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Grange Resources

Cape Riche Desalination Plant Construction Environmental Management Plan

December 2011

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Abbreviations and Acronyms

Shortened Form	Full Title
AER	Annual Environmental Review
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
BDMP	Brine Discharge Management Plan
BHMP	Benthic Habitat Monitoring Program
BPPH	Benthic Primary Producer Habitat
°C	Degrees Celsius
CEMP	Construction Environmental Management Plan
DEC	Department of Environment and Conservation (formerly CALM and DoE)
DO	Dissolved Oxygen
EPA	Environment Protection Authority (Western Australia)
EP Act	Environment Protection Act 1986
EPBC Act	Environment Protection and Biodiversity conservation Act 1999
EQC	Environmental Quality Criteria
EQG	Environmental Quality Guidelines
EQO	Environmental Quality Objective
EQMF	Environmental Quality Management Framework
EV	Environmental Values
GL/y	Gigalitres per year
ha	Hectares
HEPA	High Ecological Protection Area
km	Kilometres
kV	Kilovolts
LEPA	Low Ecological Protection Area
m	Metres

Shortened Form	Full Title
ms	Milliseconds
mg/L	milligrams per litre
ML	Megalitres
ML/day	Megalitres per day
MMO	Marine Mammal Observer
MWQMP	Marine Water Quality Monitoring Program
NWQMS	National Water Quality Management Strategy
OEPA	Office of Environmental Protection Authority
PER	Public Environmental Review
pH	Measure of the acidity or basicity in an aqueous solution
ppt	parts per thousand
PSU	Practical Salinity Units
RO	Reverse Osmosis
TRE	Toxicity Reduction Evaluation
WET	Whole of Effluent Toxicity

1. Introduction

This Construction Environmental Management Plan (CEMP) has been prepared by GHD for the Southdown Joint Venture (SDJV) involving Grange Resources Ltd (Grange) and Sojitz Resources and Technology Pty Ltd to provide a framework for environmental management during the construction phase of the Cape Riche Seawater Desalination Plant (the Project). The Project includes a desalination plant, an open channel seawater intake (seawater intake), a brine outfall, seawater intake pipeline, brine discharge pipeline and a desalinated water pipeline and 33 kV power line to the Southdown Magnetite mine site.

This document has been prepared as part of the environmental approvals process and is based on the management measures proposed in the environmental documentation at the time of writing. It is anticipated that following the receipt of Ministerial approval under the *Environmental Protection Act 1986* (EP Act) and subsequent project approvals under other Acts (including works approvals), updates and amendments will be made to the CEMP as required. The project is also being assessed under the Commonwealth *Environment Protection and Biodiversity Act 1999* (EPBC Act) and any relevant requirements arising from that assessment will also be included into the CEMP where required.

1.1 Background

Grange is a leading magnetite producer and the only commercial producer of iron ore pellets in Australia, from its operations in Tasmania. Grange has particular interest in developing the Southdown Magnetite Project, which will see it become a major exporter of magnetite concentrate and requires a reliable source of high quality water for operations at the mine and use in a slurry pipeline taking product to Albany for export.

Grange proposes to develop the Project in order to provide a reliable, high quality water supply to its Southdown Magnetite mine site. The Project will supply 12 gigalitres per year (GL/y) of treated water to the Southdown mine site via a pipeline from the desalination plant.

The desalinated water will be used primarily as process water at the mine site, meeting 85% of make-up water requirements. If required, a small portion of the desalinated water could be further treated at the mine site to provide water for potable use.

1.2 Proposed Development

The Project is located in the South Coast region of Western Australia, approximately 90 kilometres (km) east north-east of Albany and approximately 19 km from Wellstead, the nearest town.

The desalination plant is located on mostly cleared grazing land approximately five km west of Cape Riche. The seawater intake and pump station is located on private property approximately 500 m east of Cheyne Inlet (Eyre River), along the northern coastline of Cape Riche. The outfall is located on the south of Cape Riche and brine is directed to the outfall from the desalination plant by a gravity pipeline.

The pipeline alignment has been selected with consideration of the land ownership and use, road verges and crossings, minimum vegetation clearing, community advice and the preference of various land owners.

The entire Project footprint will occupy an area of approximately 64.7 ha, of which 15.9 ha will require the clearing of native vegetation, mostly along the desalinated water pipeline route. The remaining 48.8 ha footprint is within cleared agricultural land, roads and access tracks.

1.3 Purpose and Scope

This document is designed to assist all parties involved in the construction of the Project to identify and manage the potential environmental impacts that may result from construction activities. It will be used as a benchmark for contractors, who will be expected to prepare and submit their own CEMP to the SDJV for approval, which will be required to be consistent with this document.

This CEMP:

- ▶ Describes the area affected by the development of the project (Section 3);
- ▶ Describes the responsibility and accountability of persons involved in the Project (Section 4);
- ▶ Describes the potential environmental impacts, their management and monitoring and contingencies (Section 5);
- ▶ Summarises the monitoring requirements and timing of the Project (Section 6); and
- ▶ Details reporting and response requirements (Section 7).

The environmental factors relevant to this Project and covered in this CEMP are:

- ▶ Flora and native vegetation;
- ▶ Weeds and pathogens;
- ▶ Terrestrial fauna;
- ▶ Marine water quality;
- ▶ Marine fauna
- ▶ Benthic habitats;
- ▶ Air Quality;
- ▶ Noise and vibration;
- ▶ Surface hydrology;
- ▶ Waste;
- ▶ Recreation;
- ▶ Visual amenity;
- ▶ Indigenous heritage;
- ▶ Non-indigenous heritage; and
- ▶ Blast Management.

2. Legislative and Regulatory Framework

The environmental legislation applicable to the planning, construction and operation of the Project is shown in **Table 1** and will be complied with as relevant.

Table 1 Legislation relevant to the Project

Legislation	Brief Description	Regulatory Authority
Commonwealth Government Legislation		
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	The Act protects the environment, particularly matters of National Environmental Significance	Department of Sustainability, Environment, Water, Population and Communities
<i>Native Title Act 1993</i>	The Act provides for the protection and recognition of native title to unallocated Crown land, providing that a continuous connection with that land can be established	National Native Title Tribunal
State Government Legislation		
<i>Environmental Protection Act 1986</i>	The Act makes provision for the establishment of the EPA, for the prevention, control and abatement of pollution and for the conservation, preservation, protection, enhancement and management of the environment. The Act also provides for the control and licensing of potentially polluting activities, land clearing and is the Act under which the State environmental approvals process operates.	Environmental Protection Authority
<i>Aboriginal Heritage Act 1972</i>	The Act provides for the preservation and protection of places or objects of historical significance to, or of traditional or customary use by the original inhabitants of Australia or their descents.	Department of Indigenous Affairs
<i>Agricultural and Related Resources Protection Act 1976</i>	The Act provides for the management, control and prevention of certain plants and animals, for the prohibition and regulation of the introduction and spread of certain plants and	Department of Agriculture and Food

	of the introduction, spread and keeping of certain animals, for the protection of agriculture and related resources generally, and for incidental and other purposes.	
<i>Biosecurity and Agriculture Management Act 2007</i>	The purpose of this Act is to prevent new animal and plant pests (weeds and vermin) and diseases from entering Western Australia and becoming established, to manage the impact and limit the spread of those already present in the State, and to safely manage the use of agriculture and veterinary chemicals and ensure agricultural products are not contaminated with chemical residues.	Department of Agriculture and Food
<i>Bush Fires Act 1954</i>	The Act contains provisions for diminishing the dangers resulting from bush fires, for the prevention, control and extinguishment of bush fires.	Fire and Emergency Services Authority
<i>Conservation and Land Management Act 1984</i>	The Act establishes a comprehensive set of legislative provisions dealing with State conservation and land management matters. The Act provides for the use, protection and management of certain public lands, waters and flora and fauna, and establishes a number of responsible statutory bodies.	Department of Environment and Conservation
<i>Contaminated Sites Act 2003 and Contaminated Sites Regulations 2006</i>	The Act regulates matters relating to the identification, assessment, recording, management, and clean-up of contaminated land.	Department of Environment and Conservation
<i>Dangerous Goods Safety Act 2004</i>	The Act relates to the safe storage, handling and transport of dangerous goods and for related purposes.	Department of Mines and Petroleum
<i>Environmental Protection (Noise) Regulations 1997</i>	These Regulations aim to protect people from unnecessary noise while letting them carry out their business and social activities.	Department of Environment and Conservation

<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>	Regulations to manage the clearing of native vegetation.	Department of Environment and Conservation, Department of Mines and Petroleum
<i>Environmental Protection (Unauthorised Discharge) Regulations 2004</i>	Prevention of the releasing of contaminants into the environment	Department of Environment and Conservation
<i>Health Act 1911</i>	The Act provides appropriate management tools to tackle both traditional and emerging public health concerns of the 21st century.	Department of Health
<i>Heritage of Western Australia Act 1990</i>	The Act provides for, and encourages, the conservation of places (natural or constructed) that have significance to the cultural heritage of the State.	Heritage Council of Western Australia
<i>Land Administration Act 1997</i>	The Act relates to Crown land surveys, reservation of Crown land for specific purposes and the sale or transfer of Crown land.	Department of Planning
<i>Local Government Act 1995</i>	The Act vests local authorities with the responsibility for waste management, sewage disposal and protection of water supplies within their jurisdiction.	Department of Local Government City of Albany
<i>Local Government (Miscellaneous Provisions) Act 1960</i>	An Act to deal with matters concerning local government.	Department of Local Government City of Albany
<i>Rights in Water and Irrigation Act 1914</i>	The Act makes provision for the regulation, management, use and protection of water resources, to provide for irrigation schemes, and for related purposes.	Department of Water
<i>Soil and Land Conservation Act 1988 (WA) and Clearing Control Regulations 1991</i>	Regulates and controls degrading land use practices within any or all land conservation districts. Conservation of soil and land resources and the mitigation of the effects of erosion.	Department of Agriculture and Food
<i>Planning and Development Act 2005</i>	An Act relating to the planning and development of land for urban, suburban, and rural purposes	Western Australian Planning Commission

<i>Waterways Conservation Act 1976</i>	Management and conservation of water and the related land and environment	Department of Water
<i>Wildlife Conservation Act 1950</i>	The Act provides for the conservation and protection of wildlife (flora and fauna). Special provisions and schedules cover protection and management of gazetted rare flora and fauna.	Department of Environment and Conservation

3. Area Affected by the Development

3.1 General Description

Terrestrial environment

The Cape Riche and Wellstead area has a long history of vegetation clearing and grazing and there have been significant losses of native vegetation, suppression of natural regeneration and weed invasion. The areas of remnant native vegetation contain a number of native flora species and native flora communities in a range of vegetation health conditions. Some of these areas contain weed infestations (including declared weeds) and, potentially, the plant pathogen *Phytophthora cinnamomi*.

The desalination plant and pipeline alignments are largely located within existing highly disturbed areas, cleared paddocks, road verges and access tracks (**Figure 1**). The construction of the desalination plant on cleared paddocks is not considered to impact key environmental factors outlined in this CEMP.

Marine environment

The seawater intake for the Project will be located in a sheltered bay on the north side of Cape Riche. The seawater intake channel will cut through the granite or gneissic rock shoreline.

The brine discharge will be located on a granite or gneissic wave-cut platform at the base of the cliffs on the south side of Cape Riche. The end of the discharge pipeline will be directed into an exposed natural fissure in the wave-cut platform (the Fissure). Wind waves and swell propagate from the Southern Ocean towards Cape Riche and break on or over the wave cut platform.

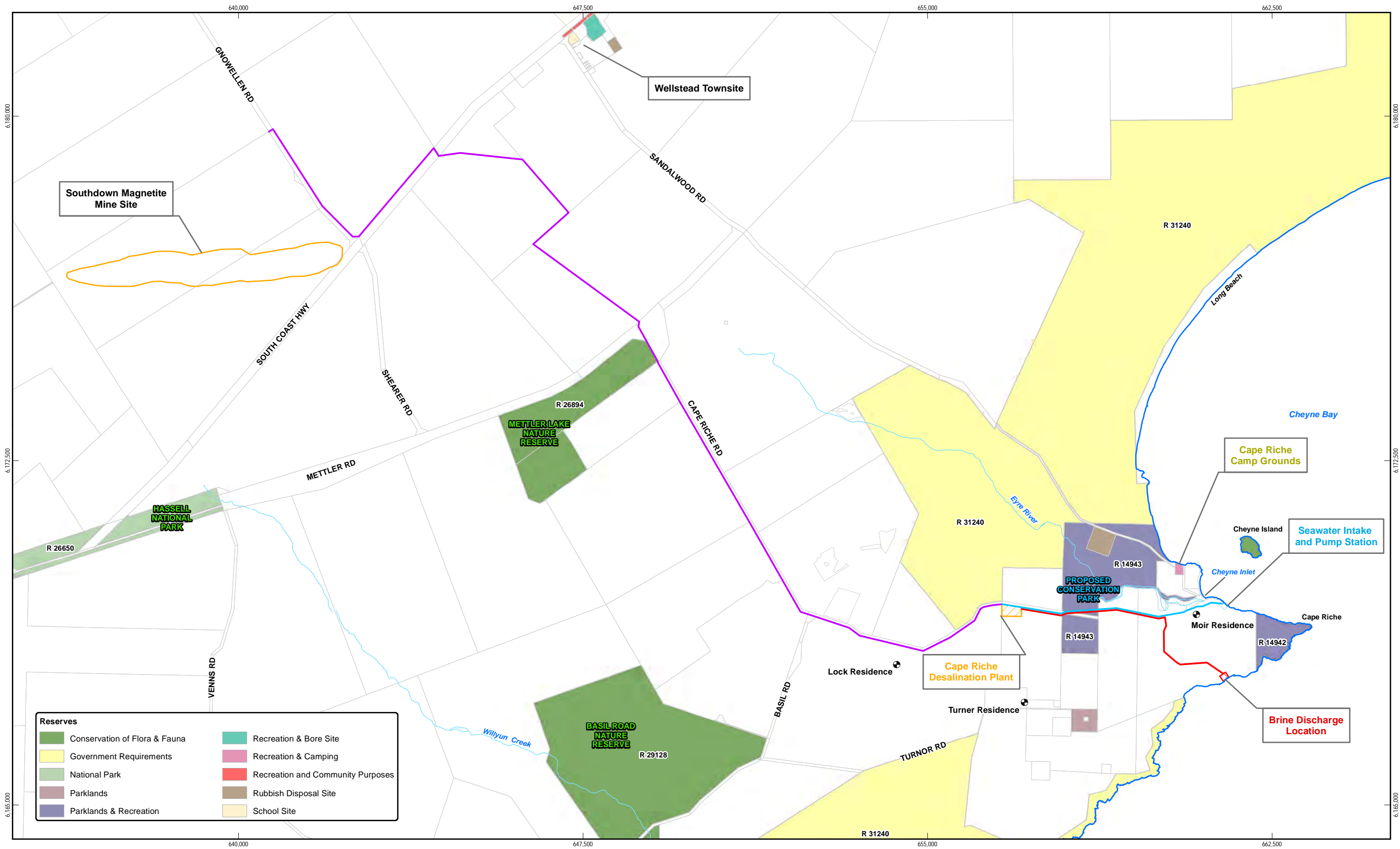
3.2 Planning and Social Context

Land uses identified within the Cape Riche region are limited to either rural or parks and recreation categories (City of Albany 2011; DEC 2008). The nearest town site to the Project area is Wellstead, approximately 19 km from the proposed desalination plant location.

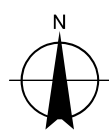
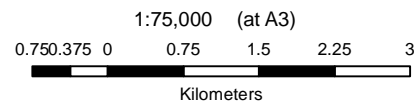
Most of the Cape Riche region is freehold land used for agriculture. The area between Wellstead and Cape Riche includes a small number of farming homesteads. The majority of the desalinated water pipeline, approximately 26 km, will be located upon freehold land that is currently used (and almost all cleared) for agricultural purposes. The rest of the Project will be located within privately owned agricultural pastures.

The proposed desalination plant will be located within a rural land use zone, as defined by the City of Albany's *Town Planning Scheme No. 3 (District Scheme)* (2011). The Cape Riche Camp Ground is situated adjacent the northern edge of Cheyne Inlet, and is currently zoned as 'special rural' (City of Albany 2011).

There are two registered nature reserves in the vicinity of the Project: Basil Road Nature Reserve (R291128), approximately 2.8 km from the Project infrastructure, and Mettler Lake Nature Reserve (R26894), which lies adjacent to part of the treated water transfer pipeline. Hassell National Park is located approximately 16 km from the proposed desalination plant site, adjacent to Mettler Road. A proposed conservation park (R14943) is located approximately one km east of the proposed desalination plant site.



Reserves	
	Conservation of Flora & Fauna
	Government Requirements
	National Park
	Parklands
	Parklands & Recreation
	Recreation & Bore Site
	Recreation & Camping
	Recreation and Community Purposes
	Rubbish Disposal Site
	School Site



LEGEND

	Residence		Brine Discharge Pipeline		Brine Discharge Location
	Seawater Transfer Pipeline and Buried Power Line		Named Watercourse		Pump Station
	Treated Water Transfer Pipeline and Power Line		Coastline		Approved Pit Boundary
	Desalination Plant		Cadastre		



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Cape Riche
Seawater Desalination Plant

Job Number | 61-26005
Revision | 1
Date | 05 Oct 2011

Project Location

Figure 1

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Data source: Landgate: Cadastre - 20101018, Reserves - 20110525; Coastline - 20110628; DoW: Water Courses - 2011; Grange Resources: Approved Pit Boundary - 20100812; Harley Global: Treated Water Transfer Pipeline and Powerline, Seawater Pipeline and Powerline, Brine Discharge Pipeline - 20110704; GHD: Desalination Plant, Brine Discharge Location - 20110527, Pump Station - 20110826 Residences - 20110623 Created by: tgoad, mczeckaj

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4. Responsibility and Accountability

During construction, environmental accountabilities within the SDJV management framework will be as follows:

- ▶ General Manager, Southdown Project – Overall responsibility for the ongoing environmental performance of the Project.
- ▶ Environment Manager, Southdown Project – Responsible for day to day environmental performance and compliance of the Project.
- ▶ Construction Manager – Responsible for the day to day overall environmental performance and the implementation of all requirements of this CEMP.
- ▶ Site Environmental Coordinator – Responsible for the day to day verification that the environmental performance of the site complies with the CEMP.

All staff and contractors associated with the construction phase of the Project are responsible for environmental management with respect to their day to day activities in accordance with this CEMP.

5. Environmental Management, Monitoring and Contingencies

5.1 Flora and Native Vegetation

The majority of the clearing required for the construction of the Project is on land used for grazing purposes. The seawater desalination plant site is located on cleared pasture and will only require the removal of scattered trees.

The pipeline and power line infrastructure will be located within existing disturbance corridors as far as possible and is expected to require approximately 15.9 ha of vegetation clearance. The seawater intake site will be located on private land and requires approximately 0.9 ha of vegetation clearing.

The total 15.9 ha to be cleared includes up to one ha of the 'Priority 3' ecological community – Swamp Yate (*Eucalyptus occidentalis*) woodlands in seasonally inundated clay basins (South Coast). This Priority Ecological Communities (PEC) includes:

- ▶ 0.7 ha from the Swamp Yate PEC found within the Mettler Road reserve; and
- ▶ 0.3 ha from the Swamp Yate PEC along South Coast Highway.

Table 2 Flora and Native Vegetation Management

CEMP - 01		Flora and Native Vegetation
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator
Objectives		
<ul style="list-style-type: none"> ▶ To minimise and manage disturbance to native vegetation. ▶ To protect conservation significant flora populations consistent with the provisions of the WC Act and the EPBC Act. 		
Management		
<ul style="list-style-type: none"> ▶ The approved clearing boundary shall be clearly marked in accordance with the Project design. This boundary will be checked by a member of the Grange Environment Team (with appropriate experience) prior to the commencement of clearing works to ensure it is correct; ▶ No clearing shall occur outside of the delineated construction footprint unless approved by the Department of Environment and Conservation (DEC); ▶ Clearing shall be limited to the 15.9 ha required for the construction of the Project; ▶ Priority flora within the construction footprint will be identified, flagged and avoided (where possible) during construction; ▶ Prior to clearing, an internal clearing permit will be approved by the Site Environmental Coordinator to ensure the applicable environmental aspects of the task are considered and managed; ▶ No clearing is to occur for temporary stockpiles or lay-down areas; existing cleared areas shall be utilised for temporary construction purposes, such as access tracks and laydown areas; ▶ Site vehicles and equipment shall not be driven over or parked on tree roots as far as is practicable; ▶ Where possible, mature trees shall be retained. Trees to be retained will be clearly marked with paint or flagged with tape; ▶ Vegetation will be pruned with a chainsaw in preference to clearing where possible; ▶ Cleared vegetation will not be burned or removed from site without express approval from the environment manager; ▶ Cleared vegetation suitable for reuse will generally be reduced in size (chipping) and reused within the site landscaping works where possible; ▶ The stripping of <i>in situ</i> topsoil at the commencement of construction, and windrowing the soil parallel to the road works within the road reserve or stockpiling in approved locations, shall be undertaken in accordance with current Australian standards; ▶ The removal, stockpiling and respreading of topsoil shall be done in accordance with current Australian standards; ▶ Different quality topsoils will be stockpiled separately to avoid contamination. Topsoil stockpiles shall be located in previously cleared areas and will be prepared to contain potential run-off; ▶ Different quality topsoils are to be mixed with the natural mulch material produced from the clearing operation prior to respreading; ▶ Track rolling of respread topsoil/mulch shall be undertaken; 		

CEMP - 01		Flora and Native Vegetation	
<ul style="list-style-type: none"> ▶ Unsuitable topsoil shall be disposed of at an approved site; ▶ The access of personnel into protected areas containing significant flora and fauna habitat shall be controlled; and ▶ Avoidance or minimisation of impacts to conservation significant species or communities or other matters protected under the EPBC Act shall be undertaken. 			
Performance Indicators			
<ul style="list-style-type: none"> ▶ No unauthorised vegetation clearing or ground disturbance. 			
Monitoring			
<ul style="list-style-type: none"> ▶ Actual clearing areas shall be compared with proposed clearing areas to ensure the overall clearing for the Project is equal to or less than 15.9 ha; and ▶ Inspections of flagging/temporary fencing surrounding priority flora shall be undertaken by the Site Environmental Coordinator as part of routine site environmental inspections. 			
Contingency			
Trigger		Action	
Non-compliance with management measures detailed above.		<ol style="list-style-type: none"> 1. Immediately investigate the cause of the non-compliance; 2. Implement contingency actions which may include: <ul style="list-style-type: none"> – Review management measures practicality or relevance; – Improve training and education for all personnel; – Improve and implement increased protective measures as necessary; – Improve methods for marking clearing lines; and – Install additional temporary fencing or signs; 3. Monitor the success of these actions; and 4. Initiate rehabilitation of effected flora and vegetation areas. 	

5.2 Weed and Pathogen

The movement of vehicles and plant on and around the site during construction could potentially facilitate the introduction and/or spread of weed species. The Project desalinated water pipeline crosses primarily consisting of agricultural farming land, with three Weeds of National Significance (WONS) known to occur on the lands. Hence, weed control is necessary to prevent the introduction of new species and the spread of those existing within the area.

Phytophthora cinnamomi, commonly known as Dieback, is found throughout the southern region of Western Australia in areas hosting susceptible plant species and which receive rainfall in excess of 400 mm/year (Dieback Working Group 2005). Dieback infestations are spread through bushland either naturally, through soil water movement, or artificially, through vector movement of soil on vehicles and, occasionally, via foot traffic.

Table 3 Weed and Pathogen Management

CEMP - 02		Weed and Pathogen
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator
Objectives		
<ul style="list-style-type: none"> ▶ To prevent the introduction and spread of weed species and pathogens. 		
Management		
<ul style="list-style-type: none"> ▶ An induction program will include hygiene training to ensure all staff and subcontractors are aware of the requirements to avoid the spread and introduction of weeds and dieback; ▶ A baseline field survey of dieback and weed risk areas shall be completed prior to commissioning; ▶ The location of declared/WONS weeds and dieback risk areas shall be marked on construction plans and flagged in the field; ▶ Plant, machinery, equipment, tools and footwear will be cleaned down prior to arrival and departure from the site and on entering and leaving weed and dieback risk areas within the site. Clean down will consist of inspection and brushing, gouging, scraping and/or water blasting to remove any adhering soil or plant matter, as appropriate; ▶ Management will be in accordance with the State Environmental Weed Strategy for Western Australia (1999). Careful management of topsoil and vegetative material will be required during construction to minimise the spread of weeds, both within and adjacent to the study area; ▶ A weed control program shall be implemented that may involve spraying to kill plants or to prevent germination; ▶ Obtain plant material for rehabilitation purposes from suppliers with appropriate <i>Phytophthora cinnamomi</i> and weed control certification; ▶ Signage shall be used where necessary to communicate the weed and dieback status of an area and hygiene requirements; ▶ Stockpiles of weed and dieback infested material shall be kept separate from weed and dieback free material; ▶ Stockpiles of infested material and site drainage shall be positioned to prevent runoff and drainage from infested areas entering un-infested areas; ▶ Machinery shall be cleaned down when moving from infested/un-interpretable areas to un-infested areas during clear, grade and rehabilitation; ▶ All topsoil within identified infested/un-interpretable dieback and weed areas shall be stockpiled within the infected area and not with topsoil from uninfested areas; and ▶ Respreading of vegetation and topsoil from infested/un-interpretable areas shall only be respread back to their point of origin. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No new weed infestation or dieback spread associated with construction works; and ▶ All plant and machinery inspected and cleaned as required prior to site entry. 		

CEMP - 02		Weed and Pathogen
Monitoring		
<ul style="list-style-type: none"> ▶ Baseline weed and dieback surveys shall be undertaken and confirmed complete by the Site Environmental Coordinator prior to construction commencing in any area; and ▶ Inspections for weed infestation and potential dieback spread shall be undertaken by the Site Environmental Coordinator as part of routine site environmental inspections, including prior to and after clearing in any area. 		
Contingency		
Trigger	Action	
Signs of significant weed and/or pathogen introduction during construction associated with construction activities.	<ol style="list-style-type: none"> 1. Notify Environment Manager; 2. Undertake remedial works to control and eradicate introduced weeds; and 3. Investigate possible introduction pathway and determine measures to prevent re-occurrence. 	

5.3 Terrestrial Fauna

Despite the modified nature of most of the Project area, some native fauna habitat is present. The regional habitat and wildlife corridor values of the area that will be impacted are reduced by the fragmented nature of the native vegetation, although some local corridor value is retained in the well vegetated road verges.

Table 4 Terrestrial Fauna Management

CEMP - 03		Terrestrial Fauna
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator
<p>Objectives</p> <ul style="list-style-type: none"> ▶ To minimise and manage the impacts to terrestrial fauna during construction; and ▶ To protect terrestrial fauna consistent with the provisions of the WC Act (1950) and the EPBC Act (1999). 		
<p>Management</p> <ul style="list-style-type: none"> ▶ Habitat disturbance will be minimised by the actions set out under Flora and Vegetation management and Weed and Pathogen management; ▶ Photographs of protected and other fauna likely to be encountered shall be supplied to staff and contractors during induction to facilitate on the ground identification of fauna; ▶ Construction of the pipeline trenches shall be conducted in a manner to allow fauna to escape, for example open trenches or pits shall be ramped to allow fauna egress at a minimum of every 500 m and no trenches shall be left open longer than required; ▶ Trenches and excavations that have been open over night or are to be left open overnight shall be inspected for fauna by suitably qualified personnel, immediately prior to work commencing on open trenches or excavations and also within two hours post sunrise and pre-sunset; any trapped fauna will be removed as found; ▶ A procedure shall be established that outlines the requirements for safe relocation of fauna (such as snake relocation). The procedure shall include an internal and external contacts list for the purposes of fauna management; ▶ Maintain a clean work environment to avoid attracting fauna to hiding places or garbage; ▶ Construction personnel shall not feed or handle native fauna, unless authorised by the Site Environmental Coordinator; ▶ No domestic animals will be permitted to be brought into the project area by company or construction personnel during construction; ▶ Native fauna encountered during clearing will be allowed to make their own way from the site. If this is not possible or is likely to hold up work for some time, a suitably qualified (with appropriate permits) person will be called to shift the fauna to a safe location; ▶ Any injured fauna shall be left alone and observed until a suitably qualified person can attend to the animal; ▶ Vehicle speeds shall not exceed 60 km/hr in the construction corridor and movements at dawn and dusk minimized, with night movements only allowed by approval of the site environmental manager; ▶ Pipes will be inspected for fauna prior to handling and welding and any fauna removed by qualified personnel; under no circumstances will disturbance of the fauna to encourage it to leave the pipe be allowed; ▶ Records of any fauna interactions shall be kept and included in reporting; and ▶ A zero flyrock shall be adopted during blasting to prevent flyrock from injuring fauna. 		

CEMP - 03		Terrestrial Fauna
Performance Indicators		
<ul style="list-style-type: none"> ▶ No significant negative¹ interactions with native fauna attributable to construction works. 		
Monitoring		
<ul style="list-style-type: none"> ▶ Inspections for trapped fauna in open trenches or any other work area which has the potential to entrap fauna shall be done prior to commencement of works and within two hours post sunrise and pre-sunset. 		
Contingency		
Trigger	Action	
Injury or death of native fauna due to construction activity	<ol style="list-style-type: none"> 1. Notify Site Environmental Coordinator; 2. Arrangements to be in place and implemented to treat the animal or euthanase it by approved methods as required; and 3. Investigate cause and determine measures to prevent re-occurrence. 	

5.4 Marine Water Quality

Water quality around the seawater intake on the north side of Cape Riche, is characterised by low turbidity, nutrient and metal levels and is considered to be of a high standard from ecological and desalination source water perspectives (360 Environmental 2010; GHD 2011a). The nutrient, metals and chlorophyll-a concentrations of the inshore coastal waters of Cape Riche meet the default ANZECC/ARMCANZ (2000) guidelines.

Potential impacts on marine water quality during construction primarily relate to the introduction of turbidity into the water column as a result of earthworks and spills of hazardous substances, such as fuels and lubricants. This is particularly relevant at the seawater intake construction site given the interface with the intertidal and subtidal zones.

In order to manage and contain sediment that may be mobilised during the construction of the seawater intake, a three staged approach will be used.

Stage 1 – Temporary rockfill platform

A temporary rockfill platform will be established over the area of the intake channel to be blasted in order to provide a dry, stable working platform and prevent drilling and blasting from occurring within the water column. The temporary rockfill platform provides a key sediment control barrier as all drilling and blasting will be undertaken within (or under) the platform.

To construct the temporary rockfill platform, a sand platform will first be established along the desired seawater intake channel route using clean, suitable grade sand. The sand platform will then be covered in a geofabric layer to stabilise the sand and to minimise the chance of fine sediments being released

¹ Negative impacts include attracting, trapping, injuring and/or killing any native fauna.

into the marine environment. A sloping rockfill batter will then be built up around the perimeter of the sand platform to provide sufficient stability and strength and protect the sand core from erosion.

Characteristics of the temporary rockfill platform shall include:

- ▶ Construction material of the outer rock armour to be 'clean' rock rubble, relatively free from fine material and with a median diameter of at least 400 mm;
- ▶ Sand fill material to be clean and of a suitable grade to prevent sedimentation impacts on the marine environment;
- ▶ The platform footprint will be contained within the approved disturbance area; and
- ▶ Silt curtains will be deployed around the outer boundaries of the platform to minimise any sedimentation risk during construction and blasting.

Stage 2 – Drill and blast

Once the platform is completed, the drill rig will use the platform as a working surface and drill the blast holes required through the sand core, starting from the seaward end and retreating landwards.

Blasting of the rock below the temporary rockfill platform will then be undertaken in what is likely to be a single blast event. Blast management is discussed in Section 5.15.

Stage 3 – Excavation of intake channel and temporary rockfill platform

Following blasting, excavation of the intake channel and temporary rockfill platform will commence. Fine blast material contained within the extent of the intake channel will be excavated, while leaving the exterior rock armour to act as an initial sediment barrier in addition to the surrounding silt curtains. Following excavation of the blasted channel material, clean coarse material will be substituted into the excavated intake channel, to minimise sediment dispersion during final removal of the temporary rock armour.

Once the coarse backfill material is in place, the temporary rockfill platform will again provide a stage upon which the excavator will be able to navigate. The entire temporary rockfill platform, including both rock armour and backfilled coarse material will then be excavated, with the excavator retreating landwards from the seaward side. The excavated material will be stockpiled and subsequently transported to a licenced waste facility.

During this stage the silt curtain will be maintained around the platform footprint to contain any sediment mobilisation that may be generated. Due to the nature of the works, the excavation can only be undertaken during calm weather, for safety reasons and to ensure the silt curtain is not compromised by rough seas.

The Site Environmental Coordinator will be present during this stage and will monitor the effectiveness of the silt curtain. If the weather conditions deteriorate such that the silt curtain is proving ineffective, the site Environmental Coordinator, along with the Construction Manager, will make a decision whether to continue the excavation or cease works until conditions improve. The decision will be based on:

- ▶ Safety;
- ▶ Sea conditions;
- ▶ Weather forecasts; and
- ▶ Current effects on the remnants of the platform.

If safe to do so, the excavation will continue in order to limit erosion of the platform and potential subsequent distribution of the material outside of the predicted impact area.

Land based construction

The key area of land-based construction that requires specific sediment control and management is the onshore component of the intake channel and the remainder of the intake pump station works adjacent the shore of Cheyne Bay.

As shown in **Figure 2**, the topography dips below the 0.00m AHD contour prior to the start point of the nearshore excavation works (Point A). Work on the landward side of this point is to be conducted independently of the nearshore construction. The raised rock section at Point A which separates the landside works from the nearshore works will be the final section to be excavated, thereby waiting until the last stage of work to connect the inner section of the channel to the ocean.

Section 5.15 outlines the mitigation required for land based blasting.

During the land based excavation it is anticipated that some dewatering will be required. Given the proximity to the coast, any dewatering water is likely to be brackish to saline and will be passed through a geofabric lined sump prior to being discharged into the intake channel construction area, within the silt curtains.

Figure 2 Separation of landside 'dry' construction and nearshore 'wet' construction, the rock at Point A will be excavated last, separating the land side works from the ocean until both sections of work are complete

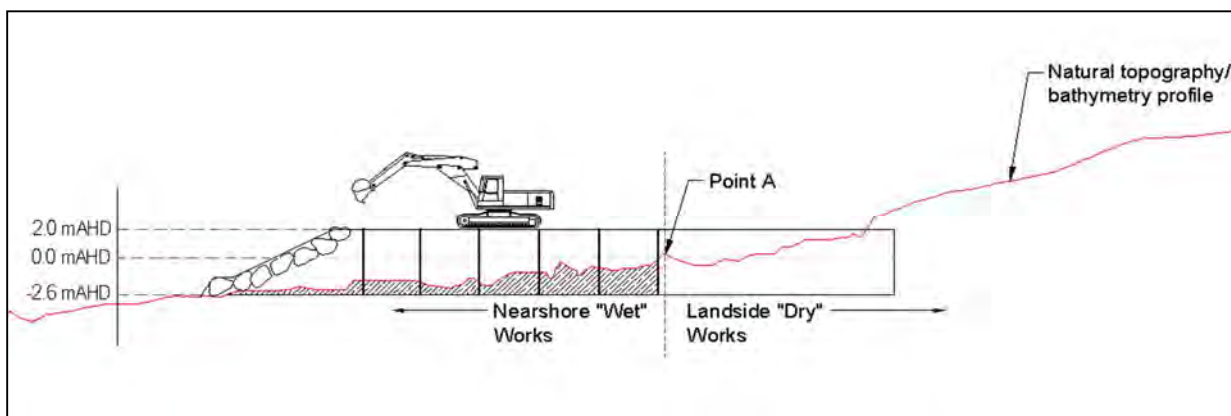


Table 5 Marine Water Quality Management

CEMP - 04		Marine Water Quality
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator
Objectives		
<ul style="list-style-type: none"> ▶ To contain impacts on marine water quality to within the approved disturbance area; and ▶ To ensure that there are no significant impacts on marine water quality associated with construction. 		
Management		
The following management relates to the temporary rockfill platform:		
<ul style="list-style-type: none"> ▶ Silt curtains shall be deployed around the outer boundaries of the construction footprint during all works within the intertidal and subtidal zones; ▶ Clean rockfill material (preferably locally sourced) with a median diameter of at least 400 mm shall be used; ▶ Clean sand of a suitable grade shall be used in the construction of the temporary rockfill platform to minimise sedimentation and contamination risks; ▶ A geofabric layer shall be placed over the sand core to stabilise the sand and minimise the chance of fine sediments being released; ▶ Following blasting, the sand and blasted material within the channel shall be excavated, while leaving the outer exterior rock armour to act as a primary sediment control barrier; ▶ Suitably sized clean coarse material (preferably locally sourced) shall be used to substitute excavated sand and blast material, assisting to minimise sediment dispersion during excavation of the temporary rock armour; ▶ Daily <i>in situ</i> monitoring of turbidity levels in the seawater outside the silt curtains shall be undertaken; ▶ Silt curtains shall remain in place during removal of the platform; ▶ Construction and removal of the platform shall only be undertaken during calm weather to ensure the efficacy of the silt curtains; and ▶ Removal of the platform to have performance indicator of removal of 95% of introduced rock, with particular emphasis on rock over two kilograms. 		
The following management relates to remaining constructions works:		
<ul style="list-style-type: none"> ▶ Land based excavation works shall be completed independently of the near shore works, only connecting the two sections in the final stage; ▶ Blast mats shall be used for land based blasting to prevent flyrock from entering the water; ▶ Sediment control measures such as silt traps and temporary bunding shall be employed in locations where excavations are required near waterways (inclusive of the brine discharge location and pipeline adjacent Cheyne Inlet); ▶ Any dewatering water shall be passed through a geofabric lined sump prior to being discharged into the intake channel construction area, within the silt curtains; ▶ The Contractor shall ensure works prevent discharge of materials, including liquid or solid wastes, into the marine environment at all times. Equipment or items that enter water must be recovered as soon as practicable; and ▶ Activities involving the use or storage of hydrocarbons or chemicals near the marine environment 		

CEMP - 04		Marine Water Quality
shall be preceded with a documented risk assessment identifying risks and their management requirements.		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No significantly observable sediment plumes beyond the approved disturbance area; ▶ Turbidity monitoring demonstrates no exceedance of Environmental Quality Criteria (EQC); and ▶ No hazardous substance spill to enter the marine environment. 		
Monitoring		
<ul style="list-style-type: none"> ▶ Daily <i>in situ</i> measurements of seawater turbidity using a calibrated water quality meter shall be undertaken from two shoreline monitoring sites located approximately 10 m either side of the silt curtains; ▶ If there is an observable plume outside of the sediment curtains, monitoring shall be undertaken within the plume. Surface and bottom measurements will be adopted in this instance; ▶ The proposed EQC for this monitoring are: <ul style="list-style-type: none"> – Environmental Quality Guideline (EQG): 2 NTU; – Environmental Quality Standard (EQS): 10 NTU; and ▶ Inspections of sediment control measures shall be undertaken by the Site Environmental Coordinator as part of routine site environmental inspections. 		
Contingency		
Trigger	Action	
Seawater turbidity at monitoring sites exceed the EQG.	<ol style="list-style-type: none"> 1. Expand number of monitoring sites (i.e. sample at 50 m, 100 m, 200 m etc) from the site along the axis of any observable plume to determine if background turbidity levels are elevated; 2. Increase number of turbidity monitoring events to twice per day; 3. If there is the likelihood that the EQS may not be met, additional containment measures (such as silt curtains) will be made available and ready for implementation; and 4. Reduce monitoring to one event per day after turbidity measurements return to levels below the EQG. 	
Seawater turbidity at monitoring sites exceeds the EQS.	<ol style="list-style-type: none"> 1. Investigate the cause of the exceedance, including the potential for the change to be attributable to adjacent land uses/activities or a breach of Cheyne Inlet; 2. Take actions to mitigate the problem; 3. Consider additional containment measures such as deployment of second layer of silt 	

CEMP - 04	Marine Water Quality
	<p>curtains;</p> <ol style="list-style-type: none"> 4. Monitor the effectiveness of the remedial actions by monitoring turbidity hourly until levels return below the EQS; and 5. If turbidity levels attributable to the construction works do not return below the EQS after three consecutive monitoring events (i.e. after one day), construction processes shall be halted until the source can be identified and managed successfully.
Occurrence of erosion leading to sediment runoff	<ol style="list-style-type: none"> 1. Investigate the cause; 2. If the occurrence is a result of the construction, preventative actions shall be undertaken to prevent further erosion. These may include: <ul style="list-style-type: none"> – Application of fill/mulch; – Installation of gabion cages; – Installation of jute matting to secure bank; and 3. Monitor the effectiveness of the remedial actions.
Spill or leak of hydrocarbons or other hazardous materials during construction.	<ol style="list-style-type: none"> 1. Contain the spill and initiate appropriate clean-up / remedial works; 2. Investigate cause and implement appropriate corrective actions (repair faulty equipment, remove/replace leaking containers); 3. The cause of: <ul style="list-style-type: none"> – Level 1 spill – greater than 20 litres but less than 250 litres; – Level 2 spill – greater than 250 litres but less than 1000 litres; – Level 3 spill – greater than 1000 litres (informing authorities for spills of Level 3) shall be investigated; 4. Appropriate remedies shall be implemented to reduce the risk of a future spill, possibly including: <ul style="list-style-type: none"> – Repairing defective equipment; – Upgrading fuel storage and handling procedures; and

CEMP - 04	Marine Water Quality
	5. The effectiveness of the remedies shall be monitored.

5.5 Marine Fauna

The marine fauna species identified within the Cape Riche coastal waters that are most susceptible to construction impacts include:

- ▶ Whales and Dolphins;
- ▶ Little Penguins;
- ▶ New Zealand fur seals; and
- ▶ Fish species, with particular attention to the commercially and recreationally important Australian Salmon.

Potential impacts on marine fauna as a result of the construction activities are primarily related to:

- ▶ Noise and water borne concussion associated with blasting and rock breaking within the subtidal zone, particularly at the seawater intake;
- ▶ Release of flyrock from the blast entering the water; and
- ▶ Increased turbidity at the seawater intake channel (covered in Marine Water Quality, Section 5.4).

The following table summarises the required construction management measures as related to marine fauna. Further discussion with respect to blasting and water borne concussion and exclusion zones is provided in the Blast Management Plan (BMP) in Section 5.15.

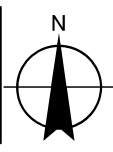
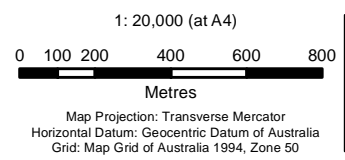
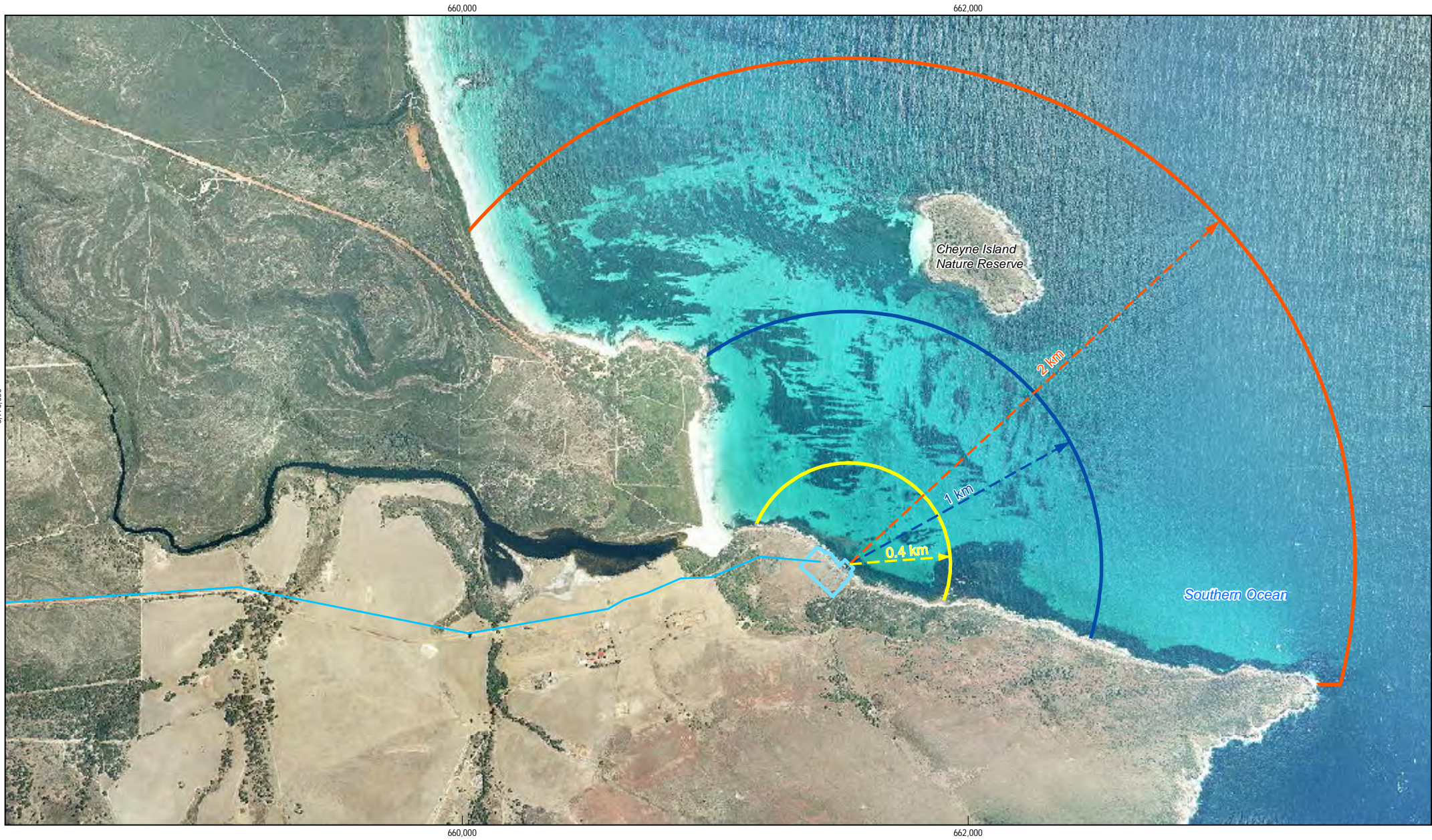
The marine mammal exclusion zones outlined in the BMP are presented in **Figure 3**.

Table 6 Marine Fauna Management

CEMP - 05		Marine Fauna
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator and Blasting Contractor
Objectives		
<ul style="list-style-type: none"> ▶ To maintain the ecological function, abundance, diversity, geographic distribution and productivity of marine fauna at species and ecosystem levels; and ▶ To maintain the health of marine fauna at the individual, species and ecosystem level. 		
Management		
<p>The following marine fauna management measures have been taken from Section 5.15.3 of the Blast Management Plan.</p> <ul style="list-style-type: none"> ▶ All blasting within the intertidal and subtidal zones shall be undertaken within (or below) the footprint of the temporary rockfill platform; ▶ A vessel based marine mammal observer² (MMO) shall observe for marine mammals within the two km radius observation zone when blasting is required within the intertidal and subtidal zone; ▶ If a cetacean is observed within a one km radius of the blast area, blasting shall cease. Blasting will only resume when all cetaceans are outside a one km exclusion zone radius, from the blast area, or no less than 30 minutes have passed since the last sighting; ▶ If a cetacean is observed within a two km radius, blasting will be suspended until it is clear that the cetacean is not moving towards the one km exclusion zone; ▶ If a pinniped or penguin is observed within the 400 m exclusion zone, blasting shall cease. Blasting will only resume when all pinnipeds and penguins are outside a 400 m exclusion zone radius, from the blast area, or no less than 30 minutes have passed since the last sighting; ▶ If a pinniped or penguin outside of the 400m exclusion zone is deemed likely to enter the zone, blasting shall cease until it is clear that the pinniped is not moving towards the zone; ▶ Blasting is to occur between the daylight hours of 10:00 am and 2:00 pm; ▶ The smallest practical charge weight shall be used; ▶ The charge weight per delay shall not exceed 11 kg; ▶ Blast mats shall be used for land based blasting and a zero flyrock policy shall be adopted to prevent flyrock from entering the water; ▶ A BMP shall be prepared by the contractor to ensure all environmental, safety and production requirements are met; and ▶ Visible fish mortalities (if any) from within 100 m of the blast site shall be removed immediately to minimise attraction of scavengers and birds to the site. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No marine mammal injuries as a result of construction activities. 		

² A marine mammal observer means a person qualified and experienced in identifying marine fauna, estimating distances and interpreting fauna behaviour.

CEMP - 05		Marine Fauna
Monitoring		
<ul style="list-style-type: none"> ▶ A MMO shall observe for marine mammals in the exclusion zones when blasting is required within the intertidal and subtidal zones. 		
Contingency		
Trigger	Action	
Non-compliance with management measures detailed above, as a direct result of construction staff/sub-contractors not understanding the outlined requirements.	<ol style="list-style-type: none"> 1. Investigate cause; 2. Implement contingency actions which may include: <ul style="list-style-type: none"> – Review of management measures and implementation of improvements; – Improvement of training and education for all personnel; – Implementation of increased protective measures, as necessary; and 3. Monitor the success of actions taken. 	
Marine mammal or penguin injured in blasting event.	<ol style="list-style-type: none"> 1. All subsequent blasting events to be halted until the cause of the injury can be determined and mitigated; 2. Advice DEC and OEPA of the incident and arrange veterinary care; and 3. Determine next steps in consultation with DEC. No further blasting to be undertaken until appropriate safe guards are in place and DEC provides approval. 	



LEGEND	
	Seawater Transfer Pipeline and Buried Power Line
	Pump Station Disturbance Area
	Cetacean Exclusion Zone
	Pinniped and Penguin Exclusion Zone
	Marine Mammal Observation Zone



CLIENTS | PEOPLE | PERFORMAN | SLIP ENABLER

Cape Riche
Seawater Desalination Plant

Job Number	61-26005
Revision	12
Date	21 Dec 2011

Marine Blasting Zones of Impact and Exclusion Zones

Figure 3

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Data source: Landgate: Mosaic 2008 Cheyne - 20111004; GHD: Pinniped and Penguin Exclusion Zone - 20111107, Seawater Transfer Pipeline and Buried Power Line - 20110704, Pump Station Disturbance Area - 20110826, Cetacean Exclusion Zone - 20111004, Marine Mammal Observation Zone - 20111004. Created by: mccekaj

5.6 Benthic Habitats

Benthic habitats play an important role in maintaining the integrity of marine ecosystems. There is strong evidence that the presence of benthic habitat is important to the maintenance of marine biodiversity, through the provision of structurally complex and diverse habitat, provision of refuge and increased food supply (EPA 2009).

The seawater intake and brine outfall have both been designed to minimise impact and loss of benthic primary producer habitats (BPPH). Some physical disturbance of the shoreline will occur during construction of the seawater intake channel (described in Section 5.4), within the intertidal and subtidal regions of Cheyne Bay. It is considered that seawater intake construction activities will result in a minor physical disturbance to the benthic habitat relative to the total intertidal and shoreline habitat along the northern side of Cape Riche and surrounds. Further, once construction is complete, it is anticipated that the benthic habitat will recover, with the local macroalgae recovering (where impacted) or recolonising (where lost).

The location of the brine outfall, on the south side of Cape Riche, is positioned upon a wave-cut platform with mostly bare boulder sub-sea substrate, and occasional patches of brown algae. There are no seagrass or corals in the vicinity of the outfall (GHD 2011a).

Figure 4 shows the approved Benthic Habitat disturbance zones associated with the seawater intake construction.

661,450

661,600

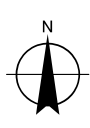
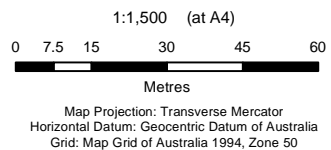


6,169,350

6,169,350

661,450

661,600



LEGEND

- Extent of Excavation
- Seawater Transfer Pipeline and Buried Power Line
- Pump Station Area
- Temporary Rockfill Platform
- BPPH Loss
- Earthworks Batter
- BPPH Effect
- Temporary Rock Armour



Cape Riche
Seawater Desalination Plant

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Open Channel Seawater Intake
Benthic Habitat Disturbance Zone **Figure 4**

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Data source: Grange Resources: 20cm Aerial Mosaic - 20100901; GHD: BPPH Loss - 20110907; BPPH Effect - 20110908, Extent of Excavation - 200110831, Earthworks Batter - 200110831, Pump Station - 20110826, Temporary Rock Armour - 20111109, Temporary Rockfill Platform - 20111109; Harley Global: Seawater Transfer Pipeline and Buried Power Line - 20110704.
Created by: tgoad, vdinh, mczeckaj

Table 7 Benthic Habitat Management

CEMP - 06		Benthic Habitats
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator
Objectives		
<ul style="list-style-type: none"> ▶ To maintain the integrity, ecological functions and environmental values of the benthic habitats in the vicinity of the Project. 		
Management		
<ul style="list-style-type: none"> ▶ Prior to construction, the approved disturbance area shall be marked using flagged stakes or marker buoys; ▶ All seawater intake construction footprints shall be contained within the approved disturbance area; ▶ All marine excavation shall be undertaken within the silt curtains surrounding the temporary rockfill platform; ▶ Following the completion of the blast event, the intake channel and temporary rockfill platform shall be removed to enable the benthic habitat to recover; ▶ Removal of the platform to have performance indicator of removal of 95% of introduced rock, with particular emphasis on rock over two kilograms; and ▶ Impacts on water quality, including sediment mobilisation, shall be managed in accordance with measures set out in Section 5.4. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ Temporary BPPH disturbance limited to approved disturbance area of 0.14 ha during the construction of the intake channel; and ▶ No direct physical loss of more than 0.003 ha benthic habitat during construction of the intake channel. 		
Monitoring		
<ul style="list-style-type: none"> ▶ Audit of actual construction footprint vs. approved disturbance area; ▶ Baseline benthic habitat monitoring prior to construction, followed by post construction and biannual monitoring throughout operation to demonstrate BPPH recovery in disturbance area (methods covered in the Brine Discharge Management Plan); and ▶ Water quality monitoring in accordance with Table 5. 		
Contingency		
Trigger	Action	
Construction footprint found to be outside of approved disturbance area i.e. rock spill	<ol style="list-style-type: none"> 1. Investigate cause; 2. Initiate measures to reduce footprint to within approved disturbance area; 3. Undertake clean-up of impacted area. This may include a validation survey of impacted 	

CEMP - 06	Benthic Habitats
	<p>area by an appropriately qualified marine scientist to confirm clean-up has been completed as far as practical;</p> <ol style="list-style-type: none"> 4. Implement actions to ensure incident does not reoccur. This may include: <ul style="list-style-type: none"> – Review management measures practically or relevance; – Improve training and education for all personnel; – Improve and implement increased protective measures as necessary; and 5. Monitor the success of these actions.
<p>Excavator fails to remove approximately 95% of introduced rock over two kilograms</p>	<p>Contractor to assess options for further recover of rock over two kilograms. This may include deployment of snorkelers or divers to manually remove the required rock.</p>

5.7 Air Quality

Air quality changes can have adverse effects on human health, adjacent ecology and may cause a potentially unsafe working environment. Wind strength and direction can greatly influence the air quality at the site. The seawater intake and outfall sites are heavily influenced by coastal winds. The primary air quality concern during construction is the dust generated during construction activities, particularly in very dry conditions. Air quality will be managed in accordance with the requirements of the *Prevention of Air Quality Impacts from Development Sites* (EPA, 2000).

Table 8 Air Quality Management

CEMP - 07		Air Quality
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator and Blasting Contractor
Objectives		
<ul style="list-style-type: none"> ▶ To ensure that dust and odour generated through the construction of the project does not create adverse social or environmental impacts. 		
Management		
<ul style="list-style-type: none"> ▶ Workforce inductions shall include education in relation to, and the minimisation of, dust; ▶ Dust suppression techniques, such as watering of unsealed surfaces, access roads and stockpiles shall be implemented as required; ▶ Dust generating activities shall not be undertaken during unfavourable weather conditions, e.g. high wind speeds, unfavourable wind directions relative to sensitive premises and environments; ▶ Vehicle speeds shall be restricted to 60 km/hr within the construction site; ▶ The extent of cleared and other disturbed areas shall be minimised as far as is practicable for construction requirements; ▶ Progressive rehabilitation of disturbed areas shall be undertaken to reduce the total exposed area; ▶ Where appropriate, hydro mulch shall be applied to exposed areas to stabilise and protect soil; ▶ Burning of rubber and plastic products, waste oil or any other waste material shall not be permitted in or near the construction site; and ▶ A complaints register shall be maintained. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No dust and/or odour related complaints; and ▶ Any complaints and actions taken shall be recorded in the complaints register. 		
Monitoring		
<ul style="list-style-type: none"> ▶ Daily and opportunistic visual assessment of dust emissions shall be undertaken by the Site Environmental Coordinator as part of routine site environmental inspections. 		
Contingency		
Trigger		Action
Complaints received concerning air quality (dust or odour).		Manage complaint and response as detailed within Section 7.4

5.8 Noise and Vibration

Noise emissions from the project will vary through the construction period depending on the type, duration and location of construction activity. Some emissions may be considered acceptable, particularly if continuous such as a running generator. Other emissions may be considered intrusive, such as the blasting and excavating.

Vibration can impact nearby infrastructure including buildings and other structures. Like noise, impacts will vary depending on many factors including duration, intensity and occurrence, as well as the locations of the source of the emission and the location of the nearest sensitive receptor.

Table 9 Noise and Vibration Management

CEMP - 08		Noise and Vibration
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator and Blasting Contractor
Objectives		
<ul style="list-style-type: none"> ▶ To ensure that noise and vibration management complies with current industry standards; and ▶ To minimise noise and vibration emissions consistent with the provisions of the <i>Environmental Protection (Noise) Regulations 1997</i>. 		
Management		
<ul style="list-style-type: none"> ▶ Workforce inductions shall include education in relation to the impacts and minimisation of noise and vibration; ▶ Construction works shall be managed in accordance with control of noise practices set out in Section 6 of AS 2436-1981; ▶ Noise and vibration generating construction activities shall be limited to the hours of 7.00 am to 7.00 pm from Monday to Saturday, excluding public holidays, unless approval is otherwise received; ▶ Residents in close proximity (approximately 5 km) to the Project shall be advised of the works schedule; ▶ Loading and unloading areas shall be positioned as far as practical from local residences, with locations to be determined in consultation with the residents; ▶ Regular maintenance and inspection of all heavy vehicles, plant and machinery shall be undertaken and documented in a maintenance register; and ▶ A complaints register for any issues of concern shall be established and maintained throughout the duration of the construction period. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No noise and vibration related complaints; ▶ No unapproved construction outside of 7.00 am to 7.00 pm; and ▶ No noise and vibration related non compliances. 		
Monitoring		
<ul style="list-style-type: none"> ▶ Daily inspection of vehicle, plant and machinery to ensure that noise and vibration is not excessive. . 		
Contingency		
Trigger		Action
Noise generating activities required outside of standard construction hours of 7.00 am to 7.00 pm from Monday to Saturday.		<ol style="list-style-type: none"> 1. Gain approval from the appropriate Local Government officers before work commences; 2. Consult residents in the vicinity of the works, provide the work schedule for the activity and the reasons why it needs to occur outside of standard hours;

CEMP - 08	Noise and Vibration
	3. Limit activities to those absolutely necessary; and 4. Reduce noise emissions as practicable.
Complaints received concerning noise or vibration.	Manage complaint and response as detailed in Section 7.4.

5.9 Surface Hydrology

Many wetlands found within the South Coast Region occur on or near the coast. The nearest significant south coast wetlands to the Project are located within Mettler Lake Nature Reserve and the adjacent Basil Road Nature Reserve. These are approximately 10 km and 4.5 km from the desalination plant site, respectively. No RAMSAR wetlands occur within or nearby the Project area.

Numerous small unnamed and unmapped drainage lines are present within the Project area. These comprise of small ephemeral drainage or seepage lines. The locally recognised Eyre River is located to the north of the Project area originating below Blackboy Hill and meandering westward collecting at Cheyne Inlet, immediately north of the seawater intake and transfer pipeline.

Table 10 Surface Hydrology Management

CEMP - 06		Surface Hydrology
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator
Objectives		
<ul style="list-style-type: none"> ▶ No impact on the quality of the wetlands and surface waters. 		
Management		
<ul style="list-style-type: none"> ▶ The workforce induction shall include information on local wetlands and surface water bodies; ▶ A minimum 50 m setback shall be maintained from the Eyre River; ▶ All surface run-off from construction activities shall be contained through appropriate drainage requirements and include erosion / degradation controls; ▶ Sediment control measures such as silt traps, silt curtains, interceptor drains and the like shall be used where there is potential for runoff to enter waterways; ▶ Exposed surfaces, including road reserves and medians, shall be progressively rehabilitated (covered with topsoil and/or mulch and revegetated unless otherwise determined); ▶ Hydrocarbons and other hazardous substances shall be stored and used in accordance with the <i>Dangerous Goods Safety Regulations 2007 (WA)</i>; ▶ Refuelling on site shall be undertaken on a sealed or bund surface or using a catch tray; ▶ No refuelling shall occur within 50 m of any water body; ▶ All hydrocarbons, chemicals, pesticides, herbicides or other chemicals spills shall be recorded using the internal project incident reporting tool; ▶ Any contaminated soil shall be dug out and disposed of to an appropriately licenced landfill; and ▶ Water quality samples shall be taken if potential contaminants are believed to have reached natural drainage channels. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No contamination of wetlands or surface hydrology as a result of construction. 		
Monitoring		
<ul style="list-style-type: none"> ▶ Weekly and opportunistic monitoring of erosion within the construction areas shall be undertaken by the Site Environmental Coordinator as part of routine site environmental inspections; ▶ Weekly and opportunistic (especially during/after rain events) monitoring for sediment run off from construction areas; ▶ Storages of hydrocarbons and hazardous substances shall be regularly inspected to ensure management requirements are being met; and ▶ Refuelling areas will be checked on a regular basis to ensure that management requirements are being met. 		
Contingency		
Trigger		Action
Occurrence of significant erosion in disturbed		1. Investigate the cause;

CEMP - 06	Surface Hydrology
areas.	<ol style="list-style-type: none"> 2. If the occurrence is a result of construction, preventative actions shall be undertaken to prevent further erosion. These may include: <ul style="list-style-type: none"> – Application of fill/mulch; – Installation of rip rap rock protection; – Installation of jute matting to secure bank; and 3. Monitor the effectiveness of the remedy.
Spill or leak of hazardous materials.	<ol style="list-style-type: none"> 1. Contain the spill and initiate appropriate clean-up / remedial works; 2. Investigate cause and implement appropriate corrective actions (repair faulty equipment, upgrade; 3. The following causes shall be investigated: <ul style="list-style-type: none"> – Level 1 spill – greater than 20 litres but less than 250 litres; – Level 2 spill – greater than 250 litres but less than 1000 litres; – Level 3 spill – greater than 1000 litres (informing authorities for spills of Level 3); 4. An appropriate remedy shall be implemented, possibly including: <ul style="list-style-type: none"> – Repairing defective equipment; – Upgrading fuel storage and handling procedures; and 5. The effectiveness of the remedy shall be monitored.

5.10 Waste

The construction of the Project will inevitably produce some waste products such as litter, general construction waste and rock material associated with blasting the seawater intake channel. Appropriate disposal of these products is important to maintain a tidy site and minimise impacts on the environment.

Table 11 Waste Management

CEMP - 10		Waste
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator
Objectives		
<ul style="list-style-type: none"> ▶ All construction activities are carried out with the principles of cleaner production and waste minimisation. 		
Management		
<ul style="list-style-type: none"> ▶ The workforce induction shall outline the requirements for waste minimisation and management practices. All workers shall be encouraged to minimise waste production and to make sure that any wastes produced are disposed of appropriately; ▶ Wastes shall be separated into: recyclable, re-usable and returnable at source; ▶ Litter bins shall be placed (and regularly emptied) in appropriate areas; ▶ General waste shall be placed in a large waste bin and periodically removed from site; ▶ Wind-blown litter shall be controlled by ensuring skips and bins are not overflowing and are covered when necessary; ▶ Where wastes have to be temporarily stored in laydown areas, it shall be done in a neat and orderly manner and clearly signed as waste material; ▶ Waste chemicals shall be disposed of as per the corresponding Material Safety Data Sheet; and ▶ All waste shall be disposed of to an appropriate licenced facility. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No non-compliances with the disposal of wastes or other legislative requirements. 		
Monitoring		
<ul style="list-style-type: none"> ▶ Monitoring the presence of litter within and adjacent to the project site which is attributed to construction activities shall be undertaken by the Site Environmental Coordinator as part of routine site environmental inspections. ▶ Routine inspection to ensure correct usage of recycle and refusal bins. 		
Contingency		
Trigger		Action
Presence of significant uncontrolled waste around the construction site		<ol style="list-style-type: none"> 1. Initiate appropriate clean-up / remedial works; and 2. Investigate cause and implement appropriate corrective actions (provision of additional bins)

CEMP - 10	Waste
	or skips, undertake further education etc.).

5.11 Recreation

Cape Riche is a popular camping and recreational area for both locals and visitors, with the recreational activities including:

- ▶ Camping (Cape Riche camp ground);
- ▶ Fishing;
- ▶ Boating (ocean);
- ▶ Coastal walking;
- ▶ Bird watching (particularly on Cheyne Island);
- ▶ Surfing; and
- ▶ Swimming.

Table 12 Recreation Management

CEMP - 11		Recreation
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator and Blasting contractor.
Objectives		
<ul style="list-style-type: none"> ▶ To ensure that existing and planned recreational uses are not unreasonably compromised during construction. 		
Management		
<ul style="list-style-type: none"> ▶ Appropriate fencing and signage shall be installed at the seawater intake site; ▶ Land based exclusion zones shall be kept to the minimum safely practical size; ▶ Exclusion zones shall be located such that walking corridors along Cape Riche are not completely blocked off at any point in time; ▶ A one km marine exclusion zone shall be established when blasting is required below the high tide mark; ▶ A BMP shall be prepared to ensure all environmental, safety and production requirements are met; ▶ The BMP shall identify stakeholders to be consulted with prior to blasting (including, but not limited to, RecFish West, local dive shops in Albany and the Cape Riche camp site); and ▶ A complaints register for any issues of concern shall be established and maintained throughout the duration of the construction period. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No complaints with respect to restrictions on recreational activities. 		
Monitoring		
<ul style="list-style-type: none"> ▶ No specific monitoring is proposed with respect to recreation 		
Contingency		
Trigger		Action
Recreational activities (boating, diving, fishing) being undertaken within the one km exclusion zone when blasting is required.		<ol style="list-style-type: none"> 1. Blasting not to be undertaken; and 2. Construction vessel to advise persons to leave the area while blasting is being undertaken.
Complaints received concerning impacts upon recreational activities.		Manage complaint as detailed in Section 7.4 and ensure a rapid response occurs.

5.12 Visual Amenity

The management of visual amenity includes both maintaining view sheds of the surrounding landscape and providing screening of the constructed outcomes from residential properties.

Table 13 Visual Amenity Management

CEMP - 12		Visual Amenity
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator
Objectives		
<ul style="list-style-type: none"> ▶ To maintain view sheds of the surrounding landscape and provide screening, where possible, of construction activities from nearby sensitive receptors. 		
Management		
<ul style="list-style-type: none"> ▶ Vegetation clearance shall be kept to a minimum in accordance with measures set out in Section 5.1; ▶ Progressive rehabilitation of disturbed areas shall be undertaken; and ▶ Laydown areas shall be determined in consultation with landowners to consider visual impact. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No visual impact related complaints. 		
Monitoring		
<ul style="list-style-type: none"> ▶ No specific monitoring is proposed with respect to visual amenity 		
Contingency		
Trigger		Action
Complaints received concerning visual impact of construction.		Manage complaint as detailed in Section 7.4 and ensure a rapid response occurs.

5.13 Indigenous Heritage

An ethnographic and archaeological cultural heritage survey involving members of Noongar families, along with representatives of Australian Cultural Heritage Management (ACHM), Grange Resources and the South West Aboriginal Land and Sea Council was undertaken by ACHM (2010).

The survey did not identify any ethnographic or archaeological heritage sites within the Project footprint, however several ethnographic sites were inspected and recorded nearby.

Table 14 Indigenous Heritage Management

CEMP - 13		Indigenous Heritage
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator
Objectives		
<ul style="list-style-type: none"> ▶ To minimise impacts on Aboriginal Heritage and comply with the requirements of the <i>Aboriginal Heritage Act 1972</i>. 		
Management		
<ul style="list-style-type: none"> ▶ Workforce inductions shall include education in relation to indigenous heritage and will highlight nearby heritage and ethnographic sites (if any), staff obligations with regards to the protection of known and unknown Aboriginal Heritage sites and values pursuant to the <i>Aboriginal Heritage Act 1972</i>; ▶ Consultation with original Aboriginal heritage survey participants will be undertaken when footprints are confirmed. Additional surveys shall be undertaken where required; ▶ Project infrastructure, both permanent and temporary shall be placed away from any known Aboriginal Heritage sites; ▶ Aboriginal Heritage sites shall be fenced off if they lie within 50 m of the construction works to prevent any unauthorised access; ▶ If Aboriginal Heritage sites are identified within close proximity to the Project footprint, a cultural monitor shall be employed to detect the presence of archaeological or skeletal material and to advise on construction methods to minimise impacts; ▶ If suspected skeletal remains are found, works shall cease in the immediate area and the find reported immediately to the WA Police Service and the Department of Indigenous Affairs (DIA). Works will not resume until the Police, DIA and archaeologists have come to an agreed solution; ▶ If skeletal remains found are to be an Aboriginal Heritage matter and not a police matter, they will be managed according to the wishes of the local indigenous communities and left as is until a decision is made about how to proceed; and ▶ The location and details of any newly discovered objects or remains shall be reported to the WA Museum and DIA. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No unauthorised disturbance to any indigenous heritage site. 		
Monitoring		
<ul style="list-style-type: none"> ▶ At this stage no Aboriginal Heritage sites have been identified within the Project footprint and no monitoring is proposed; and <p>Following the completion of further ethnographic and archaeological surveys, the requirement for monitoring will be re-assessed.</p>		
Contingency		
Trigger	Action	
Identification of potential heritage site during excavation works, or other construction activity.	1. Works shall cease in the immediate area;	

CEMP - 13	Indigenous Heritage
	<ol style="list-style-type: none"> 2. Advice shall be sought from a cultural monitor; and 3. Works shall only re-commence when the go-ahead is received from the cultural monitor.
Skeletal material found during excavation.	<ol style="list-style-type: none"> 1. Works shall cease in the immediate area; 2. Find shall be reported to WA Police and DIA; 3. Advice and recommendations shall be taken from the Police and DIA; and 4. Works shall only resume when the go-ahead is received from the Police and DIA and the local indigenous community.

5.14 Non-Indigenous Heritage

Heritage has an important social and cultural value and it protected by the *National Trust of Australia (WA) Act 1964* and the *Australian Heritage Council Act 2003*.

The Project is located within the City of Albany local government area. Albany itself is the site of WA's first European settlement, and was the main international seaport for WA between 1852 and 1900. The locally recognised Cape Riche Homestead and Woolshed are listed in the City of Albany's Municipal Heritage Inventory List (2000). Whilst the structures are not heritage listed, and located well outside of the disturbance corridor, the Project recognises their local historical importance.

Table 15 Non-Indigenous Heritage Management

CEMP - 14		Non-Indigenous Heritage
Responsibilities		Implementation – Construction Manager
		Compliance – Site Environmental Coordinator
Objectives		
<ul style="list-style-type: none"> ▶ To preserve European heritage; and ▶ To comply with the <i>Heritage of Western Australia Act 1972</i>. 		
Management		
<ul style="list-style-type: none"> ▶ Workforce inductions shall include education in relation to the location of the Cape Riche Homestead and Woolshed; ▶ Temporary fencing or flagging shall be placed between the Cape Riche Homestead and Woolshed when construction works are within the vicinity of these structures; and ▶ If objects of potential European heritage significance are found during construction works, they shall be salvaged and advice sought from a suitably qualified archaeologist. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No unauthorised disturbance to any European heritage site. 		
Monitoring		
<ul style="list-style-type: none"> ▶ No specific monitoring is proposed with respect to European heritage. 		
Contingency		
Trigger		Action
Objects of potential European heritage significance are found during construction works.		Objects shall be salvaged, with advice from a suitably qualified archaeologist.

5.15 Blast Management Plan

The blasting Contractor shall be required to prepare a Blasting Management Plan (BMP) that will address procedures and risk mitigation measures to ensure all environmental, safety and production requirements of the blasting operation are satisfied. The blast management measures discussed within this section will form the minimum level of environmental requirements for incorporation into the contractors BMP. They do not specifically address safety or other legislative requirements, which will be the responsibility of the blasting Contractor.

Blasting operations are required to create a channel for the seawater intake within the shoreline bedrock to a point 15 m into the ocean (i.e. blasting operations will occur in the marine as well as the terrestrial environment). Blasting operations have the potential to impact on marine and terrestrial fauna, local infrastructure, water quality and work safety through one or a combination of blast associated risks including flyrock, air blast, water borne concussion and sedimentation. The severity of blasting impacts greatly depends on the distance between the blast and potential receptors, the charge weight used in the blast and mitigation controls put in place.

Advice has been provided by Orica (2011) in determining the most appropriate blast methods as well as providing modelling with respect to potential impacts on marine fauna.

The following provides a description of the steps involved in completing the blasting component of the seawater intake construction and highlights the mitigation and management procedures to be included in the Contractor's BMP. Components of this section are repeated in some of the earlier sections, however this section has been prepared on the assumption that it may be provided to (or read by) potential blast Contractors as a stand-alone component.

5.15.1 Blast Process Overview

Stage 1 – Temporary rockfill platform

A temporary rockfill platform will be established over the footprint of the intake channel to be blasted (and subsequently excavated) in order to provide a dry, stable working environment for the blast hole drill rig and to provide an artificial burden that will aid in minimising sea borne concussion and flyrock associated with blasting in a marine environment.

Prior to establishment of the temporary rockfill platform, loose boulders will be removed from the construction footprint using an excavator.

To construct the temporary rockfill platform a sand platform will first be established along the desired seawater intake channel route using clean, suitable grade sand. The sand platform will then be covered in a geofabric layer to stabilise the sand and to minimise the chance of any fine sediments being released into the marine environment. A sloping rockfill revetment will then be built up around the perimeter of the sand platform to provide sufficient stability and strength.

Characteristics of the temporary rockfill platform shall include:

- ▶ Construction material of the outer rock armour to be 'clean' rock rubble, relatively free from fine material and with a median diameter of at least 400 mm;
- ▶ Sand fill material to be clean and of a suitable grade to prevent sedimentation impacts on the marine environment;
- ▶ The platform footprint will be contained within the approved disturbance area;

- ▶ Silt curtains will be deployed around the outer boundaries of the platform to minimise any sedimentation risk during construction and blasting.
- ▶ The platform shall extend to a width of two burdens (e.g. 3.6m) from the outer (seaward) blast hole location to maximise the dampening effects of the artificial burden.

Figure 5 shows the indicative layout of the temporary rockfill platform.

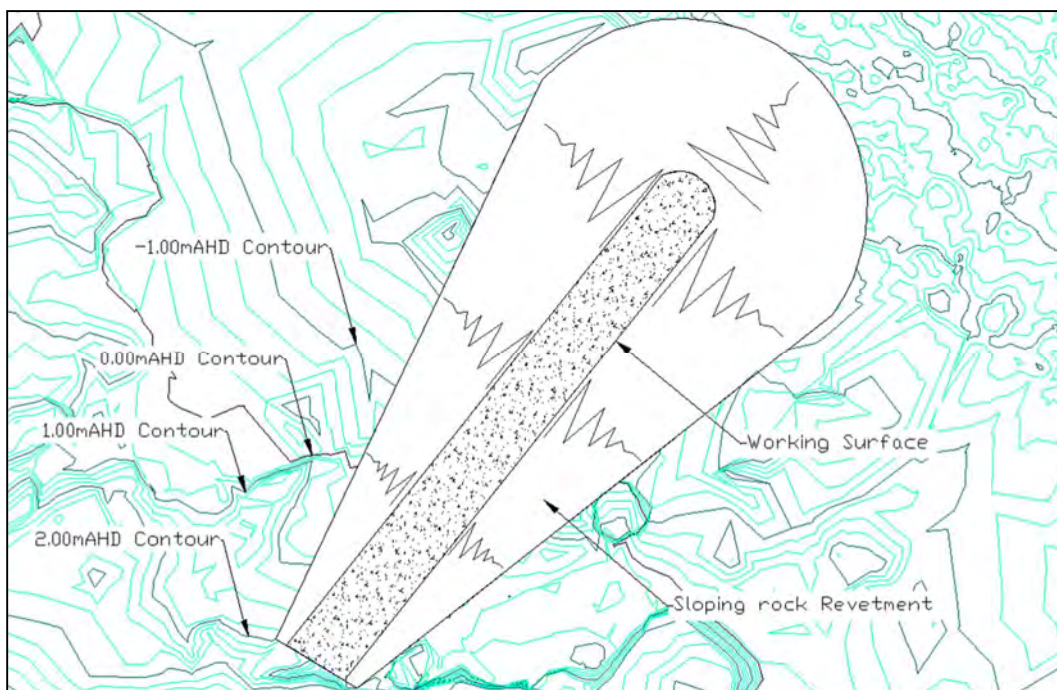


Figure 5 Indicative plan layout of the temporary rockfill platform

Stage 2 – Drill and blast

Once the platform is completed, the drill rig will use the platform as a working surface and drill the blast holes required, starting from the seaward end and retreating landwards.

Blast management requirements are outlined in Sections 5.15.2, 5.15.3, 5.15.4.

5.15.2 General blast management

The following blast characteristics and management shall be adhered to when blasting:

- ▶ The charge weight per delay shall not exceed 11 kg;
- ▶ The smallest practical charge weight shall be used;
- ▶ A minimum of an 8 millisecond (ms) firing window shall be used between any consecutive charge with no more than 11 kg of explosive detonated within any 8 ms firing window;
- ▶ A zero flyrock policy shall be implemented for all blasting;
- ▶ To ensure minimisation of flyrock, all blast holes shall have a Scale Depth of Burial greater than $1.4 \text{ mkg}^{1/3}$;

- ▶ Blasting within the intertidal and subtidal zones shall only be undertaken within the confines of the temporary rockfill platform; and
- ▶ Blasting below the low water mark shall be undertaken over a period of up to two days (weather dependant).

5.15.3 Marine blasting management

Cetacean, pinniped and penguin exclusion zones

At least one week prior to commencement of the temporary platform construction, cetacean and pinniped and penguin exclusion zones shall be established by deploying a series of marker buoys at 400 m (for pinnipeds and penguins), one km (for cetaceans) and two km (as an observation reference zone) from the intake channel as shown in **Figure 3**. These exclusion/observation zones are relevant for all blasting that is undertaken within the intertidal and subtidal zone. Delimitating three zones will assist the MMO³ in assessing the proximity of marine fauna (e.g. cetaceans, pinnipeds and penguins). Approval to install the buoys shall be obtained from the Department of Transport under the *Marine Navigational Aids Act 1973*.

From a minimum of 60 minutes prior to blasting, an MMO will commence visual observations (using range finding binoculars) for marine mammals within the two km observation zone, from either the headland at Cape Riche or a survey vessel positioned within 500 m of the blast site.

Blasting shall only proceed when the MMO advises that:

- ▶ There are no cetaceans (whales or dolphins) within the one km exclusion zone (or not less than 30 minutes have passed since the last sighting);
- ▶ There are no cetaceans within the two km observation zone deemed likely to enter the one km exclusion zone;
- ▶ There are no pinnipeds or penguins within the 400 m exclusion zone (or not less than 30 minutes have passed since the last sighting); and
- ▶ There are no pinnipeds or penguins outside of the 400m exclusion zone deemed likely to enter.

Blasting activities

Blasting shall only be undertaken between the hours of 10:00 am to 2:00 pm, as outside of these hours is considered the most active time for the fairy penguin colony located on Cheyne Island.

It is anticipated that only one blasting event will be required, however if additional blasting is required, the MMO shall check the exclusion zones for injured or dead marine fauna following each blast and prior to the next. Surfaced fish, killed within 100 m of the blast site, shall be removed following each blast to reduce the attraction of scavenging fish and birds⁴.

Should marine fauna (e.g. cetaceans, pinnipeds and penguins) be observed by the MMO within the exclusion zones between successive blasts, the blasting operation shall be stopped. Blasting shall only re-commence when the MMO advises that there are no marine mammals within the relevant exclusion zones (or not less than 30 minutes have passed since the last sighting).

³ A marine mammal observer means a person qualified and experienced in identifying marine fauna, estimating distances and interpreting fauna behaviour.

⁴ There are currently no practicable measures that can be implemented to reduce fish mortality. As such no other mitigation measure could be proposed to reduce fish mortalities.

Blasting shall not take place in poor visibility (i.e. should the MMO not able to clearly view the one km, two km and beach exclusion zones).

The blasting event itself shall be conducted using the smallest practical charge weight for both environmental and safety purposes, as determined by the blasting contractor.

Blasting operation vessels

A maximum speed limit of four knots shall be observed with the 400 m, one km and two km exclusion zones.

Marine fauna familiarisation training shall be provided to crew members of the blasting operation vessels. This will ensure that crew members are aware and understand the risk that the operation poses to marine fauna and what mitigation measures are to be adhered to.

Blasting operation vessels are not to deliberately block the direction of travel of any wildlife, or to deliberately approach wildlife (unless instructed by MMO and/or authority).

A distance of at least 150 m from cetaceans and 50 m from pinnipeds and penguins is to be maintained at all other times.

Blasting operation vessels are not stop or change direction to avoid any wildlife to the risk of the vessels and/or its crew.

Other marine fauna

Visible fish mortalities (if any) from within 100 m of the blast site shall be removed immediately to minimise attraction of scavengers and birds to the site. Any fish mortalities shall be reported to DEC, OEPA and the Department of Fisheries.

5.15.4 Terrestrial blasting management

Terrestrial blasting operation will be undertaken to ensure that the level of noise and vibration are consistent with the *Environmental Protection (Noise) Regulations 1997*.

Blast mats are to be used to contain fly rock and prevent it from entering the water and/or injuring wildlife.

Table 16 Blast Management

CEMP - 15		Blasting
Responsibilities		Implementation – Blasting Contractor
		Compliance – Site Environmental Coordinator
Objectives		
<ul style="list-style-type: none"> ▶ To minimise and manage impacts to marine and terrestrial fauna, local infrastructure, water quality. 		
Management		
<ul style="list-style-type: none"> ▶ All blasting within the intertidal and subtidal zones shall be undertaken within (or below) the footprint of the temporary rockfill platform; ▶ A vessel based marine mammal observer (MMO) shall observe for marine mammals within the two km radius observation zone when blasting is required within the intertidal and subtidal zone; ▶ Marine fauna familiarisation training shall be provided to crew members or blasting operation vessels; ▶ If a cetacean is observed within a one km radius of the blast area, blasting shall cease. Blasting will only resume when all cetaceans are outside a one km exclusion zone radius, from the blast area, or no less than 30 minutes have passed since the last sighting; ▶ If a cetacean is observed within a two km radius, blasting will be suspended until it is clear that the cetacean is not moving towards the one km exclusion zone; ▶ If a pinniped or penguin is observed within the 400 m exclusion zone, blasting shall cease. Blasting will only resume when all pinnipeds and penguins are outside a 400 m exclusion zone radius, from the blast area, or no less than 30 minutes have passed since the last sighting; ▶ If a pinniped or penguin outside of the 400m exclusion zone is deemed likely to enter the zone, blasting shall cease until it is clear that the pinniped or penguin is not moving towards the zone; ▶ Blasting shall only occur between the daylight hours of 10:00 am and 2:00 pm; ▶ The smallest practical charge weight shall be used; ▶ The charge weight per delay shall not exceed 11 kg; ▶ A minimum of an 8 ms firing window shall be used between any consecutive charge with no more than 11 kg of explosive detonated within any 8ms firing window; ▶ A zero flyrock policy shall be adopted for all blasting; ▶ Visible fish mortalities (if any) from within 100 m of the blast site shall be removed immediately following the blast; ▶ Fish mortalities (if any) shall be reported to DEC, OEPA and the Department of Fisheries; and ▶ Maximum vessel speed of 4 knots shall be adhered to. 		
Performance Indicators		
<ul style="list-style-type: none"> ▶ No impacts to marine mammals, terrestrial fauna or local infrastructure. 		
Monitoring		
<ul style="list-style-type: none"> ▶ The blast shall be monitored for water borne concussion at the closest sensitive receptors, which are likely to be the NZ fur seals location approximately 500 m from the site; and ▶ The marine and shoreline marine mammal exclusion zones shall be monitoring by a MMO. 		

CEMP - 15		Blasting
Contingency		
Trigger	Action	
Non-compliance with management measures detailed above, as a direct result of construction staff/sub-contractors not understanding the outlined requirements.	<ol style="list-style-type: none"> 1. Investigate cause; 2. Implement contingency actions which may include: <ul style="list-style-type: none"> – Review of management measures and implementation of improvements; – Improvement of training and education for all personnel; – Implementation of increased protective measures, as necessary; and 3. Monitor the success of actions taken. 	
Marine mammal, penguin or terrestrial fauna injured in blasting event.	<ol style="list-style-type: none"> 1. All subsequent blasting events to be halted until the cause of the injury can be determined and mitigated; 2. Advise DEC and OEPA of the incident and arrange veterinary care; and 3. Determine next steps in consultation with DEC. No further blasting to be undertaken until appropriate safe guards are in place and DEC provides approval. 	

6. Monitoring

Table 17 outlines the monitoring requirements for the construction of the Project.

Table 17 Summary of Monitoring to be implemented

Factor	Monitoring	Frequency
Flora and Native Vegetation	Actual clearing area vs. approved clearing area.	Weekly.
Weed and Pathogen	Baseline dieback survey.	Once prior to construction.
Terrestrial Fauna	Inspections for trapped fauna in open trenches and pits prior to commencement of works and within two hours of sunrise and pre-sunset.	Daily during trenching.
Marine Water Quality	Turbidity monitoring during seawater intake channel construction.	Daily during seawater intake construction.
Marine Fauna	Marine mammal observations within exclusion zones.	Full time during blasting within the intertidal and subtidal zones.
Noise	Vehicle, plant and machinery inspections (pre-start).	Daily.
Various	Routine site environmental inspections to include: <ul style="list-style-type: none"> ▶ Integrity of flagging/fencing around priority flora; ▶ Weed infestation; ▶ Integrity and efficacy of sediment control measures (particularly during/after rain events); ▶ Actual vs. approved construction footprint; ▶ Dust emissions and control; ▶ Identification of erosion problem areas; and ▶ Waste segregation and appropriate disposal. 	Weekly and opportunistic.
Blasting	Closest sensitive receptors to be monitored for airblast overpressure, blast vibration and water borne concussion.	During blasting

7. Reporting and Response

7.1 Annual Environmental Reporting

Annual Environmental Reporting provides progress on environmental management and monitoring results. Each Annual Environmental Report is to produce systematic, comprehensive and informative results of environmental monitoring and the construction activities of the Project as a whole.

7.2 Performance Reporting

Regular performance reports will be provided to the Construction Manager by the Site Environmental Coordinator in relation to compliance with the CEMP. These performance reports will include:

- ▶ Results from any internal and/or external audits, including any environmental management compliance and monitoring results;
- ▶ Monthly environmental compliance reports summarising performance against indicators, monitoring results, any incidents occurring within the period, including comments on response procedures and remedial actions; and
- ▶ Compliance and performance reporting to the OEPA will be undertaken in accordance with applicable and relevant legislative requirements, including any requirements of the Ministerial Statement.

7.3 Environmental Incidents

Environmental incidents will be reported and investigated promptly, enabling effective actions to be implemented without delay. Significant environmental incidents are defined as events that cause or could potentially cause harm to the environment, as defined in Section 3A (2) of the EP Act, with the level of significance assigned according to the definitions provided in **Table 18**.

The Construction Manager and/or Site Environmental Coordinator shall conduct suitable response, notification and investigation of causes in the event of an environmental incident.

Details of all incidents shall be entered into a report register to facilitate the overall reporting and tracking of project incident trends and performance.

Table 18 Environmental incident classification

Level	Nature of incident
3	Minor non-adherence to procedure, and/or a negligible environmental impact
2	Moderate breach of procedure and/or an environmental impact that requires management/mitigation to be rectified.
1	(Serious incident) Extreme breach of procedure and/or environmental impact that could lead to a breach of environmental approval conditions.

The Site Environmental Coordinator shall make himself/herself, or an appropriate representative, contactable outside of their usual working hours and ensure that incident report summaries are carried

out within 24 hours of an incident. Incident details shall be collected promptly from the scene of the incident and personnel involved to limit the potential for information to be lost or forgotten.

The Site Environmental Coordinator will also notify the appropriate authorities of the nature of the incident. These authorities may include, but not limited to:

- ▶ Office of the Environmental Protection Authority;
- ▶ Department of Environment and Conservation;
- ▶ Department of Fisheries;
- ▶ Department of Water;
- ▶ Department of Indigenous Affairs;
- ▶ Fire and Emergency Services Authority; and
- ▶ City of Albany.

Based on preliminary information, an Investigation Team shall be selected by the Construction Manager and Site Environmental Coordinator. The Investigation Team will seek expert advice if required to complete the investigation within a satisfactory timeframe and taking into consideration the level of severity of the incident as defined by **Table 18**.

Significant environmental incidents shall be communicated to site personnel during the regular toolbox meetings and any specially organised forums. Incident trends will be monitored and evaluated, with remedial action undertaken and, where appropriate, standard works procedures revised and publicised.

The Incident Investigation Report will clearly identify the responsibility and deadlines for approved closeout actions.

7.4 Complaint Handling

A project complaint and response system will be implemented during the construction phase to establish and maintain a system of records, documenting all information of complaint handling. For each complaint received, the following information will be recorded:

- ▶ Date and time of complaint;
- ▶ Name of staff member who received the complaint;
- ▶ Method by which the complaint was made;
- ▶ Nature of complaint;
- ▶ Action to be undertaken in relation to the complaint, including staff responsible in taking that action; and
- ▶ Potential for environmental incident.

Following investigation of the complaint, the complaints register will be updated to include:

- ▶ A summary of the investigate undertaken;
- ▶ The action undertaken relevant to the complaint;
- ▶ Weather conditions at the time and place of the event, if relevant to the complaint, and any construction related activities;

- ▶ If no action was undertaken, the reasons for this decision;
- ▶ Time and date of follow-up contact and resolution with the complainant;
- ▶ Nature of and outcomes from follow-up contact with the complainant; and
- ▶ Environmental incident report number, if relevant.

If the complaint investigation determines that the nature of the complaint justifies its inclusion as an Environmental Incident, it will be acted on without delay in line with the procedure detailed in Section 7.3.

7.5 Auditing

Auditing of the management measures outlined in this management plan shall be undertaken as follows:

- ▶ Regular site CEMP compliance audits;
- ▶ Audits of Contractor environmental management performance; and
- ▶ Daily and weekly work area inspections.

Persons responsible for environmental auditing will be suitably qualified.

Where audit findings show environmental management actions not being effective, the audit may recommend changes to procedures.

8. References

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft						
0	O Glade-Wright	D Farrar		D Horn		19/10/11
1	O Glade-Wright	D Horn		D Horn		08/11/11
2	O Glade-Wright	D Farrar		D Farrar		21/12/11