UN Number g 1263  
Class g 3  
Packaging Group g III  
Label g 

### Additional information

Proper shipping name g Paint  
Label g 

DWG Hazchem code g 3[Y]



## Safeguard Universal ES Comp B

yDR / RID

g Tunnel restriction code: (D/E)  
Hazard identification number: 30  
Special provisions: 640E  
ADR/RID: Viscous substance. Not restricted, ref. chapter 2.2.3.1.5 (applicable to receptacles < 450 litre capacity).

IMDW

g Emergency schedules (EmS): F-E, S-E  
Marine pollutant: No.  
IMDG: Viscous substance. Transport in accordance with paragraph 2.3.2.5 (applicable to receptacles < 30 litre capacity).

Transport in accordance with ADR/RID, IMDG/IMO and ICAO/IATA and national regulation.

## : , E ReUulatorb information

### National reUulations

#### Standard v niform Jchedule of Medicine and Poisons

5

#### Control of Jcheduled 1 arcinoUenic JuSstances

##### InUredient name

No listed substance

##### Jchedule

#### Australia inCentorb Q11 J9

g All ingredients are listed on AICS or are exempt.

### Av reUulations

Hazard sbmSol or sbmSols

: The product is classified and labelled for supply in accordance with the Directive 1999/45/EC as follows:



Harmful

1 ontains

: Phenol, methylstyrenated  
3,6-diazaoctanethylenediamin

Risk phrases

: R10- Flammable.  
R20/21/22- Harmful by inhalation, in contact with skin and if swallowed.  
R38- Irritating to skin.  
R43- May cause sensitisation by skin contact.  
R52/53- Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Jafetb phrases

: S23- Do not breathe vapour / spray.  
S36/37- Wear suitable protective clothing and gloves.  
S51- Use only in well-ventilated areas.

### v J reUulations

H1 J 1 lassification

g Flammable liquid  
Toxic material  
Irritating material  
Target organ effects

## : 6 E Gther information

Full text of R-phrases referred to in sections 2 and 3

: R11- Highly flammable.  
R10- Flammable.  
R20- Harmful by inhalation.  
R22- Harmful if swallowed.  
R20/21- Harmful by inhalation and in contact with skin.  
R20/22- Harmful by inhalation and if swallowed.  
R20/21/22- Harmful by inhalation, in contact with skin and if swallowed.  
R21/22- Harmful in contact with skin and if swallowed.  
R48/20- Harmful: danger of serious damage to health by prolonged exposure through inhalation.  
R65- Harmful: may cause lung damage if swallowed.  
R34- Causes burns.  
R38- Irritating to skin.  
R36/38- Irritating to eyes and skin.  
R43- May cause sensitisation by skin contact.  
R52/53- Harmful to aquatic organisms, may cause long-term adverse effects in the

aquatic environment.

## Notice to reader

### History

**Date of printinU** : 2, 2024, E  
**Date of issue** : 2, 2024, E  
**Version** : 3E  
**Prepared Sb** : Jotun Wroup Product Jafetb Department

### Disclaimer

*The information in this document is given to the best of Jotun's knowledge, based on laboratory testing and practical experience. Jotun's products are considered as semi-finished goods and as such, products are often used under conditions beyond Jotun's control. Jotun cannot guarantee anything but the quality of the product itself. Minor product variations may be implemented in order to comply with local requirements. Jotun reserves the right to change the given data without further notice.*

*Users should always consult Jotun for specific guidance on the general suitability of this product for their needs and specific application practices.*

*If there is any inconsistency between different language issues of this document, the English (United Kingdom) version will prevail.*



## SeaQuantum Ultra

### 1. Identification of the material and supplier

<b>Product name</b>	: SeaQuantum Ultra
<b>Label No.</b>	: 373
<b>Supplier/Manufacturer</b>	: Jotun Australia 9 Cawley Road Brooklyn 3012 Australia  Telephone + 61 39314 0722 Fax + 61 39314 0423  SDSJotun@jotun.com
<b>Emergency telephone number</b>	: Medical Emergencies 24 hours: Poisons Information Centre (Australia) 131 126
<b>Area of application</b>	: Industrial applications, Professional applications, Used by spraying.
<b>Product description</b>	: Paint.
<b>Product type</b>	: Liquid.

### 2. Hazards identification

The preparation is classified in accordance with NOHSC as follows:

<b>Classification</b>	: R10 T; R23 Xn; R21/22 Xi; R36/38 R43 N; R50/53
<b>Risk phrases</b>	: R10- Flammable. R23- Toxic by inhalation. R21/22- Harmful in contact with skin and if swallowed. R36/38- Irritating to eyes and skin. R43- May cause sensitisation by skin contact. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
<b>Safety phrases</b>	: S23- Do not breathe vapour / spray. S36/37- Wear suitable protective clothing and gloves. S38- In case of insufficient ventilation, wear suitable respiratory equipment. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S60- This material and its container must be disposed of as hazardous waste. S61- Avoid release to the environment. Refer to special instructions/safety data sheet.
<b>Statement of hazardous/dangerous nature</b>	: HAZARDOUS SUBSTANCE. DANGEROUS GOODS.

### 3. Composition/information on ingredients

**Mixture** : Yes.

Ingredient name	CAS number	Concentration
dicopper oxide	1317-39-1	25 - 50
xylene	1330-20-7	10 - 25
ethylbenzene	100-41-4	2.5 - 10
rosin	8050-09-7	2.5 - 10
bis(1-hydroxy-1h-pyridine-2-thionato-o,s)copper	14915-37-8	2.5 - 10
Solvent naphtha (petroleum), light arom. (<0.1% Benzene)	64742-95-6	2.5 - 10
tetraethyl silicate	78-10-4	0 - 1

Other ingredients, determined not to be hazardous according to Safe Work Australia criteria, and not dangerous according to the ADG Code, make up the product concentration to 100%.

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

## 4 . First-aid measures

### First-aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
- Skin contact** : Get medical attention immediately. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Inhalation** : Get medical attention immediately. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Ingestion** : Get medical attention immediately. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

## 5 . Fire-fighting measures

### Extinguishing media

- Suitable** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Not suitable** : Do not use water jet.
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. This material is very toxic to aquatic organisms. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.
- Flammable liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
- Hazchem code** : 3W

## 6. Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).
- Environmental precautions** : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.
- Methods for cleaning up** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.
- Contain and collect spillage with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

## 7. Handling and storage

- Handling** : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not breathe vapour or mist. Do not ingest. Avoid release to the environment. Refer to special instructions/safety data sheet. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.
- The handle provided on the package is for manual handling only. Transport and transfer should be carried out with appropriate equipment and carriage devices.
- Storage** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

## 8. Exposure controls/personal protection

### Ingredient name

xylene

ethylbenzene

### Exposure limits

#### Safe Work Australia (Australia, 1/2014).

STEL: 655 mg/m<sup>3</sup> 15 minutes.

STEL: 150 ppm 15 minutes.

TWA: 350 mg/m<sup>3</sup> 8 hours.

TWA: 80 ppm 8 hours.

#### Safe Work Australia (Australia, 1/2014).

STEL: 543 mg/m<sup>3</sup> 15 minutes.

STEL: 125 ppm 15 minutes.

	TWA: 434 mg/m <sup>3</sup> 8 hours. TWA: 100 ppm 8 hours.
colophony	<b>EH40/2005 WELs (United Kingdom (UK), 12/2011). Skin sensitiser.</b> STEL: 0,15 mg/m <sup>3</sup> 15 minutes. Form: Fume TWA: 0,05 mg/m <sup>3</sup> 8 hours. Form: Fume
Solvent naphtha (petroleum), light aromatic	<b>NOHSC (Australia, 11/2004). Notes: Documentation for the substances with this footnote can be found in the 5th Edition of the ACGIH documentation of the threshold limit values and biological exposure indices (1). For all other substances with 'H' in Column 7 the documentation can be found in the 6th Edition of the ACGIH documentation of the threshold limit values and biological exposure indices (2).</b> TWA: 123 mg/m <sup>3</sup> 8 hours. Form: All forms TWA: 25 ppm 8 hours. Form: All forms
tetraethyl silicate	<b>Safe Work Australia (Australia, 1/2014).</b> TWA: 85 mg/m <sup>3</sup> 8 hours. TWA: 10 ppm 8 hours.
<b>Recommended monitoring procedures</b>	: If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.
<b>Engineering measures</b>	: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
<b>Hygiene measures</b>	: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
<b>Personal protection</b>	
<b>Eyes</b>	: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
<b>Hands</b>	: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
<b>Respiratory</b>	: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
<b>Skin</b>	: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
<b>Environmental exposure controls</b>	: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

## 9 . Physical and chemical properties

<b>Physical state</b>	: Liquid.
<b>Colour</b>	: Various colours.
<b>Odour</b>	: Characteristic.
<b>Density</b>	: 1.6 g/cm <sup>3</sup>
<b>Flash point</b>	: Closed cup: 25°C (77°F) Not applicable.
<b>Solubility</b>	: Insoluble in the following materials: cold water and hot water.

## 10 . Stability and reactivity

<b>Stability</b>	: Stable under recommended storage and handling conditions (see Section 7).  Hazardous decomposition products: carbon monoxide, carbon dioxide, smoke, oxides of nitrogen.  Keep away from the following materials to prevent strong exothermic reactions: oxidising agents, strong alkalis, strong acids.
<b>Hazardous decomposition products</b>	: Decomposition products may include the following materials: carbon monoxide, carbon dioxide, smoke, oxides of nitrogen.
<b>Materials to avoid/ Hazardous Reactions</b>	: Keep away from the following materials to prevent strong exothermic reactions: oxidising agents, strong alkalis, strong acids.
<b>Conditions to avoid</b>	: Keep away from heat, sparks and flame.

## 11 . Toxicological information

There are no data available on the mixture itself. The mixture has been assessed following the conventional method of the Dangerous Preparations Directive 1999/45/EC and classified for toxicological hazards accordingly. See Sections 2 and 3 for details.

Exposure to component solvent vapour concentrations in excess of the stated occupational exposure limit may result in adverse health effects such as mucous membrane and respiratory system irritation and adverse effects on the kidneys, liver and central nervous system. Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and, in extreme cases, loss of consciousness.

Solvents may cause some of the above effects by absorption through the skin. Repeated or prolonged contact with the mixture may cause removal of natural fat from the skin, resulting in non-allergic contact dermatitis and absorption through the skin.

If splashed in the eyes, the liquid may cause irritation and reversible damage.

Ingestion may cause nausea, diarrhea and vomiting.

This takes into account, where known, delayed and immediate effects and also chronic effects of components from short-term and long-term exposure by oral, inhalation and dermal routes of exposure and eye contact.

Contains rosin. May produce an allergic reaction.

### Potential acute health effects

<b>Inhalation</b>	: Toxic by inhalation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
<b>Ingestion</b>	: Harmful if swallowed. Irritating to mouth, throat and stomach.
<b>Skin contact</b>	: Harmful in contact with skin. Irritating to skin. May cause sensitisation by skin contact.
<b>Eye contact</b>	: Irritating to eyes.

### Acute toxicity

<b>Toxicity data</b>	: Not available.
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### Potential chronic health effects

#### Carcinogenicity

Ingredient name	ACGIH	EPA	OSHA	IARC	NIOSH	NTP
xylene	A4	-	-	3	-	-
colophony	-	-	-	-	+	-
zinc oxide	A4	-	-	-	-	-



**Mutagenicity** : No known significant effects or critical hazards.

**Reproductive toxicity** : No known significant effects or critical hazards.

**Over-exposure signs/symptoms**

**Inhalation** : No known significant effects or critical hazards.

**Ingestion** : No known significant effects or critical hazards.

**Skin** : No known significant effects or critical hazards.

**Target organs** : Contains material which may cause damage to the following organs: lungs, upper respiratory tract, skin, eyes.

## 12 . Ecological information

There are no data available on the mixture itself.

Do not allow to enter drains or watercourses.

The preparation has been assessed following the conventional method of the Dangerous Preparations Directive 1999/45/EC and is classified for eco-toxicological properties accordingly. See Sections 2 and 3 for details.

**Ecotoxicity** : Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Water polluting material. May be harmful to the environment if released in large quantities.

**Aquatic ecotoxicity**

Product/ingredient name	Result	Species	Exposure
Copper oxide	Acute EC50 30 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	4 days
	Acute EC50 0,042 mg/l Fresh water	Daphnia - Daphnia similis	48 hours
	Acute LC50 350 µg/l Marine water	Crustaceans - Balanus improvisus - Nauplii	48 hours
	Acute LC50 173 ppb Marine water	Fish - Cyprinodon variegatus - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
	Acute LC50 0,075 mg/l Fresh water Chronic IC10 0,009 mg/l Fresh water	Fish - Danio rerio Algae - Pseudokirchneriella subcapitata - Exponential growth phase	96 hours 96 hours
ethylbenzene	Acute EC50 7,2 mg/l	Algae	48 hours
	Acute EC50 2,93 mg/l Acute LC50 4,2 mg/l	Daphnia Fish	48 hours 96 hours
bis(1-hydroxy-1h-pyridine-2-thionato-o,s)copper	Acute EC50 0,022 mg/l	Daphnia	48 hours
	Acute IC50 0,035 mg/l Acute LC50 0,0043 mg/l	Algae Fish	120 hours 96 hours
Solvent naphtha (petroleum), light arom. (<0.1% Benzene)	Acute EC50 <10 mg/l	Daphnia	48 hours
	Acute IC50 <10 mg/l Acute LC50 <10 mg/l	Algae Fish	72 hours 96 hours

**Conclusion/Summary** : Not available.

**Other ecological information**

**Persistence/degradability**

**Conclusion/Summary** : Not available.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Copper oxide	-	-	Not readily
xylene	-	-	Readily
ethylbenzene	-	-	Readily
Solvent naphtha (petroleum), light arom. (<0.1% Benzene)	-	-	Not readily

**Bioaccumulative potential**

Product/ingredient name	LogP <sub>ow</sub>	BCF	Potential
xylene	3,12	8.1 to 25.9	low
ethylbenzene	3,15	-	low
rosin	1.9 to 7.7	-	high
Solvent naphtha (petroleum), light arom. (<0.1% Benzene)	-	10 to 2500	high
tetraethyl silicate	3,18	-	low

**Other adverse effects** : No known significant effects or critical hazards.

## 13 . Disposal considerations

**Methods of disposal** : The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## 14 . Transport information


**Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

### International transport regulations

**Proper shipping name** : Paint  
**Marine pollutant substances** : dicopper oxide, zinc oxide  
**UN Number** : 1263  
**Class** : 3  
**Packing group** : III  
**Label** : 

**Marking** : The environmental hazardous / marine pollutant mark is only applicable for packages containing more than 5 litres for liquids and 5 kg for solids.

### Additional information

**ADG Proper shipping name** : Paint  
**ADG Label** : 

**ADG Hazchem code** : 3W  
**ADR / RID** : Tunnel restriction code: (D/E)  
Hazard identification number: 30  
Special provisions: 640E

**IMDG** : Emergency schedules (EmS): F-E, S-E  
Marine pollutant: Yes.

Transport in accordance with ADR/RID, IMDG/IMO and ICAO/IATA and national regulation.



## 15 . Regulatory information

### National regulations

#### Standard Uniform Schedule of Medicine and Poisons

5

#### Control of Scheduled Carcinogenic Substances

##### Ingredient name

No listed substance

##### Schedule

**Australia inventory (AICS)** : All ingredients are listed on AICS or are exempt.

### EU regulations

: The product is classified and labelled for supply in accordance with the Directive 1999/45/EC as follows:

#### Hazard symbol or symbols

:  

Toxic                      Dangerous for the environment

#### Contains

:  dicopper oxide  
xylene  
colophony  
bis(1-hydroxy-1h-pyridine-2-thionato-o,s)copper

#### Risk phrases

: R10- Flammable.  
R23- Toxic by inhalation.  
R21/22- Harmful in contact with skin and if swallowed.  
R36/38- Irritating to eyes and skin.  
R43- May cause sensitisation by skin contact.  
R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

#### Safety phrases

: S23- Do not breathe vapour / spray.  
S36/37- Wear suitable protective clothing and gloves.  
S38- In case of insufficient ventilation, wear suitable respiratory equipment.  
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).  
S60- This material and its container must be disposed of as hazardous waste.  
S61- Avoid release to the environment. Refer to special instructions/safety data sheet.

#### Additional information

:  Antifouling. Active substances: dicopper oxide (CAS 1317-39-1) 40.3 % w/w, copper pyriithione (CAS 14915-37-8) 3.4 % w/w. Read Technical Data Sheet and Safety Data Sheet before use. Do not reuse empty containers. For professional use only.  
This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Anti-fouling Systems on Ships as adopted by IMO in October 2001 (IMO document AFS/CONF/26).

### US regulations

#### HCS Classification

:  Flammable liquid  
Highly toxic material  
Target organ effects

## 16 . Other information

#### Remarks

: This product is registered or has a permit for trial use issued by the APVMA under the Agricultural and Veterinary Chemicals Act 1994.

#### References

: This product does not contain organotin compounds acting as biocides and complies with the International Convention on the Control of Harmful Anti-fouling Systems on Ships as adopted by IMO in October 2001 (IMO document AFS/CONF/26).

#### Full text of R-phrases referred to in sections 2 and 3

:  R11- Highly flammable.  
R10- Flammable.  
R26- Very toxic by inhalation.  
R23- Toxic by inhalation.  
R20- Harmful by inhalation.  
R22- Harmful if swallowed.  
R20/21- Harmful by inhalation and in contact with skin.  
R21/22- Harmful in contact with skin and if swallowed.  
R48/20- Harmful: danger of serious damage to health by prolonged exposure through inhalation.

R65- Harmful: may cause lung damage if swallowed.  
R41- Risk of serious damage to eyes.  
R37- Irritating to respiratory system.  
R38- Irritating to skin.  
R36/38- Irritating to eyes and skin.  
R43- May cause sensitisation by skin contact.  
R66- Repeated exposure may cause skin dryness or cracking.  
R67- Vapours may cause drowsiness and dizziness.  
R50- Very toxic to aquatic organisms.  
R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.  
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Notice to reader****History**

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**Disclaimer**

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*Users should always consult Jotun for specific guidance on the general suitability of this product for their needs and specific application practices.*

*If there is any inconsistency between different language issues of this document, the English (United Kingdom) version will prevail.*







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