



NEWGEN POWER STATION
KWINANA

MARINE WORKS
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

November 2006

Prepared by



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CONTENTS:

1.	INTRODUCTION	1
1.1	Project Background	1
1.2	Environmental Assessment and Commitments	1
1.3	Objectives and Scope	2
1.4	Roles, Responsibilities and Contact Details	2
1.4.1	General Manager (Generation Operations)	3
1.4.2	Generation Manager	Error! Bookmark not defined.
1.4.3	Construction Manager	Error! Bookmark not defined.
1.4.4	Marine Works Construction Contractor (Smithbridge Australia Pty Ltd)	3
1.4.5	All Staff	3
1.4.6	Other Contractors	4
2.	PROJECT DESCRIPTION	5
2.1	Overview	5
2.2	Temporary Jetty Installation and Removal	5
2.3	Outfall Pipe Installation	6
2.3.1	Installation and Removal of Sheet Piling	7
2.3.2	Excavation within Sheet Piling	7
2.3.3	Placement of Pipe Bedding Material	8
2.3.4	Laying of Pipe Sections	8
2.3.5	Placement of Filter Rock and Scour Protection	8
2.4	Spoil storage and disposal	9
2.5	Hours of operation	9
2.6	Schedule	9
3.	MARINE WATER QUALITY	10
3.1	Element	10
3.2	Current Status	10
3.3	Potential Impacts	10
3.4	Environmental Objectives	11
3.5	Performance Criteria	11
3.6	Implementation	11
3.7	Monitoring	11
3.8	Contingencies	13
3.9	Key Construction Phase Management Actions Table	14
4.	MARINE FAUNA AND FLORA	15
4.1	Element	15
4.2	Current Status	15
4.3	Potential Impacts	15
4.4	Environmental Objectives	15

4.5	Performance Criteria.....	16
4.6	Implementation	16
4.7	Monitoring	16
4.8	Contingencies	16
4.9	Key Construction Phase Management Actions Table	17
5.	SURFACE WATER QUALITY	18
5.1	Element.....	18
5.2	Current Status.....	18
5.3	Potential Impacts	18
5.4	Environmental Objectives	18
5.5	Performance Criteria.....	18
5.6	Implementation	18
5.7	Monitoring	19
5.8	Contingencies	19
5.9	Key Construction Phase Management Actions Table	20
6.	AIR QUALITY	21
6.1	Element.....	21
6.2	Current Status.....	21
6.3	Potential Impacts	21
6.4	Environmental Objectives	21
6.5	Performance Criteria.....	21
6.6	Implementation Strategy.....	22
6.7	Monitoring	22
6.8	Contingencies	22
6.9	Key Construction Phase Management Actions Table	23
7.	NOISE MANAGEMENT	24
7.1	Element.....	24
7.2	Current Status.....	24
7.3	Potential Impacts	24
7.4	Environmental Objectives	24
7.5	Performance Criteria.....	24
7.6	Implementation Strategy.....	24
7.7	Monitoring	25
7.8	Contingencies	25
7.9	Key Construction Phase Management Actions Table	26
8.	EROSION CONTROL	27
8.1	Element.....	27
8.2	Current Status.....	27

8.3	Potential Impacts	27
8.4	Environmental Objectives	27
8.5	Performance Criteria.....	27
8.6	Implementation Strategy.....	28
8.7	Monitoring	28
8.8	Contingencies	28
8.9	Key Construction Phase Management Actions Table	29
9.	TERRESTRIAL FLORA AND FAUNA	30
9.1	Element.....	30
9.2	Current Status.....	30
9.3	Potential Impacts	30
9.4	Environmental Objectives	30
9.5	Performance Criteria.....	30
9.6	Implementation Strategy.....	30
9.7	Monitoring	30
9.8	Contingencies	31
9.9	Key Construction Phase Management Actions Table	31
10.	ENVIRONMENTAL INCIDENT PREVENTION AND REPSONSE	32
10.1	Element.....	32
10.2	Current Status.....	32
10.3	Potential Impacts	32
10.4	Environmental Objectives	32
10.5	Performance Criteria.....	32
10.6	Implementation Strategy.....	32
10.7	Monitoring	32
10.8	Contingencies	33
10.9	Key Construction Phase Management Actions Table	34
11.	STAKEHOLDER CONSULTATION AND NOTIFICATION	35
11.1	Element.....	35
11.2	Current Status.....	35
11.3	Potential Impacts	35
11.4	Environmental Objectives	35
11.5	Performance Criteria.....	35
11.6	Implementation Strategy.....	35
11.7	Monitoring	35
11.8	Contingencies	36
11.9	Key Construction Phase Management Actions Table	37
12.	STAFF INDUCTION	38

12.1	Element.....	38
12.2	Current Status.....	38
12.3	Potential Impacts	38
12.4	Environmental Objectives	38
12.5	Performance Criteria.....	38
12.6	Implementation Strategy.....	38
12.7	Monitoring	38
12.8	Contingencies	38
12.9	Key Construction Phase Management Actions Table	39
13.	WASTE MANAGEMENT	40
13.1	Element.....	40
13.2	Current Status.....	40
13.3	Potential Impacts	40
13.4	Environmental Objectives	40
13.5	Performance Criteria.....	40
13.6	Implementation Strategy.....	40
13.7	Monitoring	41
13.8	Contingencies	41
13.9	Key Construction Phase Management Actions Table	42
14.	CULTURAL HERITAGE	43
14.1	Element.....	43
14.2	Current Status.....	43
14.3	Potential Impacts	43
14.4	Environmental Objectives	43
14.5	Performance Criteria.....	43
14.6	Implementation Strategy.....	43
14.7	Monitoring	43
14.8	Contingencies	43
14.9	Key Construction Phase Management Actions Table	44
15.	TRAFFIC	45
15.1	Element.....	45
15.2	Current Status.....	45
15.3	Potential Impacts	45
15.4	Environmental Objectives	45
15.5	Performance Criteria.....	45
15.6	Implementation Strategy.....	45
15.7	Monitoring	45
15.8	Contingencies	46

15.9	Key Construction Phase Management Actions Table	47
16.	COMPLAINTS	48
17.	AUDITING	48
18.	REVIEW AND REVISION	48
19.	REPORTING	49
19.1	Annual Reports	49
19.2	Record Keeping	49
20.	REFERENCES	50

Tables:

Table 1:	Roles Responsibilities and Contacts	2
Table 2:	Marine Water Quality Key Management Actions	14
Table 3:	Marine Fauna and Flora Quality Key Management Actions	17
Table 4:	Surface Water Quality Key Management Actions	20
Table 5:	Air Quality Key Management Actions	23
Table 6:	Noise Management Key Management Actions	26
Table 7:	Erosion Control Key Management Actions	29
Table 8:	Terrestrial Flora and Fauna Key Management Actions	31
Table 9:	Noise Management Key Management Actions	34
Table 10:	Noise Management Key Management Actions	37
Table 11:	Noise Management Key Management Actions	39
Table 12:	Waste Key Management Actions	42
Table 13:	Cultural Heritage Key Management Actions	44
Table 14:	Traffic Key Management Actions	47

Figures:

- Figure 1: Roles and Responsibilities
- Figure 2: Hierarchy of Roles and Responsibilities
- Figure 3: Temporary Jetty Construction
- Figure 4: Cooling Water Outfall Methodology Step 1 and 2
- Figure 5: Cooling Water Outfall Methodology Step 3 and 4
- Figure 6: Cooling Water Outfall Methodology Step 5 and 6
- Figure 7: Cooling Water Outfall Cross Section at Exit from Seal Pit
- Figure 8: Cooling Water Outfall Cross Section at Diffuser length

1. INTRODUCTION

1.1 Project Background

In 2005 the former Western Power Corporation (Western Power) announced NewGen Power Pty Ltd (NewGen) as the successful tenderer to construct and operate a natural gas-fired, combined cycle gas turbine (CCGT) power plant with a nominal generation capacity of 320 megawatts (MW). The plant is located close to Leith and Barter Roads in the Kwinana Industrial Area (KIA), Western Australia. The power station will provide power to the South West Interconnected System (SWIS) and has been initiated by Western Power as part of the SWIS power procurement process.

Construction of the power station includes a marine component which will involve the construction and installation of a cooling water outfall pipeline in Cockburn Sound. Cooling water will be drawn from the existing intake facilities at the adjacent Verve Energy Cockburn 1 gas fired power station. The proposed alignment of the outfall pipeline is shown in Figure 1. The outfall pipeline will extend 300m into Cockburn Sound and incorporate an 80m diffuser and associated pipeline. Installation of the pipeline is proposed to be achieved using a “dig and lay” methodology.

A detailed description of the NewGen Kwinana Gas-fired Power Station project and environmental management activities are contained in the Environmental Protection Statement (ELP, July 2005) and NewGen Kwinana Gas-fired Power Station Project Changes (ELP, October 2006) documents.

This Marine Works Construction Environmental Management Plan (MWCEMP) outlines the management and monitoring requirements for the construction activities associated with the construction of a cooling water outfall pipeline and diffuser array in Cockburn Sound from NewGen’s Kwinana Gas Fired Power Station.

The MWCMP has been prepared by 360 Environmental Pty Ltd for Environmental Licensing Professional (ELP) Pty Ltd, on behalf of NewGen Power Kwinana Pty Ltd for Western Power.

1.2 Environmental Assessment and Commitments

Stage one of the SWIS Power Procurement Process initiated by Western Power identified a site within the KIA as a potential site for the construction of a power generation facility and a Strategic Environmental Review (SER) was conducted. The SER was considered by the Environmental Protection Authority (EPA) under section 16(e) of the *Environmental Protection Act 1986* and advice detailed in EPA bulletin 1067, September 2002.

Stage two of the SWIS Power Procurement Process required short listed proponents to conduct an environmental assessment in accordance with section 38 *Environmental Protection Act 1986*. NewGen received advice from the EPA regarding its proposal for a 320MW power station utilizing an air cooled condenser (EPA Bulletin 1174, May 2005). Assessment was set at Assessment on Referral Information (ARI) and included the location of the power station at the proposed site close to Leith and Barter Roads.

Subsequent to NewGen submitting its final bid the proposal was altered to include a water cooled condenser. The proposal was resubmitted to the EPA and in 2005 NewGen received environmental approval to construct and operate a 320MW gas fired power station incorporating a water cooled condenser. The project was subject to an Environmental Protection Statement (EPS) level of assessment (EPA Bulletin 1190, August 2005). The project was recommended for approval by the Environmental Protection Authority in Bulletin 1180 and Ministerial Statement 698 was issued by the then Minister for Environment in November 2005.

As part of the Ministerial Approval for the Power Station, NewGen committed to developing a Marine Works Construction Environmental Management Plan (Statement 698, commitment 6-4). The plan requires NewGen to identify measures and procedures to be undertaken during the project to mitigate potential impacts to the marine environment, beach and fore dune area during construction and installation of the outfall pipeline. This MWCEMP identifies the procedures NewGen that will be followed to minimise and mitigate potential impacts of the construction and installation of the outfall pipeline.

1.3 Objectives and Scope

The objectives of the MWCMP are to:

- Detail measures to mitigate any potential impacts on the marine environment, beach and foredune areas associated with the construction, installation and maintenance of the outfall pipeline and diffuser.
- Provide a framework for the marine construction works to be implemented in accordance with Ministerial Statement 698, environmental commitments and legislation.
- To protect the long term values of ecosystem health, seafood safety, aquaculture, recreation and aesthetics and industrial water supply with in Cockburn Sound as set out in the State of the Environment (Cockburn Sound) Policy 2005.

The MWCMP has been prepared for construction works associated with the installation of the outfall pipeline and diffuser. The MWCMP addresses all the requirements of Ministerial Statement 698.

1.4 Roles, Responsibilities and Contact Details

The general roles and contact details of parties involved in the MWCMP are detailed in Table 1 and described as follows.

Role	Organisation	Name	Contact
Project Director	NewGen Kwinana	Matthew Forrest	(08) 9481 1100
Project Manager	NewGen Kwinana	Paul Henshall	(08) 9481 1100
Marine Works Contractor	Smithbridge	Paul Brady	(08) 9481 1100
Environment Manager	NewGen Kwinana	Tony Petersen	(08) 9481 1100

Table 1. Roles Responsibilities and Contacts

Figure 2 shows the hierarchy of role's and responsibilities for personnel for the project.

The following section outlines the responsibilities of the roles defined in Table 1.

1.4.1 Project Director

- Conduct overall review of compliance with this MWCEMP through the audit process.
- Responsible for maintaining a master list of all consents held by NewGen relating to the generation site.
- Responsible for ensuring that appropriate licences are held for the generation site.
- Responsible for ensuring ongoing effective communication with Generation Manager.
- Appointing and managing suitably qualified Contractors.

1.4.2 Project Manager

- Ensure contract documentation specifies the responsibilities of contractors consistent with the MWCEMP
- Responsible for ensuring that environmental licence monitoring and reporting requirements are met.
- Responsible for ensuring that all relevant staff and contractors are familiar with this MWCEMP.
- Responsible for the development of appropriate work procedures and ensuring that staff are trained in their use.
- Responsible for ensuring that staff are trained to competently conduct required tasks, in the requirements of this MWCEMP, appropriate licences and other legal requirements.
- Responsible for ensuring those instances of breach or potential breach of any legislation or licence conditions are identified and reported, where appropriate.
- Responsible for ensuring that potential environmental hazards are identified and reported.
- Review instances of breach or potential breach of any legislation or licence conditions and potential environmental hazards, and take action where appropriate.
- Liaison with the administering authority and stakeholders as required.

1.4.3 Marine Works Construction Contractor (Smithbridge Australia Pty Ltd)

- Be aware of and comply with the relevant legislation, regulations and approval conditions.
- Compliance with the requirements of this MWCEMP.
- Undertake regular water quality and other environmental management activities.
- Compliance with Fremantle Port Authority requirements.
- Implement construction management options to improve water quality.
- Provide access for supervisors, observers and auditors to witness, inspect, examine or monitor any part of the operations.
- Ensure construction equipment is in-survey, of good condition and properly maintained for the duration of the works.
- Report any spills or discharges into the marine environment.
- Report any injury or death to native marine fauna.
- Take all reasonable measures to protect the environment in and around the site.
- Storage and handling of hydrocarbons and chemicals; waste and sewage disposal.
- Disposal off site of all rubbish, debris, scrap metals and redundant gear and the like, including implementation of a recycling program to minimise disposal to land fill.

- Undertake pre- and post dredging seafloor surveys and prepare and submit all bathymetric survey drawings to the construction manager.

1.4.4 All Staff

- Meet general environmental duties, facilitated and supported through appropriate training, work practices and event reporting.
- Instances of breach or potential breach of any legislation or licence conditions shall be identified and reported. It is the responsibility of every NewGen staff member to report such events.
- Comply with this MWCEMP.
- Ensure that contractors and other persons working at NewGen sites undertake such works in accordance with this MWCEMP.

1.4.5 Other Contractors

- Shall comply with this MWCEMP as if they were NewGen staff members.

2. PROJECT DESCRIPTION

2.1 Overview

Construction works associated with the installation of the cooling water outfall pipeline for the NewGen Kwinana Power Station will involve trenching and backfilling the reinforced concrete pipeline in relatively short (less than 20m) lengths contained within temporary sheet piled cofferdams. Construction will take place from a purpose built temporary jetty. Excavated spoil will be removed from site and the pipe backfilled with bedding material, filter rock and scour rock. Construction works will be undertaken by Smithbridge Australia Pty Ltd (Smithbridge). Smithbridge has extensive experience in marine construction both within Australia and internationally (www.smithbridge.net). The construction methodology was selected for the following reasons:

- Minimises the footprint on the existing seabed through excavation within sheet-piled “wet caisson” and no side batters.
- Enables potential sediment plumes produced by excavation within sheet-piled “wet caisson” to be contained.
- Allows for the lowest risk construction activity with no requirement for floating plant.
- Allows for less exposure to effects from adverse weather.
- Allows pipe to be installed to final specification in relatively short lengths resulting in less permanent works exposed to the risk of damage from environmental effects at any point in time.

2.2 Temporary Jetty Installation and Removal

A temporary jetty will be constructed from the edge of the seal pit approximately 325m into Cockburn Sound immediately to the south of the pipeline alignment. The jetty will be used to support construction equipment at the leading edge of the pipeline, while also providing access for carting excavated material back to the shore and transporting of concrete pipe sections and bedding/scour rock from the lay down areas.

The temporary jetty will comply with all requirements of the Fremantle Ports.

The design of the jetty is based on that previously used by Smithbridge with detailed design carried out by Consulting Engineer, Madsen Giersing Pty Ltd to suit site specific environmental and geotechnical requirements. The jetty will be built in 12m preassembled sections with each section supported by a pair of H piles. Construction of the jetty will involve the driving of approximately 50 piles. Piles will be installed and extracted using an ICE 416 hydraulic vibratory piling hammer.

A key element of the jetty construction is a pile gate which cantilevers forward from an existing span to provide support for the driving of piles in the next headstock. The pile gate is a pair of beams braced together, which extend back under the preceding completed span and forward 12 metres to the next headstock. At the location of the next headstock there is a pair of transverse beams which make up a pair of pile gates for the next two piles. The pile gate design includes walkways to provide personnel access to the next headstock location.

The steps in advancing the jetty forward are shown in Figure 2 and are as follows:

- The pile gate is extended forward and the two pile gates surveyed into the correct position.
- The two piles for the next headstock bent are pitched and vibrated to refusal using the ICE 416 vibro-hammer.
- The piles may then be subjected to up to 10 blows with an impact hammer and the sets recorded to confirm there is adequate vertical capacity. If required the impact hammer to be used will be a Dawson HPH 1800
- The piles are then trimmed to the correct cut-off level
- A headstock is placed, with pre-fitted pile boxes fitting over the driven piles. The piles will be welded to the headstocks
- Soffit plates are fitted to the underside of the pile boxes and the annulus between the pile and the pile box filled with gravel.
- Longitudinal beams are then placed and bolted to the headstocks, joining the new headstock to the completed jetty.
- Deck planks are placed to extend the decking out over the new length.

Construction of the jetty is anticipated at 3 bents or 36 metres per week, with completed construction possible in two months. However construction may alternate between jetty construction and pipeline installation depending on project requirements.

On completion of the pipe laying, the temporary jetty will be removed from site.

Removal will be the reverse procedure to the installation process, with removal on a span-by-span basis facilitated by the crawler crane working at the leading edge. The removal process of each span will be as follows:

- Deck planks will be disconnected and carted to shore
- Longitudinal beams will be removed in pairs
- The cantilevered pile gate will then be used to access disconnection of the headstock from supporting piles, thus enabling removal of the headstock
- The hydraulic vibrohammer will be used to extract the full length of all vertical piles

The crane will then walk shorewards another span and repeat the sequence for the next span.

It is estimated that a removal rate of one span per day is achievable, and therefore that the removal operation should be completed over an approximate one month period.

After removal of the temporary jetty, the jetty abutment and dune area will be restored to a condition, equivalent or better than the pre-construction condition.

2.3 Outfall Pipe Installation

Trenching is required to install the 1800mm internal diameter buried outfall pipe and associated diffusers to a distance of approximately 320m offshore from the seaward end of seal pit. The maximum depth of the trench will be 4m.

Outfall pipe will be completed in approximately 12 to 18m lengths. Installation of each length will involve the following steps:

- Installation of sheet piling
- Excavation within the sheet pile cofferdam to the underside of pipe bedding material
- Placement of pipe bed material
- Laying and jointing of pipe sections
- Placement of bedding surround to pipe
- Placement of rock filter layer
- Placement of scour protection armour
- Removal of sheet piling

The proposed work method is shown in Figures 4 to 6

2.3.1 Installation and Removal of Sheet Piling

Sheet piles will be installed in sections at a nominal width of 4.5m apart. Sheet piles will be guided into their required position by means of walers either side of the required alignment. The trussed walers will extend over two bays of work , cantilevering forward to the next bay when required.

Sheet piles will be installed using an ICE 416 hydraulic vibrohammer wherever possible. However, it is anticipated that the impact hammer may be required where bedrock is encountered to install piles to a sufficient distance below the intended excavation. Once driven, the sheet piles will be tied back to the trussed walers to provide top support as horizontal load is applied from excavation.

At the seaward (leading) edge of the work face, the end wall of sheet piles will consist of two lines of overlapping sheets, one from either side. This overlap will prevent the ingress of material once excavation commences.

Sheet piles will be removed using the same vibrohammer as utilized for installation. Upon removal sheet piles will be immediately re-installed in the next section of coffer dam.

2.3.2 Excavation within Sheet Piling

Excavation will commence once sheet piles are tied into position. The coffer dam will be completely closed during excavation. Excavation within the sheet piled cofferdam will be carried out using a clamshell bucket on a crawler crane. The crane proposed for constructing the works is a 150 tonne crawler crane, model IHI CCH1500. The clamshell will be hydraulically opened and closed, and will hang from a telescopic Kelly bar mounted on the crawler crane. The use of a Kelly bar gives greater accuracy in locating the grab head and better safety and control when raising and lowering the grab.

Within each length of sheet piled cofferdam approximately 200m³ of sediment is expected to be removed. Removal of this quantity of sediment is anticipated to be achieved within an estimated 12 hour time frame. A total of approximately 6000m³ of sediment is estimated to be excavated. Excavated material will be loaded into dump trucks (tippers) and carted to the designated stockpile area.

Controls on excavated levels will be undertaken by markings on the Kelly bar, backed up by hand soundings.

2.3.3 Placement of Pipe Bedding Material

Once excavation within each cofferdam is complete the sheet pile return wall will be removed. A layer of bedding material will be placed on the base of the exposed trench and be laid to an average depth of approximately 200mm. Approximately 6000 tonnes of bedding material will be laid over the full length of the pipeline trench.

Bedding material will be transported to each coffer dam by tipper truck on the temporary jetty and placed using either the grab bucket on the crane or by use of a rock tray.

To prevent backfilling causing a sediment plume a temporary gate and/or silt curtain (nominal pore size 80 microns) will be installed in place of the sheet pile return wall during all backfilling works.

2.3.4 Laying of Pipe Sections

Pipe will be constructed of reinforced concrete and layed in its cast lengths of 2.44m. At each coffer dam pipe sections will be delivered by rigid-body truck or Franna crane using the temporary jetty.

Each section of pipe will be lowered into position under water using a placing frame. The placing frame will feature survey rods to ascertain the level, line and chainage of the pipe section as it is being lowered.

Once the spigot (shoreward) end is in the correct location relative to the socket on the previous pipe, a hydraulic pushing device reacting against the sheet pile walls will apply pressure to the new section to locate the spigot within the socket. As the previously laid pipe takes the weight of the shoreward end of the new section, the lifting frame will be used to adjust the level and line of the seaward end. Support of the lifting frame will then be transferred to the sheet pile walls as additional bedding material is placed around the pipe.

It is anticipated that up to 8 sections of pipe will be installed in one day.

2.3.5 Placement of Filter Rock and Scour Protection

Once the pipes have been laid and bedded within a given length of sheet piles, placement of filter rock and scour protection will proceed. A cross section of the installed pipe at the seal pit end and at the diffuser end are shown in Figures 7 and 8.

It is anticipated that approximately 2000 tonnes of filter rock and 5000 tonnes of scour protection material will be backfilled over the pipeline.

Filter rock and scour protection will be moved to each section of coffer dam using a tipper truck on the temporary jetty. Rock will be placed using the crawler crane or a rock tray. A temporary gate and/or silt curtain will be in place during all backfilling works.

Upon completion of the pipe installation the seabed will be reinstated to natural seabed levels (with a tolerance of $\pm 300\text{mm}$) as recorded prior to the commencement of works. This will be achieved by comparison of survey results prior to construction with those recorded on completion of

construction. Detailed backfilling will take place to achieve natural levels before the removal of sheet piles.

2.4 Spoil Storage and Disposal

Excavated sands will be temporarily stored in a designated spoil disposal area. The spoil storage area will be lined with geotextile and run off controlled to prevent erosion and sediment plumes entering Cockburn Sound. The excavated spoil will be allowed to dry in the spoil storage disposal area before being removed from site for use as fill or taken to a licensed landfill.

The existing temporary limestone rock constructed as part of the Perth Seawater Desalination Plant marine works may be utilised for storage of excavated spoil. If the rock groyne is utilised it will be completely removed on the completion of works and all rock taken off site.

Access to the spoil area will require a track to be constructed from the jetty along the foreshore. The access track will be approximately 6m wide. Construction will include:

- Laying of geotextile membrane over existing beach
- Spreading and compacting of 300mm road base material
- Placement of rock armour along the beach side of the road to protect the works. Rock armour would be similar in size to the protection on the existing reclamation

At the Northern end of the beach, a ramp will be built up the edge of the dune (approx grade 1:10) to take access up to the temporary jetty deck level of +5.0 Chart Datum (CD).

On completion of construction the access track will be completely removed and the foreshore returned to equivalent pre-construction condition (in terms of removal of foreign materials, compaction and contours).

2.5 Hours of operation

In accordance with the *Environmental Protection (Noise) Regulations 1997* construction work will be carried out between 7.00am and 7.00pm on any day which is not a Sunday or a public holiday unless otherwise approved.

2.6 Schedule

Construction of the site access roads and laydown areas is scheduled to commence in January 2007, with installation of the temporary jetty in February 2007.

Pipe installation is expected to commence in April 2007 and is expected to be completed by November 2007.

A schedule of the works is provided in Appendix A. It is possible that the schedule provided may vary during the course of the project as a result of weather conditions, equipment performance or availability. Updated schedules will be provided as required or by request.

3. MARINE WATER QUALITY

3.1 Element

Water quality in Cockburn Sound has the potential to be affected by the installation of the outfall pipeline. Water quality may be affected by the excavation of the trench to install the pipeline and by piling associated with the construction and removal of each coffer dam and the temporary jetty.

3.2 Current Status

Seawater quality in Cockburn Sound has historically varied as a result of industrial discharge and surrounding land uses. To protect the environment of Cockburn Sound the State of the Environment (Cockburn Sound) Policy 2005 was developed along with the associated Environmental Quality Criteria Reference Document for Cockburn Sound (2003-2004) (EPA 2005) and the Manual of Standard Operating procedures for Monitoring Environmental Quality in Cockburn Sound (EPA 2003-2004). The documents provide a set of reference criteria to ensure water quality is maintained and spatially defines 3 levels of ecological protection within Cockburn Sound. The site of the construction for the outfall pipeline is contained within the Low Ecological Protection Area (LEPA).

A sediment sampling and analysis program was undertaken in October 2006 along the proposed pipeline alignment and corridor of potential disturbance. The results of the program are documented in 360 Environmental report reference 200-AD, November 2006. The main findings of the sediment sampling analysis and analysis for landfill classification are summarised below.

- Sediments in the areas to be excavated comprise predominately medium grained, calcareous sands. Small amounts of silty sands were present in the surface (0-0.5m) strata
- Settling rate tests indicate the bulk of sediment resettled in seawater within one minute of disturbance. However, associated cloudiness of surrounding waters may take significantly longer (up to six hours) to clear due to smaller fractions, including fine sands and silts, remaining in suspension for a longer period of time.
- Concentrations of contaminants analysed (metals, TBT, TPH/BTEX, PAH, PCBs and nutrients) were below Screening Level Effects (Low), Health Investigations Levels and DEC Environmental Investigation Levels in all sediment samples.
- The results of the acid sulfate soil (ASS) testing were consistent with previous testing programs in the region. Notable levels of oxidisable sulphur occur in the sediments. However, no acidity exists in the system to allow the oxidation of sulphur to form acid sulfate soils. Acid Neutralising Capacity results indicate significant shell material in the sediment (uncrushed). Validation testing of excavated spoil will be undertaken at a rate of no less than one sample per 1000m³ of spoil to verify the material is Non Acid Sulfate Soils (NASS).

3.3 Potential Impacts

Sources from the construction activities that may affect marine water quality include:

- Increased turbidity, increased light attenuation and reduced photosynthetic potential in surrounding waters as a result of trench excavation.
- Release of contaminants such as tributyltin (TBT) and metals into surrounding waters from sediment disturbance as a result of trench excavation.
- Spread of contamination through inappropriate disposal of contaminated excavated sediments.

- Alteration of pH and dissolved oxygen (DO) concentrations in surrounding waters from sediment disturbance as a result of trench excavation.
- Spills of fuel, hydraulic fluid and other chemicals from equipment and machinery operating over water.

3.4 Environmental Objectives

The environmental objectives of this EMP are:

- To maintain the quality of surrounding waters in Cockburn Sound by appropriately managing construction works associated with the implementation of the outfall pipeline.
- To prevent the contamination of surrounding waters and sediment disposal site through the disturbance and inappropriate disposal of sediment.
- To minimise the potential for hydrocarbon or chemical spills and ensure the availability of appropriate hydrocarbon spill kits.

3.5 Performance Criteria

- No exceedences of water quality monitoring trigger values.
- Knowledge of all staff of appropriate procedures for emergency and oil spill response procedures.

3.6 Implementation

The following strategies have and will be implemented:

- Sediment sampling and analysis of the area to be excavated has been undertaken to identify the presence of any contaminants of concern.
- Excavation of the pipeline alignment shall be undertaken within sheet pile trenches to limit the level of turbidity and light attenuation impacts on surrounding waters and reduce the volume of material required to be excavated.
- Silt curtains or a temporary gate shall be in place at all times whilst the trailing edge of a sheet pile trench is open. Silt curtains may also be mobilised in the event a visible plume is found not to be contained mostly within the sheet piles. Silt curtains shall have a nominal pore size of 80 microns.
- A water quality monitoring program will be implemented during all marine construction works
- Trench excavation is expected to be completed in a short period of time and will only occur approximately once per week for the duration of the pipe installation.
- All equipment used will be appropriate for the scope of work and will be inspected by a qualified mechanic prior to work commencing. In particular all hydraulic hoses will be pressure tested and replaced as required.
- All contractors will be required to comply with the Port Authorities Act 1999 and Port Authority Regulations 2001 during all work.
- NewGen personnel and contractors will be made aware prior to the commencement of construction that the Fremantle Ports is responsible for the co-ordination of environmental emergency response activities and is to be notified of any significant marine environmental incident in the port environment.
- All machinery shall carry adequate spill kits at all times. In addition an adequate spill kit is to be located on the jetty for the duration of the construction works.
- All equipment and machinery (including hoses, fuel lines, etc) will be inspected regularly for faults / signs of wear and reported if necessary.

- No refuelling of equipment or machinery will take place outside of designated refuelling locations

3.7 Monitoring

A water quality monitoring program will be implemented that shall ensure water quality is maintained for the duration of the marine construction works. In designing the monitoring program consideration has been given to recent works undertaken in the area.

The construction associated with the installation of the outfall pipe will involve the excavation of less than 6000m³ of sediment and all excavation will be carried out within enclosed sheet pile coffer dams. In addition sediment will be excavated in 200m³ sections with a significant time delay between excavation of each section. Backfilling will take place in the same coffer dams with a temporary gate and or silt curtain in place at the trailing edge where the sheet piled wall has been removed to allow pipe laying. The driving and removal of piles has the potential to create a sediment plume however any plume created is expected to be localised and persist for a short period of time.

Given the small scale of excavation and the contained nature of the construction methodology a visual monitoring program is considered appropriate. However, to ensure the works do not impact on the marine water quality an initial monitoring program will be implemented that will include:

- At least one monitoring event corresponding with each potentially plume generating activity (excavation, backfilling, installation of sheet piles and removal of sheet piles)
- Monitoring shall include dissolved oxygen (DO), pH and Light Attenuation Coefficient (LAC).
- Monitoring shall be undertaken at two control sites independent of the effects of construction activities and two monitoring sites 500m north and south of the coffer dam.
- Trigger values have been derived from the results of water quality monitoring program undertaken for the construction of the adjacent Perth Seawater Desalination Site (Water Corporation 2006, unpublished) and the Environmental Quality Criteria Reference Document for Cockburn Sound (2003-2004) (EPA, 2005). The trigger values were not able to be calculated according to the environmental quality criteria as to the stop start nature of the works and the limited amount of data likely to be generated renders the calculation of comparable median and percentile values ineffective. Therefore the results of the monitoring shall be compared against the following trigger values.
 - DO will not fall below 80 percent saturation and the control value for the same monitoring event.
 - pH will not vary by more than 0.2 pH units from the control pH value for the same monitoring event.
 - LAC shall not exceed 0.19 and the control value for the same monitoring event.
- If the monitoring does not exceed any triggers for any parameter then a visual monitoring program shall be implemented for the remainder of the construction works.

The visual monitoring program shall include;

- Visual markers will be placed 300m and 500m to the north and south of the coffer dam location.
- Visual monitoring twice daily for extent of the visible plume.
- A monitoring record form will be developed and the results of the daily monitoring recorded.

In addition the following monitoring activities will be carried out to ensure the environmental objectives are met:

- Environmental audits of all marine construction equipment and operations will be undertaken by NewGen at the commencement of marine works and at regular intervals for the duration of the project.
- Documented inspections of all plant and equipment for fuel oil or hydraulic leakage shall be undertaken daily. Any leakages must be repaired before plant and equipment is permitted to be utilised.
- Immediate reporting by personnel of damaged or ineffective sediment control measures or potential water contamination to the Construction Manager.

3.8 Contingencies

The triggers and management actions that will result when monitoring indicates a non-conformance or potential non-conformance include:

- If the extent of the visual plume is found to extend greater than 300m from the coffer dam management actions will be implemented. Management measures that may be implemented that include but are not limited to:
 - Alter excavation or backfilling method eg rate, volume or duration.
 - Alter construction program.
 - Install silt curtains or alternative sediment plume barrier.
- If the extent of the visible plume is found to extend greater than 500m from the coffer dam work will cease until management measures are implemented that restrict the visible plume to within 500m of the coffer dam.
- If a significant hydrocarbon (>200L) or hazardous material spill occurs the contingencies outlined in Section 10 (Incident Prevention and Response) will be implemented.
- The Construction Manager is to maintain an incident reporting system to record significant events and issues with water quality controls.

3.9 Key Construction Phase Management Actions Table

Table 2: Marine Water Quality Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
MWQ1	Undertake sediment sampling and analysis program for contaminants of concern.	360 Report 200 - AD	Complete
MWQ2	Excavation confined to within sheet piled coffer dam's		
MWQ3	Temporary gate and/or silt curtains in place while trailing edge sheet pile coffer dam is open.		
MWQ4	Initial water quality monitoring program implemented includes at least 1 monitoring event for each potentially plume generating activity. Monitoring for DO, pH and LAC.		
MWQ5	Ongoing water quality monitoring program implemented.		
MWQ6	Trench excavation to undertaken approximately weekly.		
MWQ7	All equipment appropriate for scope of work and inspected by a qualified mechanic prior to commencing work.		
MWQ8	All contractors comply with Port Authorities Act and Port Authority regulations		
MWQ9	NewGen personnel and Contractors made aware that Fremantle Port Authority is responsible for co-ordinating marine environmental emergency response activities.		
MWQ10	All machinery to carry appropriate spill kits		
MWQ11	All equipment and machinery (including hoses, fuel lines, etc) will be inspected regularly for faults / signs of wear and reported if necessary		
MWQ12	No refuelling of equipment or machinery will take place outside of designated refuelling locations		
MWQ13	Management actions implemented if extent of visual plume found to extend greater than 300m from coffer dam		
MWQ14	Environmental audits of marine works undertaken by NewGen at the commencement of works and at regular intervals.		
MWQ15	Documented daily inspections of all plant and equipment. for fuel or hydraulic leakages		
MWQ16	Immediate reporting by personnel of damaged or ineffective sediment control measures or potential water contamination to the Construction Manager.		
MWQ17	Significant Hydrocarbon spills dealt with according to contingencies outlined in Incident Prevention and Response plan.		
MWQ18	The Construction Manager is to maintain an incident reporting system to record significant events and issues with water quality controls.		

4. MARINE FAUNA AND FLORA

4.1 Element

Marine fauna and flora in Cockburn Sound have the potential to be affected by the installation of the outfall pipeline directly through disturbance to the seafloor by construction of the outfall pipe and temporary jetty and indirectly through disturbance as a result of reduced water quality.

4.2 Current Status

A seabed survey was conducted along the proposed disturbance corridor of the outfall pipeline and temporary jetty in October 2006 (360 Environmental Report Reference 200-AE, 2006). The findings of the survey are summarised below.

- The habitats identified within the potential disturbance zone along the pipeline corridor were sand and soft sediment.
- No significant communities of living epibenthos were encountered.
- Photosynthetic organisms were present in the water column and pelagic fish were found to frequent the area.
- No seagrasses were observed along the proposed pipeline route and proposed corridor of disturbance.

The results of this survey are consistent with recent seabed survey conducted as part of the construction of the adjacent Perth Seawater Desalination Plant which also found sand and silt to be the dominant habitat types (360 Environmental, 2005). Previous benthic mapping of Cockburn Sound (DALSE, 2004) has indicated the nearest seagrass habitat to be located greater than 1.5km from the pipeline alignment.

A resident population of Bottlenose Dolphins (*Tursiops sp*) inhabit Cockburn Sound and are a recognised tourist attraction. Cockburn Sound is also utilized by several species of seabirds however the site is not a significant nesting or roosting area given the highly developed nature of the surrounding area.

4.3 Potential Impacts

Sources from the construction activities that may affect marine flora or fauna include:

- Disturbance of marine flora through habitat destruction as a result of trench excavation and sheet piling.
- Disturbance to marine flora, particularly seagrass, through decrease in water quality either by decreased photosynthetic potential or release of contaminants.
- Injury to marine fauna, particularly resident dolphins, for example through entanglement with silt curtains.
- Disturbance of marine fauna through temporary noise impacts of construction, particularly low frequency noise generated by driving sheet piles.

4.4 Environmental Objectives

The environmental objectives of this EMP are:

- To prevent damage to marine flora in surrounding waters during construction.
- To prevent injury or disturbance to marine fauna.

4.5 Performance Criteria

- No loss of marine flora as a result of construction activities.
- No injury or death to marine fauna as a result of construction activities.

4.6 Implementation

The following strategies will be implemented:

- A seabed survey has been undertaken prior to construction to ensure no marine flora will be directly disturbed by construction and installation of the outfall pipeline temporary jetty.
- The measures outlined in Section 3, including a water quality monitoring program, to preserve water quality will be adhered to by all NewGen personnel and contractors to ensure water quality does not affect marine flora or fauna.
- Piling will be undertaken with a Vibrohammer wherever possible to limit noise impacts. Anecdotal evidence suggests noise from piling has not had an adverse effect on the local dolphin population given the significant number of previous piling projects previously undertaken in Cockburn Sound.
- The coffer dam will be visually inspected prior to the commencement of works each day to ensure no dolphins or other marine fauna have become trapped. Previous construction projects in Cockburn Sound have utilized silt curtains with no reported detrimental impact to marine fauna.
- Seabed levels will be surveyed prior to works commencing and at the completion of works. Seabed levels will be returned to preconstruction levels with a tolerance of $\pm 300\text{mm}$.

4.7 Monitoring

The following monitoring activities to be carried out to ensure the environmental objectives are met include:

- Daily visual inspection of coffer dams for dolphins and other marine fauna to be carried out by Construction Manager during the construction phase.
- Immediate reporting by personnel of damaged or ineffective sediment control measures or environmental incidences to the Construction Manager.
- An environmental incident register will be maintained that shall document any environmental (and safety) incidents,
- A complaints register will be maintained, where any complaints from the community or stakeholders will be logged. Complaints will be investigated and, if appropriate, acted upon in a prompt manner.

4.8 Contingencies

The triggers and management actions that will result when monitoring indicates a non-conformance or potential non-conformance include:

- In the event of a dolphin becoming entangled or trapped in a coffer dam a DEC ranger will be immediately notified and advice sought.
- The Construction Manager is to maintain an incident reporting system to record significant incidences of any loss of marine flora or injury to marine fauna.

4.9 Key Construction Phase Management Actions Table

Table 3: Marine Fauna and Flora Quality Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
MFF1	Undertake a seabed survey prior to construction commencing.		
MFF2	Implement measures outlined in Marine Water Quality plan, including water quality monitoring program.		
MFF3	Piling undertaken wherever possible with vibrohammer.		
MFF4	Daily visual monitoring of coffer dam.		
MFF5	Seabed level surveyed prior to construction.		
MFF6	Seabed levels returned to ± 300 mm of pre construction levels.		
MFF7	Immediate reporting of damaged or ineffective sediment control measures to construction manager.		
MFF8	Maintain environmental incident register.		
MFF9	Maintain complaints register. Complaints investigated and, if appropriate acted upon.		
MFF10	DEC ranger notified and advice sought and acted upon in event of marine fauna injury or incident		

5. SURFACE WATER QUALITY

5.1 Element

The surface water quality of the area surrounding the seawater water cooling pipeline corridor has the potential to be affected by the construction activities of installing the underground pipeline. This may be through stormwater run-off and/or contaminated site runoff from the project construction area impacting on the surrounding environment.

5.2 Current Status

There are no defined drainages, streams or rivers located on or near the site. The site is extensively developed and lies within the Kwinana Industrial Area (KIA). Rainfall runoff is likely to collect in shallow depressions and infiltrate to the water table.

5.3 Potential Impacts

Construction activities as a result of installation of the ocean outfall pipeline have the potential to contaminate surface water. The increased runoff could also cause erosion and sedimentation. Sources from the construction activities that may affect surface water quality include:

- Fuel, hydraulic fluid and other chemicals from equipment and machinery.
- Sediment-laden runoff from the construction site.
- Sediment-laden water released from the pipeline trench during dewatering and/or over-pumping.

5.4 Environmental Objectives

The environmental objectives of this EMP are:

- To ensure the design and construction of permanent or temporary works are appropriate and maintained during and after construction.
- To minimise the risk of contamination of surface water, groundwater and stormwater through leaks or spills of chemicals / polluting substances during the construction phase.
- To control disposal of potentially contaminated site water.
- To ensure the availability of hydrocarbon spill kits.
- To ensure increased or contaminated runoff from the construction site is controlled.

5.5 Performance Criteria

The performance criteria for surface water quality are that there are no unplanned events during construction resulting in a release of sediment or other pollutants into Cockburn Sound.

5.6 Implementation

The following strategies will be implemented:

- Excavated soil will be stockpiled in such a way as to minimise release of sediment (e.g. not close to water or drainage lines).
- Permanent drainage works will be installed as early as possible during construction.
- Vehicular traffic will be controlled during construction, confining access, where possible, to proposed or existing roads / access tracks.
- Ensure appropriate storage and handling of materials on site which may contaminate surface water or groundwater.

- Ensure spill kits are available on site for the clean up of spills and leaks of contaminants and also potentially contaminated water.
- Equipment and machinery will refuel within designated refuelling locations.
- Stored fuels and chemicals are to be maintained within an appropriately bunded area.
- Upon the completion of construction, the impacted area shall be rehabilitated.
- All equipment and machinery (including hoses, fuel lines) will be inspected regularly for faults / signs of wear and reported if necessary.

5.7 Monitoring

The following monitoring activities to be carried out to ensure the environmental objectives are met include:

- Weekly visual inspection of sediment and water quality control devices to be carried out by Construction Manager during the construction phase and/or following major rain events.
- Immediate reporting by personnel of damaged or ineffective sediment control measures or potential water contamination to the Construction Manager.
- A complaints register will be maintained, in which any complaints from the community will be logged (refer section 12). Complaints will be investigated and, if appropriate, acted upon in a prompt manner.

5.8 Contingencies

The triggers and management actions that will result when monitoring indicates a non-conformance or potential non-conformance include:

- Corrective action will be undertaken immediately if a complaint is made, or potential/actual leak or spill of a polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.
- The Construction Manager is to maintain an incident reporting system to record significant events and issues with water quality controls.
- In the event of a major spill or leak of contaminants, the administering authority must be immediately notified.
- The Construction Manager will report on the performance of the surface water quality control measures if required by the administering authority.
- In the event that surface water quality at the monitoring locations is found to fall outside of the prescribed guideline levels, the source of the deviation will be investigated and measures taken to correct the problem.

5.9 Key Construction Phase Management Actions Table

Table 4: Surface Water Quality Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
SWQ1	Vehicular traffic and access to be restricted, where practicable, to existing roads and/or proposed access track.		
SWQ2	Clearing of ground cover or vegetation to be confined within pipeline corridor.		
SWQ3	Permanent drainage works, if required, to be provided ASAP.		
SWQ4	Excavated soil to be stockpiled to minimise release of sediment. No stockpiling close to water or drainage lines, where practicable.		
SWQ5	Ensure appropriate storage and handling of materials on site which may contaminate surface water or groundwater.		
SWQ6	Spill kits and booms available on site for the clean up of spills and leaks of contaminants and potential contaminated water.		
SWQ7	Equipment and machinery to be refuelled within designated refuelling locations.		
SWQ8	At construction completion, the pipeline corridor is to be rehabilitated.		
SWQ9	All equipment and machinery (inc hoses, fuel lines, etc) inspected regularly for faults / signs of wear and replaced where necessary.		
SWQ10	Weekly visual inspection of sediment and water quality control devices by Construction Manager during construction phase and/or following major rain events.		
SWQ11	Immediate reporting by personnel of damaged or ineffective sediment control measures or potential water contamination to the Construction Manager.		
SWQ12	A complaints register is to be maintained. Complaints investigated and, if appropriate, acted upon.		
SWQ13	Corrective action undertaken immediately following a complaint, or if a potential/actual leak or spill of a polluting substance is identified (includes stopping the contaminant from further escaping, cleaning up the affected environment and implementing preventive measures).		
SWQ14	Construction Manager to maintain an incident reporting system to record significant events and issues with water quality controls.		
SWQ15	In the event of a major spill or leak of contaminants into Cockburn Sound administering authority to be immediately notified.		
SWQ16	Construction Manager to report on the performance of the surface water quality control measures if required by the DECC Kwinana.		
SWQ17	In the event that surface water quality falls outside the prescribed environmental guideline levels, the source of the deviation will be investigated and measures taken to correct the problem.		

6. AIR QUALITY

6.1 Element

Temporary air quality impacts may result from construction activities. This occurs through emissions such as the release of dust particulates and/or greenhouse gases from construction plant and machinery. Due to the industrial nature of the surrounding environment and close proximity to major roadways, the air quality impacts will only be minor and temporary in nature. Appropriate measures to manage air quality are detailed below.

Sources of air emissions include:

- Clearing of vegetation and topsoil/sand.
- Excavation, grading/scraping and transport of soil and spoil materials.
- Loading and unloading of trucks.
- Re-entrainment of deposited dust by vehicle movements
- Wind erosion from stockpiles and unsealed roads and surfaces.
- Fuel burning engines.

6.2 Current Status

The air quality in the vicinity of the KIA is dominated by industrial emissions and to a lesser extent by motor vehicles and other domestic activities in the local area. Located within the KIA are heavy industries such as metals processing, chemical manufacture, oil refining, grain handling and power generation from coal fired and gas fired plants.

6.3 Potential Impacts

- Release of minor amounts of air pollutants (for example NO₂, CO, PM₁₀ and SO₂) from vehicles and equipment.
- Release of greenhouse gas emissions from vehicles and equipment.
- Dust and particulates from vehicle usage, pipeline excavation, temporary stockpiles and land clearing affecting the surrounding community and site visibility.

6.4 Environmental Objectives

- Compliance with the Kwinana Environmental Protection Policy (2005); and
- To minimise nuisance to workers and the community through air impacts (e.g. dust and fumes).

6.5 Performance Criteria

- NO₂, CO, PM₁₀ and SO₂; greenhouse gas; particulates and dust will not exceed specified regulatory requirements.
- No complaints from the local community relating to dust and air quality impacts during construction.
- Any community complaints in relation to dust, odours and gaseous emissions to be investigated and responded to within 24 hours and corrective action taken for each incident if necessary.

6.6 Implementation Strategy

- Use of water sprays or other dust retardants if required to reduce dust generation from exposed areas and stockpiles during unfavourable weather conditions (i.e. strong winds).
- Ensuring prompt cleanup of any spilled material being transported.
- Haul vehicles covering their loads when moving outside the construction site.
- Restricting speed of construction vehicles over access tracks.
- Using sealed surfaces where possible.
- Revegetating disturbed areas as soon as practicable.
- Ensuring that vehicles and equipment are appropriately maintained and serviced.

6.7 Monitoring

Monitoring will be undertaken to ensure emissions are not exceeding the prescribed levels via the following methods:

- Visual daily inspections of dust by Construction Manager throughout construction phase.
- Use of the incident reporting system for potential or actual issues with nuisance dust or emissions.
- A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon in prompt manner.

6.8 Contingencies

- If monitoring results or complaints indicate inadequate performance, an investigation will be conducted to determine corrective actions and reporting requirements.
- The incident reporting system will advise the Construction Manager of potential non-conformances with air quality limits or air quality complaints.

6.9 Key Construction Phase Management Actions Table

Table 5: Air Quality Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
AQ1	Use of water sprays or other dust retardants if required to reduce dust generation from exposed areas and stockpiles during unfavourable weather conditions (i.e. strong winds)		
AQ2	Prompt cleanup of any spilled material being transported.		
AQ3	Haul vehicles moving outside the construction site to have loads covered.		
AQ4	Speed of construction vehicles restricted.		
AQ5	Revegetating disturbed areas as soon as practicable.		
AQ6	Vehicles and equipment are appropriately maintained and serviced.		
AQ7	Visual daily inspections of dust by Construction Manager.		
AQ8	Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Construction Manager.		
AQ9	Complaints register maintained. Complaints will be investigated and, if appropriate, acted upon.		
AQ10	If monitoring results or complaints indicate inadequate performance, an investigation will be conducted to determine corrective actions and reporting requirements.		
AQ11	The incident reporting system will advise the Construction Manager of potential non-conformances with air quality limits or air quality complaints.		

7. NOISE MANAGEMENT

7.1 Element

The construction works will involve the use of machinery and equipment that will generate construction noise on a temporary basis. Sources of noise from the construction activities include:

- Site preparation and earthworks.
- Construction-related transport.
- Foundations or plant equipment installation.
- Construction activities.

7.2 Current Status

The project is being undertaken in the KIA. The KIA is surrounded by a buffer zone designed to reduce environmental noise impacts by maintaining separation distances between industry and residential property.

Noise from construction sites in Western Australia is governed by the *Environmental Protection (Noise) Regulations 1997*. The Regulations state that construction work can be carried out between 7.00am and 7.00pm on any day which is not a Sunday or a public holiday provided:

- The construction work is carried out in accordance with control of environmental noise practices set out in Section 6 of AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites.
- The equipment used on the premises is the quietest reasonably available.
- Construction outside these times and days if approved by the Chief Executive Officer of the Department of Environment and Conservation.

7.3 Potential Impacts

- Noise from construction affects workers or the surrounding community.
- Fauna populations may be temporarily affected by construction noise.

7.4 Environmental Objectives

- To limit construction noise impacts on the workforce, surrounding community and faunal populations.
- To comply with *Environmental Protection (Noise) Regulations 1997*.

7.5 Performance Criteria

- No noise complaints received.
- Compliance with *Environmental Protection (Noise) Regulations 1997*

7.6 Implementation Strategy

- Construction hours limited to 7:00am to 7:00pm Monday to Saturday or as otherwise approved.
- Construction noise will be managed according to AS 2436: 1981 Guide to Noise control on construction, Maintenance and Demolition Sites.
- Exhaust silencers fitted on construction equipment if required.

- Schedule services (e.g. delivery of construction materials) planned for minimal congestion or waiting queues. Deliveries shall also occur within construction hours.
- Training of site personnel will include a noise awareness component.

7.7 Monitoring

- Monitoring of boundary noise levels during the construction phase.
- A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon in a prompt manner.

7.8 Contingencies

- If monitoring results or complaints indicate inadequate performance, an investigation will be conducted to determine corrective actions and reporting requirements.
- The incident reporting system will advise the Construction Manager of potential non-conformances with air quality limits or air quality complaints.

7.9 Key Construction Phase Management Actions Table

Table 6: Noise Management Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
NM1	Construction hours limited to 7am – 7pm Mon – Sat unless otherwise approved.		
NM2	Construction noise will be managed according to AS 2436 – 1981 Guide to Noise control on construction, Maintenance and Demolition Sites.		
NM3	Exhaust silencers utilised and fitted on construction equipment if appropriate.		
NM4	Services are scheduled (e.g. delivery of construction materials) so that there is minimal congestion or waiting queues.		
NM5	Training of site personnel will involve a noise awareness component.		
NM6	If monitoring results or complaints indicate inadequate performance, an investigation will be conducted to determine corrective actions and reporting requirements.		
NM7	The incident reporting system will advise the Construction Manager of potential non-conformances with noise limits or noise complaints.		

8. EROSION CONTROL

8.1 Element

Construction of the onshore component of the water cooling pipeline may result in erosion along the alignment and subsequent sediment release to the surrounding environment.

Sources and activities that may attribute to the processes of erosion and sedimentation include:

- Site preparation and earthworks.
- Construction-related transport.
- Construction activities.
- Vegetation clearing.
- Topsoil and subsoil stockpiled while the pipe is being laid.
- Inadequate compaction during backfilling and weakened soil structure may make the alignment more susceptible to water erosion, forming gullies.
- Sand dunes being trenched and/or compacted in parts, making them vulnerable to erosion.

8.2 Current Status

The local geography of the site consists of a relic foredune sequence of Holocene calcareous sands which are eolian in origin. This sequence is known as the Safety Bay Sands. The foredune topography is low and undulating and contains variable thickness of fine to medium grained quartz sand mixed with shell debris. The sands have a high infiltration capacity and therefore erosion risks are low.

8.3 Potential Impacts

- Erosion of sand dunes.
- Sediment release and deposit into surrounding areas.
- Decrease in quality and alteration of flora and fauna habitats.
- Exceed water quality criteria.
- Negative impact on water amenity.

8.4 Environmental Objectives

- To minimise erosion of sediment on site during construction.
- To provide and maintain erosion and sediment control measures where required.

8.5 Performance Criteria

The performance criteria for this EMP include the following:

- Erosion and sedimentation control measures function properly and are maintained.
- Compliance with water quality discharge criteria.
- The stability of the beach is maintained and no areas are significantly eroded.

8.6 Implementation Strategy

- Disturbance of vegetation and topsoil will be kept to a minimum.
- Movement of vehicles on and off site is to be through approved access points only, which shall be adequately maintained throughout the construction period.
- Reinstatement of disturbed areas will involve returning topsoil, stabilisation and revegetation works.
- Where practicable, land should be progressively disturbed to ensure minimum exposure to the influence of weather conditions.
- Erosion and sediment control structures (e.g. diversion banks and berms) will be designed and installed where necessary.
- Soil stockpiles will be located and orientated to prevent excessive loss by wind and water erosion where practicable.

8.7 Monitoring

The site will be monitored for erosion and sedimentation affects through:

- Regular inspections of all erosion and sediment control measures by the Construction Manager to ensure that controls are functioning correctly.
- Inspections after any significant rainfall events, or any event which could affect the integrity of the erosion and sediment controls.

8.8 Contingencies

- If monitoring results or complaints indicate inadequate performance, an investigation will be conducted to determine corrective actions and reporting requirements.
- The incident reporting system will advise the Construction Manager of potential non-conformances with water quality limits or water quality complaints from erosion or sediment.

8.9 Key Construction Phase Management Actions Table

Table 7: Erosion Control Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
ES1	Disturbance of vegetation and topsoil kept to a practical minimum.		
ES2	Movement of vehicles on and off site through approved access points only, which shall be adequately maintained throughout construction.		
ES3	Reinstatement of disturbed areas will involve returning topsoil, stabilisation and revegetation works.		
ES4	Land progressively disturbed where possible.		
ES5	Erosion and sedimentation control structures (e.g. diversion banks and berms) designed and implemented where necessary.		
ES6	Soil stockpiles situated to prevent excessive loss by wind and water erosion. They should also be covered if necessary.		
ES7	Regular inspections of erosion and sediment control measures by the Construction Manager.		
ES8	Inspections after any significant rainfall events, or any event which could affect the integrity of the erosion and sediment controls.		
ES9	If monitoring results or complaints indicate inadequate performance, an investigation will be conducted to determine corrective actions and reporting requirements.		
ES10	The incident reporting system will advise the Construction Manager of potential non-conformances from erosion control equipment or water quality complaints from sediment.		

9. TERRESTRIAL FLORA AND FAUNA

9.1 Element

Construction activities may affect terrestrial flora and fauna through the loss or damage of vegetation and subsequent loss of habitat along the pipeline easement and access tracks. There is also the potential for weed species to be introduced on site following this disturbance. The construction activities will produce noise, vibration and dust which can also impact on local fauna populations.

9.2 Current Status

The site has been highly degraded by clearing and development. Due to the cleared nature of the site there is little habitat for native fauna. The site mainly consists of backfilled dams and cleared or compacted earth. A strip of foredune vegetation exists on the Western edge of the fore dune. The corridor for the cooling water pipeline will disturb some of this vegetation. Post construction, this section will be rehabilitated to ensure the dunes are stable and to prevent erosion after construction is completed.

9.3 Potential Impacts

- Loss of native flora and fauna habitat.
- Disruption to local fauna population.
- Introduction of exotic species.
- Construction wastes may attract pest species.

9.4 Environmental Objectives

- To limit disturbance to local flora and fauna populations.
- To rehabilitate the dune and dunal vegetation disturbed along the western boundary of the site and the pipeline corridor.

9.5 Performance Criteria

- Dunal rehabilitation successful in returning local flora species.

9.6 Implementation Strategy

- To limit disturbance of dune vegetation and utilise previously disturbed areas wherever possible.
- Areas to be cleared will be clearly marked in the field to avoid unnecessary clearing.
- Implementation of a site rehabilitation program.
- Weed and pest eradication where necessary.
- Topsoil will be stored and returned to assist rehabilitation.
- Supervision of all clearing and earthworks.

9.7 Monitoring

- Clearing monitored for within marked areas.

- A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon in a prompt manner.

9.8 Contingencies

- If complaints indicate inadequate performance, an investigation will be conducted to determine corrective actions and reporting requirements.
- The incident reporting system will advise the Construction Manager of any unauthorised clearing or disturbance.

9.9 Key Construction Phase Management Actions Table

Table 8: Terrestrial Flora and Fauna Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
FFM1	Disturbance of dune vegetation limited to pipeline works.		
FFM2	Previously disturbed areas utilised where possible.		
FFM3	Cleared areas clearly marked in the field.		
FFM4	Site rehabilitation program implemented.		
FFM5	Program of weed and pest eradication implemented where necessary.		
FFM6	Topsoil stored and returned.		
FFM7	Supervision of all clearing and earthworks.		
FFM8	Complaints register maintained. Complaints will be investigated and, if appropriate, acted upon.		
FFM9	Incident reporting system to record unauthorised clearing and over clearing to the Construction Manager.		

10. ENVIRONMENTAL INCIDENT PREVENTION AND RESPONSE

10.1 Element

The construction works will involve the use of plant and equipment in a marine environment. NewGen will respond to any emergencies or environmental incidents during marine construction works in an appropriate manner according to agreed protocols.

10.2 Current Status

The project is being undertaken further to close consultation with within Fremantle Ports. The protection of the environment within Fremantle Ports' jurisdiction is the responsibility of Fremantle Ports. NewGen and all contractors are required to comply with the *Port Authorities Act 1999* and the *Port Authority Regulations 2001* during all works. NewGen is also required to comply with all other relevant regulations and legislation.

10.3 Potential Impacts

- Inappropriate incident response leading to damage to environment of Cockburn Sound.

10.4 Environmental Objectives

- To respond to any emergencies or environmental incidents during marine construction works in an appropriate manor according to agreed protocols.

10.5 Performance Criteria

- Knowledge of all staff of appropriate procedures for emergency and oil spill response.
- Compliance with Fremantle Ports regulations and all other environmental regulations.

10.6 Implementation Strategy

- Ensure all staff are inducted and trained in correct operating procedures to avoid or minimise spills.
- Ensure adequate spill kits, absorbent material and bunding (booms) are available on site and readily available to at all times to contain and clean up spills. Personnel involved with refuelling are to adequately trained in the use of spill response kits.
- Any oils or chemicals are to be stored in an appropriately bunded area away from the foreshore.
- On-site fuelling activities are to be appropriately licensed and controlled. The location of a secure fuel storage area for marine work is to be determined in conjunction with the NewGen Construction Manager.

10.7 Monitoring

- Environmental audits of all marine works construction equipment and operations will be undertaken by NewGen at the commencement of works and at regular intervals throughout excavation works.
- Documented inspections of all plant and equipment for fuel, oil or hydraulic leakage will be carried out daily. Any leakages must be repaired before plant and equipment is permitted to be used.
- Regularly monitor knowledge of staff of where spill kits and booms are located, and on site instructions on how-to-use. Ensure all spill kits are complete and functional.

10.8 Contingencies

In the event that fuel or chemical spills occur at the site, the following procedure is to be followed:

- The sources of the suspected spill is to be stopped.
- The area is to be contained as much as possible, for example bunding on all sides using silt curtains/boom and adsorbent materials.
- Spilt fuel/chemical is recovered where possible, or disposed to an approved facility.
- After containment and initial cleanup of spill, incident reporting process has to be followed.

Any environmental incidents or other concerns are to be reported to the Construction Manager and the Environmental Auditor, and recorded in the site incidents register. An environmental incident includes any hydrocarbon spills greater than 10L.

In the event of a significant environmental incident the contractor is to immediately notify the NewGen Power Environmental Officer who will contact Fremantle Port's in accordance with Fremantle Port's Emergency Notification Plan. Emergency contact numbers for Fremantle Port's are provided in Appendix B. The construction contractor shall also notify the incident to the Site Construction Manager.

- If response to an environmental incident is deemed inappropriate by NewGen, NewGen Auditor or regulatory body, an investigation will be conducted to determine corrective actions and reporting requirements.
- The incident reporting system will advise the Construction Manager of any environmental incidents.

10.9 Key Construction Phase Management Actions Table

Table 9: Environmental Incident and Response Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
EIR1	All staff inducted and appropriately trained in operating procedures		
EIR2	Adequate spill kits available on site and readily available		
EIR3	Personnel involved in refuelling adequately trained in use spill response kits.		
EIR4	All hydrocarbons or chemicals are stored in an appropriately banded area away from the foreshore		
EIR5	Onsite fuelling activities appropriately licensed and controlled		
EIR6	Location of a secure fuel storage area from marine works determined in conjunction with NewGen construction manager		
EIR7	Environmental audits of marine works undertaken by NewGen at the commencement of works and at regular intervals.		
EIR8	Daily documented inspections of all plant and equipment for fuel, oil or hydraulic leakage.		
EIR9	Regular monitoring of staff of location of spill kits and instructions.		
EIR10	Ensure spill kits are complete and functional.		
EIR11	Hydrocarbon and chemical spills are dealt with according to procedures in plan.		
EIR12	Environmental incidents reported to construction manger.		
EIR13	Fremantle Ports notified in the event of a significant environmental incident.		
EIR14	Conduct investigation into environmental incident response if deemed inappropriate by NewGen, NewGen auditor or regulatory authority.		
EIR15	Construction manager to maintain incident reporting system to record significant environmental incidents.		

11. STAKEHOLDER CONSULTATION AND NOTIFICATION

11.1 Element

NewGen Power will respond directly to all comments received from stakeholders on the MWCEMP. The marine construction works may potentially affect and be of interest to local businesses and community groups. NewGen will appropriately notify and consult all parties prior to and during marine construction works.

11.2 Current Status

The project is being undertaken in the KIA and Cockburn Sound. The following Key Stakeholders have been identified:

- Fremantle Ports
- Town of Kwinana
- Cockburn Sound Management Council
- Water Corporation
- Verve Energy
- Department of Environment and Conservation (DEC), Marine Division and/or Department of Environment and Conservation, Kwinana Office.
- Rockingham Dolphins Western Australia

11.3 Potential Impacts

- Receive complaints from key stakeholders as a result of lack of consultation and notification of construction activities.

11.4 Environmental Objectives

- To undertake required consultation and notification of construction works.

11.5 Performance Criteria

- No complaints lodged by identified stakeholders.

11.6 Implementation Strategy

This MWCEMP will be made publicly available. This will include the following:

- Free copies of the MWCEMP, when approved by the DEC for release, will be provided to – the DEC library (2 copies), Town of Kwinana public library (2 copies), and the Battye library (2 copies);
- The MWCEMP will be posted on the NewGen Power website www.newgenpower.com.au ;
- DEC will be requested to advertise the availability of the MWCEMP in the “West Australian” newspaper.

Stakeholders will be notified of the release of the MWCEMP.

11.7 Monitoring

- Incident reporting system will monitor complaints.

11.8 Contingencies

- If complaints indicate inadequate performance, an investigation will be conducted to determine corrective actions and reporting requirements.

11.9 Key Construction Phase Management Actions Table

Table 10: Stakeholder Consultation and Notification Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
SCN1	Complaints investigation completed within two working days.		
SCN2	MWCEMP provided to DEC, ToK and Battye library.		
SCN3	MWCEMP posted on NewGen website.		
SCN4	DEC requested advertise availability of MWCEMP.		
SCN5	Stakeholders notified of MWCEMP release.		
SCN6	Construction manager to maintain incident reporting system to record complaints.		
SCN7	Conduct investigation to determine corrective actions and reporting requirements if complaints indicate inadequate performance.		

12. STAFF INDUCTION

12.1 Element

The construction works will take place within a marine environment. NewGen will ensure that all personnel have received an adequate induction during the marine construction works.

12.2 Current Status

All staff and contractors receive induction for land based activities.

12.3 Potential Impacts

- Environmental incident as a result of inadequate environmental education.

12.4 Environmental Objectives

- To ensure all onsite personnel are educated in site environmental issues and potential impacts resulting from marine construction.

12.5 Performance Criteria

- 100 percent induction of all site personnel.
- No environmental incidents.

12.6 Implementation Strategy

Implement an environmental awareness induction for all employees, contractors and sub-contractors, or any other on-site personnel, prior to their involvement with the marine works on site. The awareness shall cover:

- Environmental risk from the marine works.
- Contents and implications of the Marine Works Construction Management Plan and other EMPs for the site.
- General duty of care obligations under the *Environmental Protection Amendment Act 2003*.
- Location of the Marine Works Construction Management Plan and site contacts during the works.

12.7 Monitoring

- Induction records.

12.8 Contingencies

- The incident reporting system will advise the Construction Manager of un-inducted personnel operating on site.

12.9 Key Construction Phase Management Actions Table

Table 11: Staff Induction Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
SI1	All staff inducted.		
SI2	Construction manager to maintain incident reporting system to record incidents of un-inducted personnel operating on site..		

13. WASTE MANAGEMENT

13.1 Element

The pipeline construction will involve production of various construction wastes. In order to manage wastes effectively, NewGen will adhere to guidelines for the assessment, classification and management of wastes, along with industry principles for minimising construction wastes.

Sources of waste include:

- Plastic containers, wrapping and packaging materials.
- Scrap metal, concrete, timber and other construction wastes.
- Topsoil, trench spoil and rock wastes from excavation.
- Drums, containers, waste oil and grease and lubricants.

13.2 Current Status

Before construction commences the area will be cleared of any wastes from previous industrial activity.

13.3 Potential Impacts

- Inefficient use of resources resulting in excessive waste generation.
- Litter on site, or contamination of soils, and surface and groundwater.
- Potential ingestion and/or entanglement in litter by native fauna.
- Spread of disease through the introduction of vermin attracted to the waste.
- Spread of weeds through the introduction of green waste.
- Potential fire hazard.
- Visual amenity impacts.
- Odour generation.

13.4 Environmental Objectives

- To comply with waste management guidelines and licence conditions.
- To minimise production of waste.
- To ensure appropriate waste disposal.
- To avoid environmental harm from waste disposal.

13.5 Performance Criteria

- No waste related complaints.
- Internal site audits identifying that waste segregation, recycling and reuse is occurring appropriately.

13.6 Implementation Strategy

- Adhere to waste management legislative requirements and any relevant licence conditions.
- Ensure that the recycling bins and skips are available on site (e.g. timber, metals, general refuse, etc).

- Disposal of waste by licensed contractors.
- Comply with regulated waste procedures including use of Waste Tracking Certificates and records.
- Hydrocarbon waste is contained and stored according to AS1940.

13.7 Monitoring

- Waste management practices will be periodically audited.
- Waste documentation records will be checked.
- A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon.

13.8 Contingencies

- If complaints indicate inadequate performance, an investigation will be conducted to determine corrective actions and reporting requirements.
- The incident reporting system will advise the Construction Manager of any unauthorised waste disposal.

13.9 Key Construction Phase Management Actions Table

Table 12: Waste Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
WM1	Relevant legislative requirements and licence conditions adhered to.		
WM2	Recycling bins and skips available on site		
WM3	Disposal of waste by licensed contractors.		
WM4	Regulated Waste procedures followed.		
WM5	Hydrocarbon waste is contained and stored according to AS1940.		
WM6	Waste management practices audited.		
WM7	Waste documentation completed.		
WM8	Complaints register maintained. Complaints will be investigated and, if appropriate, acted upon.		
WM9	The incident reporting system will advise the Construction Manager of any unauthorised waste disposal.		

14. CULTURAL HERITAGE

14.1 Element

Construction earthworks and disturbance must comply with the *Aboriginal Heritage Act 1972*.

14.2 Current Status

No archaeological or ethnographic sites were identified in the desktop survey of registered aboriginal sites. The foredunes may contain archaeological materials and the Indian Ocean is a site of cultural significance to Aboriginal people.

14.3 Potential Impacts

Heritage objects or artefacts found on site are inappropriately managed.

14.4 Environmental Objectives

- To ensure that any indigenous or non-indigenous heritage objects found on site are managed appropriately and in accordance with the relevant legislation.
- Maintain positive working relationships with Aboriginal groups.

14.5 Performance Criteria

- All heritage items located are successfully managed and remain unharmed.

14.6 Implementation Strategy

- Cultural heritage monitors will be present during all excavation and ground disturbance work in the foredune areas.
- Staff and contractors will be aware of the procedures for dealing with indigenous/non-indigenous heritage objects.
- Procedures will include that if a heritage object is found, excavation work will stop in the area until appropriate action is agreed between site management and heritage monitors.

14.7 Monitoring

- Monitoring will be undertaken during earthworks and disturbance of the foredune area by indigenous monitors.
- Any heritage objects found will be reported.
- A complaints register will be maintained, complaints will be investigated and, if appropriate, acted upon.

14.8 Contingencies

- If a heritage object is found, excavation work in that area will cease until an agreed course of action is decided. This may involve assistance from appropriate specialists brought in to assess and notify the administering authority of the item.

14.9 Key Construction Phase Management Actions Table

Table 13: Cultural Heritage Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
CH1	Cultural heritage monitoring personnel are to be present during excavation and ground disturbance work in foredune areas.		
CH2	Staff and contractors are to be familiar with procedures for dealing with indigenous/non-indigenous heritage objects.		
CH3	If a heritage object is found, excavation work will stop until actions are agreed between site management and heritage monitors.		
CH4	Any heritage objects found are to be reported.		
CH5	A complaints register will be maintained, complaints investigated and, if appropriate, acted upon.		

15. TRAFFIC

15.1 Element

The construction phase of the project will be the most significant in terms of generating traffic impacts and will include the transport of materials and staff to the site during construction and the return of the vehicles after delivery of materials.

15.2 Current Status

The KIA is well served by major road and rail transport routes. The NewGen Power Station site has good access from Leath Road which serves as an access road for the other power stations and businesses nearby.

15.3 Potential Impacts

- An increase in traffic and accident potential at the proposed access point and on neighbouring roads.
- Increase in noise

15.4 Environmental Objectives

- To ensure roads are maintained and road traffic managed to meet acceptable levels of service and safety.
- To ensure the requirements of the local authority (Town of Kwinana) and Main Roads of Western Australia are met.

15.5 Performance Criteria

- No traffic accidents involving NewGen personnel or contractors.
- No complaints received concerning road condition or traffic management from construction.

15.6 Implementation Strategy

- Road watering and speed limits implemented to reduce dust emissions.
- Vehicle movements limited to standard construction operating hours wherever possible to limit noise impacts and nuisance.
- Management of arrival and departures times for heavy vehicles and equipment to reduce potential interactions with other road users.
- Clearly marked designated access to the proposed site to ensure safe entry and exit.
- Traffic management signage will be as specified in Australian Standards as a minimum.
- Transport of all hazardous substances will be in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail.
- Potential traffic delays alerted and co-ordinated with appropriate authorities.

15.7 Monitoring

- Visual monitoring by the Construction Manager of dust produced by traffic.
- Visual monitoring by the Construction Manager of traffic control measures to ensure they are effective.

- A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon.

15.8 Contingencies

- If a complaint is received the complaint process will be followed.
- If a traffic accident occurs it will be immediately reported, with the likely causes determined so as to instigate any strategies that will make the area safer.

15.9 Key Construction Phase Management Actions Table

Table 14: Traffic Key Management Actions

Ref #	Key Management Action	DEC Reporting/Evidence	Status
TM1	Road watering and speed limits implemented to reduce dust emissions.		
TM2	Vehicle movements limited to standard construction operating hours wherever possible.		
TM3	Management of arrival and departures times for heavy vehicles and equipment to reduce potential interactions with other road users.		
TM4	Clearly marked designated access to the proposed site to ensure safe entry and exit.		
TM5	Traffic management signage as specified in Australian Standards as a minimum		
TM6	Transport of all hazardous substances in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail.		
TM7	Coordinate any traffic delays with appropriate authorities.		
TM8	Visual monitoring of dust by the Construction Manager.		
TM9	Visual monitoring by the Construction Manager of traffic control measures.		
TM10	A complaints register will be maintained, and complaints investigated and, if appropriate, acted upon.		

16. COMPLAINTS

A complaints procedure shall be established to receive and respond to complaints from the community associated with the construction activities for the power station. The following information about each complaint shall be recorded:

- Name of complainant (anonymous if preferred).
- Address/general location of complainant when complaint occurred.
- Nature of complaint (e.g. noise, sediment release).
- Detailed description of complaint (e.g. noise characteristics, colour of air / water released).
- When complaint event occurred.
- If ongoing, frequency and duration of events.

All complaints shall be recorded and, where the power station is likely to be the cause of the complaint, action shall be taken to rectify the cause and prevent the incident recurring.

The following information shall be recorded:

- Details of the activities undertaken at the time of the complaint (e.g. sheet pile driving, cement pour underway).
- Details of the nature of any abnormal activities or environmental conditions.
- Results of on-site observations and investigations.
- Results of on-site observations of wind speed, wind direction, cloud cover, any discharges evident.
- Details of actions taken to alleviate or mitigate the identified causal factors of the complaint and actions to reduce the risk of recurring complaints.
- Steps taken to notify complainant of the outcomes of any investigations.

17. AUDITING

An audit program has been agreed with the Department of Conservation and Environment. Annual compliance reports will be submitted to the Department each year of the construction phase. The results of internal audits against the requirements of this MWCEMP will be reported.

18. REVIEW AND REVISION

This MWCEMP will be reviewed if construction has not commenced within twelve months of the date of its approval. Any substantial changes will result in a revised document being issued.

19. REPORTING

19.1 Annual Reports

An annual compliance report will be prepared within three months of completion of the first year of construction and annually thereafter if required, that:

- Summarises compliance with the MWCEMP conditions.
- Provides details of any incidents of non-compliance with the MWCEMP conditions. Summarises monitoring data collected as part of this MWCEMP.
- Summarises complaints.
- Summarises outcomes of auditing.

The report will be prepared in accordance with the Department of Environment's guidelines for performance and compliance reporting. The annual report will be made publicly available by placing on www.newgenpower.com.au.

19.2 Record Keeping

The following records are to be kept on site and made available to an EPA representative on request.

- Environmental monitoring reports and data, including daily plume monitoring logs;
- All environmental complaints – maintain complaints register;
- External reporting to EPA, including annual reports; and
- Daily, monthly or seasonal checklists.

20. REFERENCES

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- Environmental Protection Authority, 2005. Manual of Standard Operating Procedures: For Environmental Monitoring against the Cockburn Sound Environmental Quality Criteria (2003 - 2004) Environmental Protection Authority Report 21 January 2005 (A supporting document to the State Environmental (Cockburn Sound) Policy 2005).
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