WALLBRIDGE & GILBERT
Consulting Engineers

WAVE RIDER ENERGY

BIRD MONITORING PLAN

Prepared for

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1 INTRODUCTION

1.1 Background

Renewable energy is an essential part of Australia's low emissions energy mix and is important to Australia's energy security. It plays a strong role in reducing Australia's greenhouse gas emissions and accordingly, the Australian government is supportive of renewable energy industry development.

In line with Australia's need for renewable energy sources, Wave Rider Energy has proposed to locate a Wave Rider pilot plant in the high energy waters off Locks Well Beach, South Australia for up to 18 months. The greatest advantage is that the Wave Rider does not produce any greenhouse gases, harmful wastes or pollutants when converting wave energy into electrical energy. Therefore during operations, converting wave energy is virtually non-polluting, with significant benefits in the form of mitigating climate changes, securing energy supply and decoupling economic growth from resource use.

The Wave Rider project was referred to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) for assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). After providing Preliminary Documentation (refer to 2009/4859), the project was approved with conditions.

1.2 Conditions of project approval

The Wave Rider pilot project was approval subject to the following conditions:

- A towing and decommissioning plan be submitted and approved prior to the action occurring
- A maintenance plan be submitted and approved prior to the action occurring
- A monitoring and management plan for Southern Right Whales, Pygmy Right Whales and Australian Sea lions be submitted and approved prior to the action occurring
- A monitoring and management plan for EPBC listed birds be submitted and approved prior to the action occurring
- A compliance report is submitted annually
- An independent auditors report is submitted.

This plan is for monitoring and managing EPBC birds.

1.3 Objective of this Monitoring Plan

The overall objective of this Monitoring Plan is defined as:

- To provide a comprehensive and robust program of baseline and commissioning monitoring of EPBC-listed birds to confirm quantitatively that there are no adverse effects to the populations resulting from the Wave Rider.

1.4 Project Description

The pilot Wave Rider will be of experimental size and will have the following specifications:

- Length: 111 m
- Width: 13 m
- Height: 4 m
- Material: Carbon Steel
- Truss weight: 130 tonnes
- Pontoon weight: 60 tonnes
- Total weight, including axles, generators and buoys: 290 tonnes.

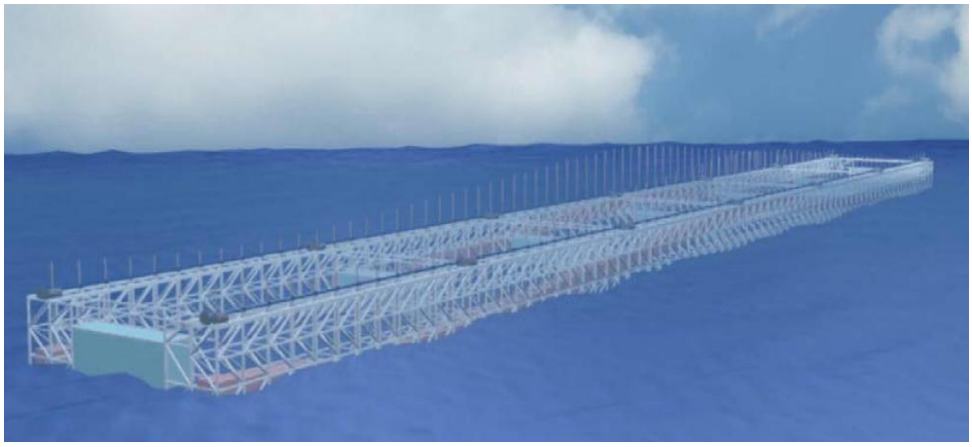

Figure 1– Modelled view of the Wave Rider

The Wave Rider will be moored to the seabed using an Admiralty-type single point mooring.

The pilot plant is designed to float with about one-third above the surface and two-thirds of the device being underwater. To secure the Wave Rider infrastructure and maintain public safety, a seafloor area of 64 ha is required.

The Wave Rider uses a series of buoys to convert the vertical movement of the waves into mechanical energy. As waves pass the buoys move up and down and this movement causes rotation of an axle that is connected via a chain, which in turn drives a generator that converts the mechanical energy into electrical energy. The axle and generator are above the water.

The Wave Rider will operate mechanically meaning that no fluids are involved, unlike other competitor's systems which make use of hydraulics. As such there will not be any danger of fluids leaking into the water. The Wave Rider will receive an environmentally friendly antifouling surface treatment to protect it from corrosion and barnacles.

At the completion of the pilot, the project area will be restored to its natural state, as stipulated within the Department of Planning Transport and Infrastructure (DPTI) seabed lease conditions.

1.5 Location

The Wave Rider pilot plant will be towed from Port Adelaide to its ultimate destination at Locks Well Beach (the centre of the site is given as coordinates 135° 0.517'E, 33° 44.505'S). Suitable mooring conditions (e.g. thick sandy sediment) exist in a 2 km^2 area from the centre of the site and extend 3 km northwest towards Elliston (Geosonics Australia 2010). The Wave Rider will be moored approximately 800 m from shore at a depth of 28 m.

The Locks Well Beach site is located within a continuous line of high (40-80 m) and sheer cliffs, broken only by shorter sections of sandy beaches.

Locks Well Beach consists mainly of bare sand (Bryars 2003). Geophysical site surveys conducted 2 km^2 from the centre of the proposed location showed large areas of unconsolidated sand with thicknesses greater than 3 m (Geosonics Australia 2010).

Small isolated stands of seagrasses occur in the area and patches of heavy limestone or calcarenite reef may also occur (Bryars 2003).

1.6 Project Phases

The project can be described in three activity phases:

- Towing: towing the Wave Rider to Locks Well Beach (approximately 2-3 days depending on weather conditions; all moving parts will be fixed during the towing phase)
- Mooring and decommissioning: mooring the Wave Rider at Locks Well Beach involves minor work to allow the Wave Rider to operate as the moving parts will be

fixed during the towing phase, decommissioning will see the Wave Rider detached from moorings, towed into the sheltered bay to fix all moving parts prior to towing back to Port Adelaide

- Operation: monitoring the efficiency of the Wave Rider and maintenance.

Importantly, the project can be considered as a large scale experiment. Whilst proven to work under laboratory conditions, the efficiency at using this technology to generate clean energy has not been tested in the field.

2 SPECIES OF INTEREST

In accordance with the EPBC Act, the following species of interest were identified:

Species	Status	Notes
Gibsons Albatross	Migratory ,marine, vulnerable	No breeding in Australia; only Australian record from Wollongong; principally feed in Tasman Sea; 40,000 individuals
Campbell Albatross	Migratory, marine, vulnerable	No breeding in Australia; estimated 26,000 breeding pairs, with a greater population size
Shy Albatross	Migratory, marine, vulnerable	No breeding in South Australia; rarely seen beyond 600 km from breeding colony; 55,000-60,000 individuals
Little penguin	Locally abundant, protected	Abundant and secure in SA (Page & Goldsworthy 2009)
Short-tailed shearwater	Locally abundant, protected	23 million individuals; adults spend 17% time foraging in coastal waters if rearing chicks; breeds Oct-May; not threatened (Page & Goldsworthy 2009)
Flesh-footed shearwater	Locally abundant, protected	Population size and islands where adults breed is not well documented; SA colonies in summer, leave in May, and return in Aug (Page & Goldsworthy 2009)
White-faced storm petrel	Locally abundant, protected	300,000 individuals breed in SA at offshore islands between Oct and Feb (Page & Goldsworthy 2009)
Southern giant petrel	Endangered, migratory, marine	Unknown population status because of inconsistent population censuses; no known breeding near Locks Well
Northern giant petrel	Migratory, marine, vulnerable	Approximately 10,700 breeding pairs globally; breeds outside of Australia
Tern species	Locally abundant, protected	Offshore breeding in summer; fairy terns vulnerable under IUCN, others not threatened.
Silver gull	Locally abundant, protected	Variable breeding, no species listed as threatened
Cormorant species	Locally abundant, protected	Variable breeding, typically in Spring

3 RISK ASSESSMENT

3.1 Risk Assessment Methodology

Environmental risk assessment is a process for evaluating the chance that a project will cause harm to the environment and developing measures to manage and mitigate this harm. Events and entities associated with a project that have the potential to cause harm to the environment are referred to as aspects (hazards). Risk is characterised by the likelihood that an aspect will cause environmental harm and the consequences or severity of the environmental effect, taking into account assumptions and uncertainties.

Risk assessment differs from an impact assessment in that it provides a direct link between exposure to hazards and the effects of environmental harm, enabling the prediction and comparison of risk associated with scenarios.

Using the risk assessment approach developed by Campbell and Gallagher (2007), likelihood (Table 1) and consequence (Table 2) were combined using a risk matrix to qualitatively characterise risk as negligible, low, moderate, high or extreme (Table 3).

Table 1 – Measures of likelihood (adapted from Campbell and Gallagher 2007)

Level	Description
Rare	Event will only occur in exceptional circumstances
Unlikely	Event could occur in most circumstances
Possible	Event could occur
Likely	Even will probably occur in most circumstances
Almost certain	Event is expected to occur here in most circumstances

Table 2 – Measures of consequence (adapted from Campbell and Gallagher 2007)

Level	Description
Insignificant	No individual deaths, no significant effects on prey availability, foraging and breeding habitat, or changes in behaviour.
Minor	Incidental deaths of individuals, not to levels that would cause a decline in a subpopulation that is not recoverable in years.
Moderate	Persistent deaths of individuals and declines in some subpopulations. May effect on any of: prey availability, foraging habitat, breeding habitat and behaviour. In absence of additional effect, recovery occurs in years or decades.
Major	Significant loss of individuals declines in subpopulations and localised extinctions likely. Significant effects on prey availability and/or foraging and/or breeding habitat. In the absence of additional effects, recovery rates in decades or centuries.
Catastrophic	Localised extinctions, recovery of subpopulations not expected, loss of further subpopulations likely. Severe effects on prey availability and/or foraging and/or breeding habitat. In the absence of additional effects, recovery is not expected.

Table 3 - Risk matrix (adapted from Campbell and Gallagher 2007)

	Consequence				
Likelihood	Insignificant	Minor	Moderate	Major	Severe
Rare	Negligible	Low	Low	Moderate	Moderate
Unlikely	Negligible	Low	Moderate	Moderate	Moderate
Possible	Negligible	Low	High	High	Extreme
Occasional	Negligible	Moderate	High	Extreme	Extreme
Likely	Negligible	Moderate	Extreme	Extreme	Extreme

A risk assessment workshop was undertaken by Associate Professor Simon Goldsworthy, the Leader of the Threatened, Endangered and Protected Species Subprogram at the South Australian Research and Development Institute (Aquatic Sciences). A/Professor Goldsworthy brings over 20 years experience in studying seabirds (and pinnipeds). Wallbridge & Gilbert and Wave Rider Energy personnel also assessed the potential interactions between the project and the marine environment for the following phases:

- Towing
- Mooring and Decommissioning

- Operations.

Mitigation and management measures have been suggested to mitigate identified risks where possible.

3.2 Injury and death of seabirds from collisions during towing

Collision with protrusions above and below the water and with tow lines causing seabird injury and death were considered effects of the towing phase of the project and are presented in Table 4 along with the level of risk identified for each effect.

Table 4 – Risk assessment of the potential for seabird and marine mammal injury and death from collisions during towing

Effect	Likelihood	Consequence	Risk
Injury and death from collision with protrusions above water	Possible	Minor	Low
Injury and death from collision with protrusions below water	Rare	Minor	Low
Injury and death from collision with tow lines	Possible	Minor	Low

The likelihood of seabirds colliding with parts of the Wave Rider or colliding with tow lines during towing is considered possible, however, because the towing phase is expected to take five days the severity of these consequences is regarded as minor and would not cause a decline in a subpopulation that could not be recovered.

To reduce seabird collisions devices that alert birds (audibly and visually) to the presence of obstructions such as bird flight diverters, tori lines, bright coloured paint, flags and lights will be incorporated on the Wave Rider. Towing the Wave Rider at a time when fewer birds are in the region (May to September) could further minimise the incidence of seabird collisions. The incidence of seabird and marine mammal collisions during towing could be monitored during daylight hours of the towing phase.

3.3 Injury and death of seabirds from collisions during commissioning/ decommissioning

Injury and death of seabirds from collision with protrusions above the water was identified as a potential effect during mooring and decommissioning. The associated risk for seabirds is considered to be low to moderate depending on the species which are likely to be there:

- For most seabirds collisions are expected to occur occasionally and be of minor severity: moderate risk
- For tern species and Silver Gull, collisions are considered unlikely to occur and be of minor severity if they do: low risk

As during towing, some sea birds could occasionally collide with protrusions above the surface, but these incidents would not cause a decline in a subpopulation that could not be recovered.

To reduce seabird collisions devices that alert birds (audibly and visually) to the presence of obstructions such as bird flight diverters, bright coloured paint, flags and lights need to be incorporated on the Wave Rider.

3.4 Injury and death of seabirds from collisions during operations

Collision with protrusions above and below the water causing seabird injury and death were considered effects for the operation phase of the project and are presented in Table 5 along with the level of risk identified for each effect.

Table 5 – Risk assessment of the potential for seabird injury and death from collisions during operation

Effect	Likelihood	Consequence	Risk
Injury and death from collision with protrusions above water	Unlikely to Occasional	Minor	Low to Moderate
Injury and death from collision with protrusions below water	Rare	Minor	Low
Injury and death from entrapment in moving parts below the water	Rare to Occasional	Minor	Low

Entrapment in the moving parts below water was considered more likely to occur for deep diving birds than for other seabirds.

To further reduce the low-moderate risk of seabird collisions, devices that alert birds (audibly and visually) to the presence of obstructions such as bird flight diverters, bright coloured paint, flags and lights need to be incorporated on the Wave Rider.

The presence and abundance of seabirds during operation could be monitored during daylight hours.

3.5 Seabird displacement from feeding (noise, shading, physical)

Risk associated with the displacement from feeding for seabirds caused by noise, shading or the presence of the physical structure are considered to be negligible risk (occasional likelihood, insignificant consequence).

Seabirds will most likely be displaced from part of their feeding grounds during the operation phase, however, because the affected area is relatively small compared to their feeding grounds, the severity of the effect of displacement from feeding due to noise is considered minor.

3.6 Injury and death from collisions with navigation lights

The Wave Rider will be fitted with navigation lights which seabirds may collide with.

For seabirds the risk associated with potential collisions with navigation lights is considered negligible risk for Tern species and Silver gull (unlikely likelihood, insignificant consequence) but moderate risk for other seabirds which are more likely to rest there (occasional likelihood, minor consequence).

To reduce seabird collisions devices that alert birds (audibly and visually) to the presence of obstructions such as bird flight diverters, bright coloured paint, and flags need to be incorporated on the Wave Rider.

3.7 Injury and death from entanglement in Wave Rider above water

Seabirds may rest on the Wave Rider and injury and death from entanglement is considered a potential effect with low risk (unlikely to possible likelihood, minor consequence). The likelihood of seabirds of being effected is species dependent and based on the species more likely to rest on the Wave Rider.

The magnitude of the ecological effect on seabirds is considered minor given the population size potentially affected and that this effect would not cause a decline in a subpopulation that could not be recovered.

To reduce risk of injury to birds, housing could be used to cover the chain on the buoy, the sprocket on the axle or the axle itself. The incidence of physical injury to seabirds from the Wave Rider throughout the pilot should be monitored to best understand the implications.

3.8 Injury to birds from accumulation of rubbish

It is possible that the truss-like structure of the Wave Rider may accumulate rubbish and other flotsam and jetsam such as plastic bags or fishing gear. The effects of this type of rubbish can be life threatening to birds if ingested and is considered a hazard.

Injury to birds from the accumulation of rubbish is moderate risk (occasional likelihood, minor consequence).

The incidence of litter accumulation in the truss structure throughout the pilot should be monitored to best understand the implications. A maintenance plan has been established to ensure rubbish is managed appropriately as this will negatively affect the efficiency of the Wave Rider.

3.9 Seabird displacement from feeding from noise during commissioning/ decommissioning

The displacement of seabirds from feeding due to noise during the mooring and decommissioning phases was considered a low risk (possible likelihood, minor consequence).

Seabirds may be displaced from part of their feeding grounds during the mooring and decommissioning phases, however, because the affected area is relatively small compared to their feeding grounds and these phases are relatively brief, the severity of the effect of displacement from feeding due to noise is considered minor.

4 MONITORING PLAN

The Wave Rider Energy development is restricted to the shallow coastal waters adjacent to Locks Well Beach at a maximum depth of 28 m. Possible interacting activities to marine birds associated with the development were determined in a risk assessment (Section 3). Whilst ranked as a low risk, the activity that may interact with birds includes physical collision with the structure during:

- Towing phase
- Operational phase.

Other risks, such as the structure interacting with food resources, breeding, and chemical pollution were ranked as negligible. The risk assessment and proposed monitoring and management measures developed in collaboration with specialist scientists from South Australian Research and Development Institute (Aquatic Sciences) (Page & Goldsworthy 2009).

The date of towing, and accordingly the commencement of this action is dependent upon final Commonwealth approvals.

4.1 Collision during the towing phase

Although the risk assessment identified that the impact to birds during the towing phases was low, audible and visible scaring devices will be fitted during the tow period. This has been recommended by the independent scientific report provided by Page & Goldsworthy (2009) to help further ameliorate any risks.

Audible devices will minimise the risk of strikes during night towing. Examples include bird flight diverters, tori lines, bright coloured paint and flags on protrusions above water. Whilst efforts to further reduce the low risk that towing presents to EPBC-listed bird have been made, interactions during the tow period to will be recorded by a tow boat-based qualified biologist.

Monitoring events will be conducted each day during the towing phase, and will capture dawn, midday and dusk periods. Standard techniques for at-sea surveys (e.g. Van Franeker 1994) will be used. This includes using five 10-min time blocks to record birds within a 300 m wide transect, in a 90 degree forward quadrant to one side of the bow. All birds sitting in, or flying over the transect band will be included in the counts. Binoculars may be used for species identification.

Three time periods during each tow day have been selected for monitoring birds along the journey, with species counts and abundance to be recorded. Approximate distance

to the Wave Rider, any near misses, collisions, injuries or deaths will be recorded and reported. Other data to be collected during the tow period will be qualitative. If there are deviations in flight paths from individuals/flocks close to the Wave Rider, this will be recorded, as will any 'ship attraction' or use of the Wave Rider by a species. General tow position during survey times will be recorded, as well as weather and ocean conditions.

Interactions between animals that are not listed as matters of National Environmental Significance and the towing operations will be recorded and reported to DSEWPC and EPA South Australia.

Similarly, during a period of adjustment (if required), any interactions with EPBC-listed and non EPBC-listed species will be monitored and recorded. All data will be made available to DSEWPC and EPA South Australia.

Aspect	Monitoring	Frequency
Towing	5 x 10min blocks at dawn	Each day of towing
	5 x 10min blocks at midday	
	5 x 10min blocks at dusk	
Adjustment (if required)	5 x 10min blocks at dawn	Each day of adjustment
	5 x 10min blocks at midday	
	5 x 10min blocks at dusk	

The date of towing will be dependent upon approval timelines. The Wave Rider is ready to be towed, and a tow plan has been submitted.

4.2 Collision during the Operational Phase

The risk assessment workshop rated collision between birds and the Wave Rider as a low to moderate risk. It is unlikely to occur, but if it does, will have minor consequences. Monitoring of birds prior to the action taking place will occur, and the Wave Rider will be fitted with bird scaring devices to mitigate this risk.

A point count survey of EPBC-listed species (see Table 1) will be undertaken from a repeatable cliff site at the general location of the proposed Wave Rider site prior to mooring, and at a control site. All avian surveys will be undertaken by a qualified ecologist and record species abundance, flying height, and general behaviour (including foraging success). Data will be recorded quantitatively and qualitatively. The surveys will be conducted at dawn, midday and dusk for a minimum of one hour. Non-EPBC listed birds that are present will also be recorded. Surveys will be undertaken from a landward

location using binoculars so as to minimise bird disturbance. Any bird species that appear to be 'ship attracted' will be recorded. Birds are deemed ship attracted if they change their flight direction to inspect the Wave Rider.

A shoreline count of dead seabirds will also be conducted adjacent to the project site and at a control site along a transect of no less than 100 m (depending on the coastal morphology at the site).

During the first week of operations, point count bird abundance, flying height and behaviour will be recorded daily at the Wave Rider location and at a control site at dawn, midday and dusk. Any EPBC-listed birds that are seen to interact with the pilot Wave Rider will be recorded. Any changes in abundance or behaviour will be compared to baseline data and control site data.

Foraging behaviour and foraging success rates will be compared at each site.

Should there be no statistical difference between sites and surveys, and no changes in behaviour or any injury, monitoring will be reduced to one survey (encompassing dawn, midday and dusk) each week for the first month of operations, and then monthly for the duration of pilot period.

In the event of a statistically different reduction in abundance or changes to behaviour and/or injury during the first week of operations, daily monitoring will continue for a second week, and data analysed. Should the data indicate a negative interaction between EPBC-listed birds and the pilot Wave Rider, adaptive measures such as fitting more bird scaring devices will be undertaken. If this occurs, surveys will recommence on a daily basis for a week. Should negative interactions continue, Wave Rider Energy will discuss modification of operations with DSEWPC.

If at any point during the operations phase there is an incident of negative interaction or injury to seabirds, monitoring frequency will again intensify with the monitoring program recommencing from the beginning (as during the first week of operation). Further mitigation responses will be to place more bird scaring devices along the length of the Wave Rider such that they are every 10 m along the exposed lengths.

Shoreline counts of dead seabirds will be conducted along transects of no less than 100 m (depending on factors such as coastal morphology). The transects will be used at both the deployment site and at a control site.

Unacceptable levels of impacts to bird populations (threshold limits) have been identified in Section 5.

Throughout the surveys and monitoring periods, any incidence or evidence of EPBC-listed bird strike, injury or mortality will be reported within 24 hours of occurrence. Presence of non-EPBC birds will be recorded during all surveys.

Aspect	Method	Monitoring	Frequency
Baseline	Point count abundance and behaviour (including foraging) survey Control and Project Site	1 hour at dawn	Once
		1 hour at midday	
		1 hour at dusk	
	Shoreline inspection Control and Project Site	Low tide	Once
Operations	Point count abundance and behaviour (including foraging) survey Control and Project Site	1 hour at dawn	Daily, Week 1 and 2
		1 hour at midday	
		1 hour at dusk	
		1 hour at dawn	Monthly
		1 hour at midday	
		1 hour at dusk	
	Shoreline inspection Control and Project Site	Low tide	Daily, Week 1 and 2
			Monthly

*If differences / interactions are recorded between the baseline and first week of the operations phase, a full week of monitoring activities will be repeated. If changes continue to be recorded, adaptive measures have been proposed.

All monitoring records, raw data files, data analyses and a summary report will be provided to EPA SA and DSEWPC.

5 LIMITS OF CHANGE

The majority of listed birds breed offshore or away from Locks Well Beach. As such, there is little possibility for the Wave Rider to interfere with breeding success and rearing-related foraging abilities. Accordingly, no threshold of change has been set in regards to these life history stages.

It is expected that the Wave Rider will have the most interaction with flight behaviour.

During towing, Wave Rider Energy has committed to fixing audible and visual bird scaring devices on the Wave Rider for the expected five day towing period as used in the tuna long-lining industry. Further, qualified bird monitoring personnel will be stationed on the vessel to monitor interactions at dawn, midday and dusk. As this is a pilot exercise, any incidents will be recorded. The towing phase is considered to be brief. Data collected during the tow to site will be used to inform any changes to future towing (e.g. during decommissioning) methodology and communicated with the Department.

Once on site, any deaths attributed to the functioning of the Wave Rider will be recorded. The following thresholds have been designed.

EPBC listing	Common names	Threshold of change
Vulnerable and Endangered bird species	Albatross, Petrels	No interaction with breeding locations therefore no limit of change applied to breeding success. No interaction with feral pest species, human disturbance of nests, loss or competition for nesting habitat; introduction of parasites and disease therefore no limit of change applied to habitat use. Changes to foraging behaviour will be recorded via observer program above. Data and analyses will be reported to DSEWPC. Given the small spatial coverage by the Wave Rider, no limit of change has been applied to foraging success.

		Unacceptable level of impacts: No more than 0.0001% of a population size will be affected by the Wave Rider operations during any one year. Any death(s) attributed to the Wave Rider will be reported to the Department within 24 hours or as reasonably practical.
Locally abundant, marine, migratory species	Shearwaters, penguins, terns, gulls, cormorants	No interaction with feral pest species, human disturbance of nests, loss or competition for nesting habitat; introduction of parasites and disease therefore no limit of change applied to habitat use. Changes to foraging behaviour will be recorded via observer program above. Data and analyses will be reported to DSEWPC. Unacceptable level of impacts: No more than 0.0001% of a population size will be affected by the Wave Rider operations during any one year. Any death(s) attributed to the Wave Rider will be reported to the Department within 24 hours, or as reasonably practical.

6 EMERGENCY RESPONSE

The purpose of environmental performance monitoring is to measure conformance with, and the effectiveness of, established environmental limits, controls, and processes identified.

In the case of the Wave Rider pilot project, it is intended that the trial period for the technology is also the appropriate period to monitor environmental performance such that should the pilot project successfully operate as intended, the full scale Wave Rider can be modified to work more efficiently and sensitively.

Design has already eliminated the potential for hydraulic leaks and incorporated bird scaring devices to mitigate impacts against EPBC-listed avian fauna.

Given the structural nature of the Wave Rider and the wave climate, there is no in-situ 'shutdown' procedure possible because of the risk to personnel safety. Should the incident of bird strike exceed the identified threshold limit, the Wave Rider will be towed from site to the sheltered bay at Elliston. Consideration during this decommissioned period will include seasonal movements and the potential for seasonal closure(s) of the wave energy converter.

Emergency responses in the case of injured birds include:

- Remove the bird from possible sources of danger such as cats, dogs, ants and extreme heat or cold
- Place the bird in a warm protected environment such as a strong, ventilated, cardboard carton
- Make sure that the bird is kept out of the reach of pets and young children.
- Call Bird Care & Conservation Society South Australia, or the RSPCA South Australia as soon as possible for advice.

7 COMPLIANCE AND REPORTING

It is the responsibility of Wave Rider Energy to maintain a record of procedures employed during operations. Such records should be auditable and account for aspects of the operation that relate to legislative approvals and regulations. Additionally, information on the species of interest sighted during the survey may be useful in the planning and assessment of future marine industry activities.

A report on the conduct of the survey, and any bird interactions, should be provided to the Department within two months of survey completion. The report should, at a minimum, contain:

- Location, date and start time of the survey;
- Weather conditions
- Name, qualifications and experience of any Observers (or research scientists) involved in the survey
- Location, times and reasons when observations were hampered by poor visibility or high winds
- Location, time and distance/flight height of birds, including species where possible;
- Physical description of features, flock size where determinable; any species that show ship-attraction behaviour
- Date and time of survey completion.

8 CONCLUSION

As many new and innovative renewable energy developments are proposed to decrease Australia's greenhouse emissions and reliance on traditional energy sources, it is important that robust data are collected to during pilot studies to best inform new developments. This monitoring plan has focused on protected species identified during a Commonwealth assessment against the Environment Protection and Biodiversity Conservation Act 1999. It will assist in understanding interactions and limitations for future commercially-sized Wave Rider energy converters, as well as providing population-scale protection for species during the pilot period.

REFERENCES

Bryars, S (2003) An Inventory of Important Coastal Fishery Habitats in South Australia. Fish Habitat Program,. Primary Industries and Resources South Australia

Campbell ML & Gallagher C (2007) Assessing the relative effects of fishing on the New Zealand marine environment through risk analysis. ICES J. Mar. Sci. 64 (2):256 – 270.

Page B & Goldsworthy SD (2009) Review of potential risks to seals and seabirds from the wave energy plant to be located near Elliston, South Australia. SARDI Publication No F2009/000537-1.

Van Franeker J.A (1994) A comparison of methods for counting seabirds at sea in the Southern Ocean. J. Field Ornithol. 65(1): 96 – 108.