BAULDERSTONE

PRELIMINARY ENVIRONMENT AND CONSTRUCTION MANAGEMENT PLAN

Barangaroo Central Waterfront Promenade and Interim Public Domain Works

Client: Barangaroo Delivery Authority

Document Number: PLAN-CT-001

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3	1-Nov-12	Revised and re-issued for use
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APPENDICES

Terms used in this document

BDA	Barangaroo Development Authority
DGRs	Director-General's Requirements
DP&I	NSW Department of Planning and Infrastructure
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPL	Environment Protection Licence
MSDS	Material Safety Data Sheet
OEH	Office of Environment and Heritage
PECMP	Preliminary Environment and Construction Management Plan
SSDA	State Significant Development Application
SWMS	Safe Work Method Statement

EXECUTIVE SUMMARY

BACKGROUND

The Barangaroo Central Waterfront Promenade and Interim Public Domain is the first phase in the development of the Barangaroo Central site with works planned for completion in 2015. The project is the subject of a State Significant Development Application (SSDA) and accompanying Environmental Impact Statement (EIS).

The project broadly comprises:

- Waterfront promenade - including paving, planting, furniture, lighting signage, a public wharf and water taxi pontoon, provision for the berthing of ships during special events and a low level timber board walk.
- Interim public domain – construction and use of a flexible public space to accommodate a range of temporary and long-term uses, including passive recreation and organised events. The site would be graded to the northwest with a fall of 2 per cent to create a naturalised amphitheatre.
- Structural works – allowing the existing seawall structure to link the Barangaroo Headland Park with Barangaroo South.
- Remediation - remediation and management of contaminated soil and groundwater would be undertaken to a level that supports the intended use of the site.
- Demolition – dismantling of the Interim Cruise Passenger Terminal and associated services. Dismantling of all fencing and kerbs, light poles and traffic signage. Demolition and disposal of above ground temporary water service and fire hydrant lines and equipment.

PURPOSE

This Preliminary Environment and Construction Management Plan (PECMP) describes the construction process and the mitigation measures proposed to protect the environment. It also assists in addressing the Director-General's Requirements (DGRs) for issued for the EIS. The PECMP is based on the level of detail available at this stage in the project. Construction activities and mitigation measures to protect the environment will be developed in further detail as the proposal progresses towards construction.

CONSTRUCTION SEQUENCE AND HOURS OF WORK

The expected sequence of construction activities for the project is as follows:

- Install underground services including stormwater, power, gas, sewer etc.
- Install stormwater collection tanks and gross pollutant traps.
- Bulk and detail fill ranging between 40,000m^3 to 60,000m^3. Install sandstone block retaining wall to foreshore walk progressively during fill operations.
- Demolition of concrete footings from existing light towers.
- Finishing works including timber boardwalk, park furniture, importation of topsoil and trees.

Subject to approval, it is expected that working hours would be consistent with those set for Headland Park. These hours are:

- 7am to 6pm Mondays to Fridays
- 8am to 3pm Saturdays

- No work on Sundays and public holidays.
- Out of hours work in certain prescribed circumstances.

ENVIRONMENTAL MANAGEMENT

Key inputs to the environmental management on the Barangaroo Central site include:

- Statutory, policy and contractual requirements.
- Potential environmental impacts arising from the project as identified and assessed in the EIS.

The main issues requiring management during the construction stage have been identified as:

- Noise and vibration form plant and equipment.
- Dust mobilisation and consequential effects on nearby receivers.
- Water pollution resulting from surface water runoff during rainfall events.
- Management of waste.

Management measures and monitoring have been proposed to address these issues. Proposed measures for the management of air quality include dust suppression with water, work practices to minimise dust mobilisation (covering of loads, speed controls, use of road sweepers etc), monitoring of air quality and procedures for corrective action.

Measures to address potential noise / vibration, water quality and waste issues are provided in the following issue specific plans:

- Preliminary Waste Management Plan.
- Preliminary Water Quality Management Plan.
- Preliminary Construction Noise and Vibration Management Plan.

COMMUNICATIONS AND COMPLAINTS MANAGEMENT

A number of community groups and the general public have been identified as stakeholders in relation to the construction phase of this project. Communication with these groups and other stakeholders would be described in a Communications Management Plan.

All community enquiries / complaints will be tracked. Any actions that cannot be managed immediately would be assigned to the appropriate construction personnel, and would become an outstanding action. The action would remain outstanding until it is closed out.

ENVIRONMENTAL PERFORMANCE

Environmental performance during the construction phase of the project would be managed through the following processes:

- Induction and training.
- Environmental monitoring.
- Inspections and audits.
- Compliance tracking.
- Corrective and preventative action.

1. INTRODUCTION

1.1 BACKGROUND

It is envisioned that the Barangaroo site be developed into an actively diverse cultural and civic centre. The Barangaroo site is divided into three distinct venues, being Headland Park at the northern end, Barangaroo Central and Barangaroo South. Across these venues a mix of land use including residential, retail, commercial, leisure and community purposes is planned.

The Barangaroo Central Waterfront Promenade and Interim Public Domain ("the Project") is the first phase in the development of the Barangaroo Central site with works planned for completion in 2015.

Barangaroo Central is part of the broader Barangaroo site which is a State Significant Development site under Schedule 2 of the State Environmental Planning Policy (State and Regional Development) 2011 ("State and Regional Development SEPP"). As the proposed public domain works have a capital investment value of more than $10 million, the State and Regional Development SEPP requires that a State Significant Development Application (SSDA) and accompanying Environmental Impact Statement (EIS) be prepared for the project.

In July 2012, a request for Director-General's Requirements (DGRs) for an environmental Impact Statement was lodged with the Department of Planning and Infrastructure (DP&I). The Department issued DGRs on 31 July 2012.

1.2 PURPOSE

This document is a Preliminary Environmental and Construction Management Plan (PECMP), which has been prepared to respond to the DGRs, specifically DGR No.16 which states.

16. Environmental, Construction and Site Management Plan

The EIS shall provide an Environmental and Construction Management Plan for the proposed works, and is to include:

- *Community consultation, notification and complaints handling.*
- *Impacts of construction on adjoining development and proposed measures to mitigate construction impacts.*
- *Noise and vibration impacts on and off site.*
- *Air quality impacts on the neighbourhood.*
- *Odour impacts.*
- *Water quality management for the site.*
- *Waste and chemical management.*

The PECMP describes construction methodologies and the mitigation measures proposed to protect the environment. It is based on the level of detail available at this stage in the project. Construction activities and mitigation measures to protect the environment will be developed in further detail during the detailed design, contract works specification and construction methods development phases of the works.

1.3 DOCUMENT STRUCTURE

The structure of this document is as follows:

- Introduction, background and purpose (this section).

- Project overview (Chapter 2) – Provides a brief overview of the project, including the construction sequence.
- Environmental Management approach (Chapter 3) – Explains the environmental management framework for the project, defines responsibilities and presents the approach to communications and complaints management.
- Environmental issues and controls (Chapter 4) – considers environmental aspects and impacts, then identifies approaches to mitigation and management.
- Environmental performance (Chapter 5) – reviews the approach to managing environmental performance including training, monitoring, inspections, auditing, corrective action and incident management.

2. PROJECT OVERVIEW

2.1 PROJECT ELEMENTS

The proposal has several main elements. These are described below.

2.1.1 WATERFRONT PROMENADE

The Waterfront Promenade is proposed to integrate with and continue the foreshore promenade from the approved and yet to be constructed Headland Park.

Key features of the Promenade design within Barangaroo Central include:

- Planting, including shade trees along the Promenade.
- Paving and walls including pavements for pedestrians (including accessible pathways), cyclists and vehicular (emergency and maintenance) traffic, and sandstone block walls adjacent to the boardwalk.
- Furniture including seats, rubbish bins, drinking fountains, bike racks and life buoys along the Promenade and at key locations.
- Public deck and stage extending into northern cove.
- Public wharf and water taxi pontoon.
- Signage.
- Lighting.
- CCTV, WiFi infrastructure.
- Infrastructure for berthing of ships for special events.
- Low level timber board walk

These elements would be consistent with those used in the Headland Park and are intended as long term features.

2.1.2 INTERIM PUBLIC DOMAIN

The Interim Public Domain will provide a flexible public space to accommodate a range of uses including passive recreation and organized events.

Key features of the Interim Public Domain design include:

- Planting including a lawn of a suitable quality to support leisure and recreation activities such as touch football, and occasional major events.
- Signage.

- Lighting.
- Provision for two future Pavilions and a Public Art / Event Staging Area including all necessary services to support the intended end use of these facilities.
- Infrastructure for events (power, water, sewer).

The creation of the interim public domain would include the placement of fill (40,000 to 60,000 cubic metres) on site to an approximate maximum RL of 5.8 in the south eastern corner of the site adjacent to Hickson Road. The site would be graded to the north west with a fall of 2 per cent to create a naturalised amphitheatre for events etc.

2.1.3 ACCESS

The Waterfront Promenade and Interim Public Domain would be accessed by:

- Pedestrians from Hickson Road, the Headland Park, and the temporary foreshore connection through the Barangaroo South construction site extending from King Street Wharf to the subject site.
- Water taxis and small boats at the public wharf and pontoon in the Northern Cove.
- Large boats at the mooring location along the western edge.

For vehicular access, a temporary accessway for emergency, event and maintenance vehicles is proposed along the overland flow path to the south of the site.

2.1.4 EVENTS

The proposal includes the use of the interim public domain area for events. Events are likely to include open air performances (including music and theatre), twilight cinema, wine and food festivals, circus, live sites for major sporting or cultural events, private and/or corporate functions and the like.

2.1.5 STRUCTURAL WORKS

Structural work would be undertaken on the existing seawall structure to link the Barangaroo Headland Park with Barangaroo South. These works include:

- Reuse of the existing caissons (including cathodic protection works).
- Provision of new retaining walls to raise the levels of the western Promenade.
- Provision of a boardwalk and associated stairs and ramps; construction of a structural concrete slab beneath the boardwalk.
- Provision of a water taxi pontoon with a ramp in the Northern Cove.
- Reuse of existing shipping infrastructure (bollards and fenders).

2.1.6 CIVIL WORKS

Earthworks would be undertaken to create the desired finished surface levels across the site. A temporary accessway would be constructed to provide maintenance and occasional emergency and event vehicle access, as well as pedestrian access across the site from east to west. The temporary accessway would also act as an overland flow path. Pavement woul be provided within the public Promenade along the harbour edge.

2.1.7 SERVICES

All required services are proposed to support the intended use including stormwater, sewer, potable water, recycled water, irrigation, telecommunications and security, electrical, and public lighting. Generally permanent services would be provided to support the Waterfront Promenade, and temporary services to support the Interim Public Domain.

2.1.8 SUSTAINABILITY MEASURES

The following overarching sustainability goals have been defined for the Barangaroo Precinct:

- Water Positive - more water recycled and exported from the site than is used within the site;
- Zero Waste – through prevention, minimisation, recycling and re-use;
- Carbon Neutral – by generating more new renewable energy the total net greenhouse gas emissions; and
- Socially Sustainable – through learning development programs, effective community infrastructure and a commitment to cultural and public arts facilities.

2.1.9 REMEDIATION WORKS

Remediation and management of contaminated soil and groundwater would be undertaken to a level that supports the intended use of the site.

2.1.10 DEMOLITION

Demolition proposed as part of the subject works would include:

- Dismantling and reuse off site of the Interim Cruise Passenger Terminal and associated services and structures.
- Dismantling and disposal of all fencing and kerbs, light poles and traffic signage.
- Dismantling and off-site disposal of three light towers and temporary electrical conduits powering the light towers.
- Demolition and disposal of above ground temporary water service and fire hydrant lines and equipment.

2.2 CONSTRUCTION SEQUENCE

The works are anticipated to commence in January 2014. Table 2-1 provides a general sequence of activities and an anticipated schedule.

Table 2-1 Works stages and timing

Stage	Description	Equipment	Expected duration
Stage 1	Install underground services including stormwater, power, gas, sewer etc.	Excavator with hammer and saws, trucks moving material, compaction rollers.	Ist Quarter To Third Quarter 2014 (Approximately 9 mths)
Stage 2.	Install stormwater infrastructure.	Truck deliveries, some oversized loads, plant as above.	Ist Quarter To Third Quarter 2014 (Approximately 8 mths)
Stage 3	Bulk and detail fill ranging between 40,000m^3 to 60,000m^3. Install sandstone block retaining wall to foreshore walk progressively during fill operations.	Truck deliveries up to 80 trucks a day, large compacter, dozers, rollers and excavators.	2nd and 3rd Quarters 2014 (Approximately 5 mths)
Stage 4	Demolition of concrete footings from existing light towers.	Excavators with hammers, crushing machine, trucks removing material off site.	Ist and 2nd Quarters 2014 (Approximately 5 mths)
Stage 5	Finishing works including timber	Cranes, bobcats,	3rd Quarter 2014

Stage	Description	Equipment	Expected duration
	boardwalk, park furniture, importation of topsoil and trees.	excavators and trucks	through to Ist Quarter 2015 (Approximately 8 mths)

2.3 HOURS OF WORK

Subject to approval, it is expected that working hours would be consistent with those set for Headland Park. These hours are:

- 7am to 6pm Mondays to Fridays
- 8am to 3pm Saturdays
- No work on Sundays and public holidays

Works outside of these general hours would only be permitted in circumstances that include:

- Work that is inaudible at residential premises.
- The delivery of material outside of these hours as requested by police or other authorities for safety reasons.
- Emergency work to avoid the loss of lives, damage to property and/or to prevent environmental harm.
- Other works expressly approved by the Director-General of the Department of Planning and Infrastructure.
- Outside of standard hours identified in the Construction Noise and Vibration Management Plan approved by the Director General.

3. ENVIRONMENTAL MANAGEMENT APPROACH

The construction contractor, on behalf of the Authority, will be responsible for implementing the environmental management principles developed for the construction phase of the project. It is envisaged that the construction contractor would manage these obligations generally in accordance with the approach set out below.

3.1 ENVIRONMENTAL MANAGEMENT FRAMEWORK

3.1.1 STATUTORY, POLICY AND CONTRACTUAL REQUIREMENTS

Key inputs to the environmental management on the Barangaroo Central site will include:

- Statement of commitments included with the EIS and revised as required.
- Conditions of approval
- Relevant legislation
- Approvals, licences and permits
- The project contract
- NSW Government's EMS Guidelines.

These matters will be addressed in detail by the construction contractor.

3.1.2 RISKS AND OPPORTUNITIES

Potential environmental impacts arising from the project have been identified and assessed in the EIS.

An Aspects, Impacts and Risk Register has been developed and is included in Section 4.

The register aims to ensure that all aspects are captured, requirements addressed and mitigation measures applied. The Aspects, Impacts and Risk register will be reviewed periodically throughout construction as part of the management review process, or as required in the event of a change to the project

3.1.3 ENVIRONMENTAL DUE DILIGENCE

Environmental due diligence is the systematic identification of the environmental risks and liabilities associated with an organisation's sites and operations.

The principles of environmental due diligence have been applied throughout the preparation of this plan and related environmental documents. Due diligence principles are included in the development of all other environmental management procedures or changes to plans.

3.2 ENVIRONMENTAL MANAGEMENT DOCUMENTATION

Figure 3-1 illustrates the expected structure of the project environmental management documentation. This suite of documentation will be refined by the construction contractor to ensure all elements of any planning approval are addressed.

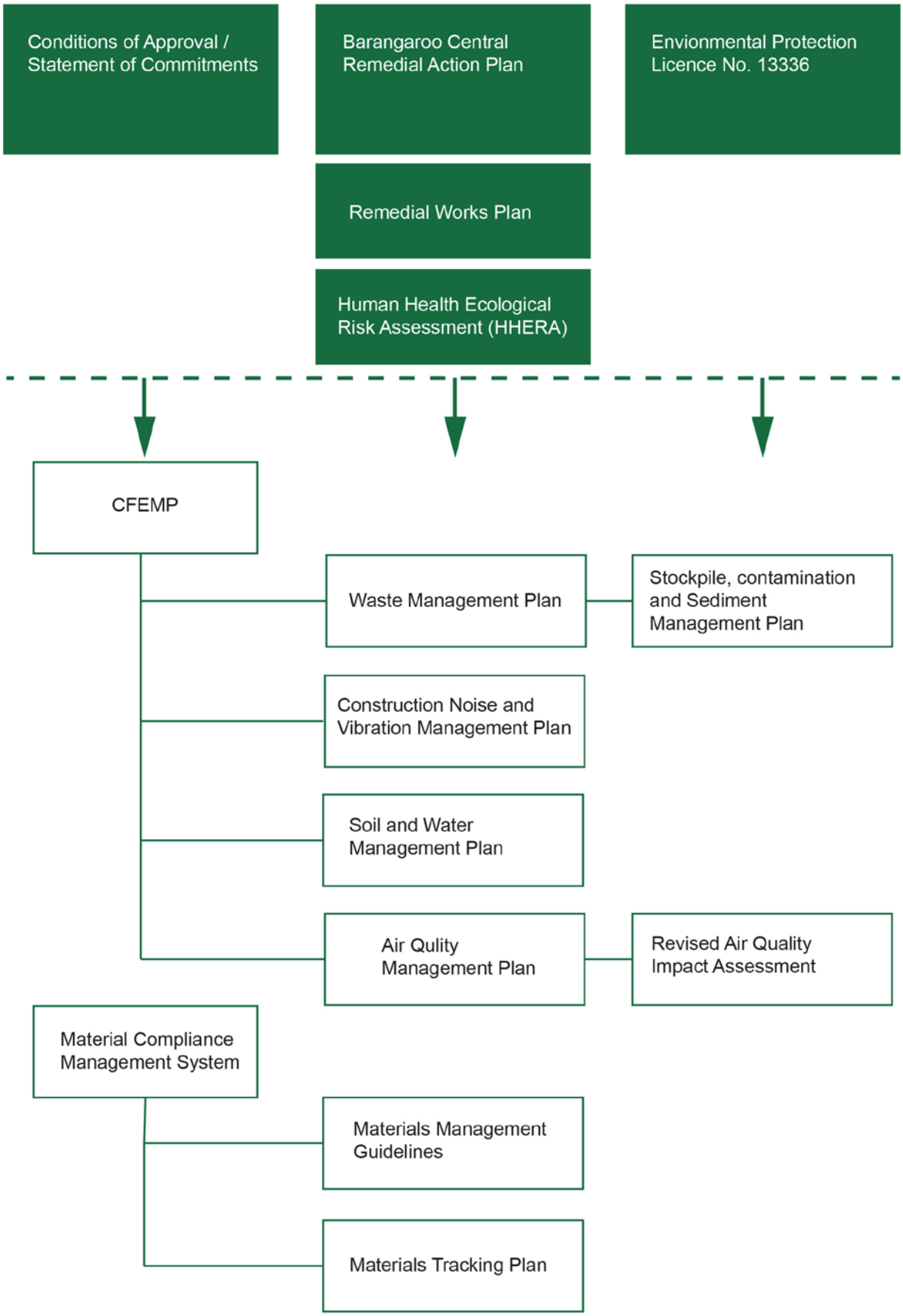

Figure 3-1 Environmental management documentation

3.3 ROLES AND RESPONSIBILITIES

The construction contractor will identify key positions / personnel with responsibilities for environmental management and compliance. It is expected that environmental management responsibilities will be articulated for, but not necessarily limited to, the following positions:

- Project Director
- Environmental Manager
- Specialist environmental resources
- Project and site engineers
- Superintendents
- Forman
- Suppliers and subcontractors

3.4 COMMUNICATION AND COMPLAINTS MANAGEMENT

A number of community groups and the general public have been identified as stakeholders in relation to the construction phase of this project. Communication with these groups, along with BDA, authorities, service authorities and other groups would be described in a Communications Management Plan.

All community enquiries / complaints will be tracked. Any actions that cannot be managed immediately would be assigned to the appropriate construction personnel, and would become an outstanding action. The action would remain outstanding until it is closed out.

Enquiries including complaints would be received through any one of the communication channels available, which would include:

- the project telephone line;
- the project email address;
- the project website that has a comment form that people can readily complete to make an enquiry, comment or complaint; and
- approach to workers operating around the site boundaries or on the streets or contact with project staff that they come to know through the project.

Figure 3-2 illustrates the expected approach to complaints management.

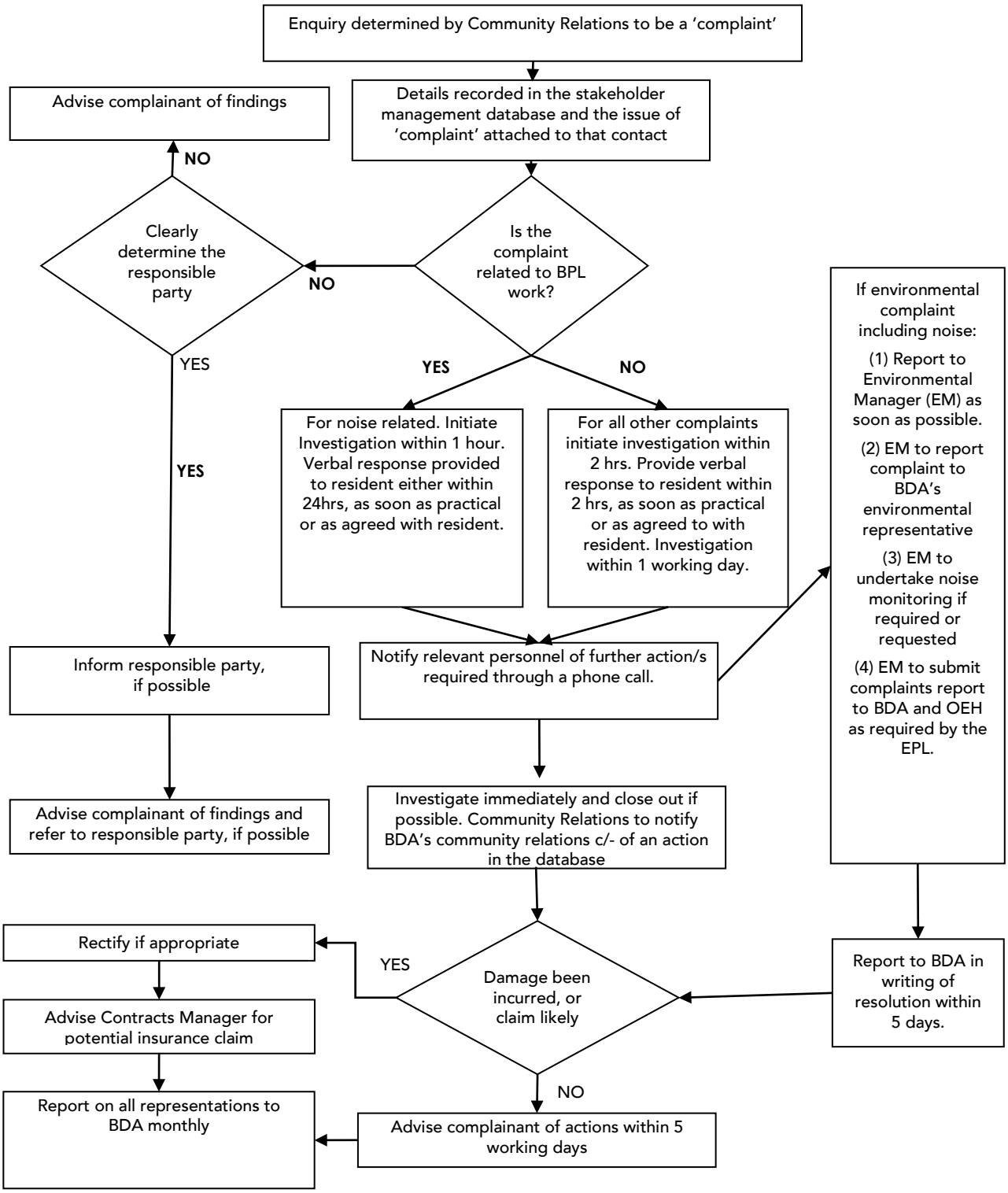

Figure 3-2 Complaints management

4. ENVIRONMENTAL ISSUES AND CONTROLS

4.1 ENVIRONMENTAL RISK ASSESSMENT

A preliminary environmental risk assessment of construction activities has been undertaken and is included below.

The objectives of the risk assessment are to:

- identify activities, aspects, events or outcomes that have the potential to adversely affect the local environment;
- qualitatively evaluate and categorise each risk item;
- assess whether risk issues can be managed by the implementation of environmental protection measures;
- qualitatively evaluate residual risk with implementation of measures; and

It is intended that the construction contractor will review the environmental risk assessment periodically over the life of the project to ensure the register remains current. Risk assessment is undertaken for all major activities, new works and activities in environmentally sensitive areas.

LIKELIHOOD (L)			CONSEQUENCE (C)				RISK RATING (R)					RISK RATING – SUMMARY and CONTROLS APPROVAL
							1	2	3	4	5	E. = Extreme (CD Approval)
A	Almost certain	Expected to occur	1	Insignificant	Little of no environmental harm and/or impact on operations	A	H	H	E	E	E	H. = High (CM Approval)
B	Likely	Will probably occur	2	Minor	Minimal environmental harm and/or some impact on operation	B	M	H	H	E	E	M. = Medium (CM Approval)
C	Possible	Might occur at some time.	3	Moderate	Moderate environmental harm and/or some impact on operation	C	L	M	H	E	E	L. = Low (EM Approval)
D	Unlikely	Could occur at some time	4	Major	Long term or serious environmental damage and/or impact on operations	D	L	L	M	H	E	
E	Rare	May occur in exceptional circumstances.	5	Catastrophic	Catastrophic environmental harm and/or significant impact on operations	E	L	L	M	H	H	

Category/activity	Potential aspect or hazard	Potential impacts/risks	Likelihood	Consequence	Risk	Actual or potential actions and controls
Ongoing Activities						
Establishing sites Site compound(s) Amenities/storage sheds and facilities Storage of fuels, oils, chemicals	▪ Noise generation ▪ Wastewater management ▪ Runoff of pollutants ▪ Soil/land contamination	▪ Visual impacts	B	2	High	▪ Appropriate selection, design and layout of compound and facilities ▪ Consultation with City of Sydney Council regarding the location and design any site compound.
		▪ Surface and groundwater pollution (increasing suspended solids, oil and grease, chemical pollutants)	D	4	High	▪ Provide impervious bunded areas of appropriate capacity and design ▪ Locate bunds/potentially polluting activities away from drainage lines ▪ Development of Soil and Water Management Sub Plan

Category/activity	Potential aspect or hazard	Potential impacts/risks	Likelihood	Consequence	Risk	Actual or potential actions and controls
		▪ Noise pollution from plant/vehicles	C	3	High	▪ Residential grade silencers. ▪ Time restrictions ▪ Noise level monitoring
		▪ Human health impacts from dust	D	3	Medium	▪ Dust suppression
Transport of employees to and from the site	▪ Fuel emissions	▪ Air pollution ▪ Use of a natural resource	A	2	High	▪ No parking will be provide onsite for employees to encourage the use of public transport or cycling/walking to work
	▪ Traffic and pedestrian impacts.	▪ Road congestion. ▪ Conflict with footpath and cycling routes	B	3	High	▪ Develop and implement traffic control plan that includes interaction with pedestrians and cyclist.
Use of paper	▪ Contribution towards loss of native forests (depending on paper source); energy use, water use	▪ Contribution towards loss of biodiversity, water and air pollution	A	2	High	▪ Encourage use of duplex printing on photocopiers and laser printers ▪ Encourage recycling/reuse of paper that has only been printed on one side ▪ Include logo in email signatures to prompt people as to whether they really need to print out an email
Ordering construction materials	▪ Sourcing timber from unsustainably managed sources	▪ Loss of biological diversity	D	2	Low	▪ Stipulate requirement in relevant sub-contractor contracts
	▪ Over-ordering materials	▪ Depletion of non-renewable resources and waste generation	C	2	Medium	▪ Precise estimating, checking and ordering of materials ▪ Arrangements with suppliers for return of surplus items/quantities where practicable
Delivery of materials to site	▪ Vehicle movements	▪ Greenhouse gas emissions	A	3	Extreme	▪ Planning to minimise number of orders and deliveries from same supplier
	▪ Fuel consumption ▪ Greenhouse gas and other air emissions	▪ Air pollution from exhaust emissions	A	2	Moderate	▪ Where appropriate, contracts with major suppliers to stipulate requirement that delivery vehicles are appropriately maintained and emissions comply with relevant criteria/standards
	▪ Traffic and pedestrian impacts.	▪ Road congestion. ▪ Conflict with footpath and cycling routes	C	3	High	▪ Develop and implement traffic control plan that includes interaction with pedestrians and cyclist.
	▪ Noise from heavy machinery/trucks. ▪ Loading and unloading of material	▪ Noise impacts on nearby receivers.	B	3	High	▪ Implement Construction Noise and Vibration Management Sub Plan. ▪ Undertaken consultation with the affected community. ▪ Work undertaken during standard working hours.
Office printing and photocopying	▪ Use of consumables and energy – toner cartridges	▪ Resource and energy use	A	1	High	▪ Recycling of photocopier and laser printer cartridges ▪ Encourage black & white printing wherever possible
General waste management at offices	▪ Waste generation	▪ Use of landfill space, loss of resources	A	2	High	▪ Recycling of e-waste
Use of electricity –	▪ Greenhouse gas emissions; use of non-renewable	▪ Contribution to global warming, depletion of	A	2	High	▪ Leasing of temporary buildings that feature energy saving devices

Category/activity	Potential aspect or hazard	Potential impacts/risks	Likelihood	Consequence	Risk	Actual or potential actions and controls
offices	resources	resources, air pollution				▪ Compulsory use of screen savers ▪ Appropriate power settings on PCs
Kitchen and bathroom facilities	▪ Water use	▪ Water wastage and wastewater generation	A	2	High	▪ Leasing of temporary buildings that feature water saving devices ▪ Encourage temporary site building providers to incorporate water-efficient fixtures and fittings ▪ Water conservation signs in kitchens and bathrooms
1. Install underground services including stormwater, power, gas, sewer etc.	▪ Operation of trenching, boring and earthmoving equipment.	▪ Noise	A	2	High	▪ Residential grade silencers ▪ Time restrictions ▪ Noise level monitoring Respite periods
		▪ Vibration	A			▪ Safe working distances will be devised to prevent damage and adverse impacts off-site ▪ Vibration level monitoring
	▪ Damage to existing services.	▪ Service interruptions	D	4	High	▪ Confirm and implement agreed relocation methodology. ▪ Implement protection measures where appropriate.
2. Install stormwater infrastructure	▪ Excavation of material	▪ Air Quality – Dust	B	3	High	▪ Use appropriate equipment for dust suppression (e.g. water sprays) ▪ Avoid dust-generating excavation activities during hot and/or windy conditions, if possible.
		▪ Noise pollution by machinery and de-watering equipment	A	3	Extreme	▪ Residential grade silencers ▪ Time restrictions ▪ Noise level monitoring ▪ Respite periods where necessary ▪ Equipment/plant will be selected mindful of noise pollution ▪ Where necessary mufflers/noise reduction kits will be used on plant/equipment
		▪ Vibration risk	A	3	Extreme	▪ Respite periods will be considered ▪ Safe working distances will be devised to prevent damage and adverse impacts off-site ▪ Vibration level monitoring
		▪ Noise and Vibration effects on Marine Mammals	D	2	Low	▪ Monitoring of the National Parks and Wildlife announcements during migration periods ▪ Developing a Management Plan in the instance that there are mammals are in the bay ▪ Emergency Response Procedure ▪ Marine health monitoring and surveying
	▪ Flooding of excavation from groundwater in-flow/seepage and/or rain	▪ Potential contamination in water accumulated in excavations.	A	3	Extreme	▪ Excavations to be dewatered as necessary ▪ Testing of water for water quality parameters and chemical characteristics prior to reuse/disposal ▪ Suitable treatment of water to be undertaken if necessary prior to water reuse/disposal
	▪ Stockpiling of excavated material	▪ Migration of contaminants and stockpiled soil into underlying soils and/or groundwater, and migration	C	3	High	▪ Stockpiles to be placed on concrete/asphalt hardstand or other areas with impermeable ground surface. ▪ Stockpiles and/or stockpile area to be adequately bunded to control runoff from stockpiles / stockpile area

Category/activity	Potential aspect or hazard	Potential impacts/risks	Likelihood	Consequence	Risk	Actual or potential actions and controls
		of contaminants and stockpiled soils via runoff to receptors.				
		▪ Dust & Erosion	B	3	High	▪ Stockpiles to be adequately covered to prevent erosion and generation of dust ▪ Use windbreaks and barricades to reduce wind erosion ▪ Minimise working face ▪ Align perpendicular to prevailing winds ▪ Water sprays
		▪ Odour pollution	D	3	Medium	▪ Cover stockpiles ▪ Air monitoring ▪ Odour masking agent
	▪ Acid Sulfate Soils	▪ Acid water run-off ▪ Hydrogen sulphide vapours ▪ Dissolution of heavy metals	D	3	Medium	▪ Acid Sulfate Management Plan (ASMP) ▪ Neutralisation of the acid with lime
3. Bulk and detail fill approximately 40,000 – 60,000m^3.	▪ Transfer of crushed material ▪ Odour ▪ Receipt of contaminated material from supplier (Lend Lease)	▪ Energy use through transportation of material	A	3	Extreme	▪ Efficiency will be encouraged through reduction of double handling
		▪ Odour pollution while in transit	C	2	Medium	▪ Cover loads ▪ Specified haul routes ▪ Air monitoring ▪ Odour Masking
		▪ Soil and groundwater contamination	D	3	Medium	▪ Materials must meet site acceptance criteria set by the RAP. ▪ No Tar Containing Materials (as defined by the RAP) to be accepted. ▪ No materials form the Declaration Area to be accepted. ▪ Implement Materials Compliance Tracking System
4 Demolition of concrete footings of existing light towers.	▪ Crushing and removal of concrete ▪ Noise associated with activities ▪ Dust generation	▪ Waste management	A	2	High	▪ If suitable, the waste concrete will be reused within the headland ▪ Bituminous material will be removed from site
		▪ Land contamination	D	3	Medium	▪ If un-suitable (contaminated), the crushed concrete will be removed from site
		▪ Noise pollution	A	3	Extreme	▪ Residential grade silencers ▪ Time restrictions ▪ Noise level monitoring ▪ Respite periods
		▪ Vibration risk to surrounding infrastructure	A	3	Extreme	▪ Time restrictions ▪ Respite periods ▪ Safe working distances
		▪ Air quality – dust	A	3	High	▪ Selection and use of appropriate equipment featuring dust suppression mechanisms

Category/activity	Potential aspect or hazard	Potential impacts/risks	Likelihood	Consequence	Risk	Actual or potential actions and controls
5 Finishing works including timber boardwalk, park furniture importation of topsoil and trees	▪ Placement of growing media	▪ Sedimentation of surrounding waters	D	3	Medium	▪ Cover inlets to stormwater drains and pits as a precautionary measure ▪ Marine health monitoring/surveying
		▪ Dust generation	C	3	High	▪ Use appropriate equipment for dust suppression (e.g. water sprays) ▪ Avoid dust-generating excavation activities during hot and/or windy conditions, if possible.

4.2 MANAGEMENT OF KEY ENVIRONMENTAL ASPECTS

The DGRs specifically require the Preliminary Environmental and Construction Management Plan to consider the following environmental aspects:

- Community consultation, notification and complaints handling.
- Impacts of construction on adjoining development and proposed measures to mitigate construction impacts.
- Noise and vibration impacts on and off site.
- Air quality impacts on the neighbourhood.
- Odour impacts.
- Water quality management for the site.
- Waste and chemical management.

Community consultation and complaints handling is considered in section 3.4 while the impacts of construction on adjoining development and associated mitigation are considered by the environmental risk assessment in Section 4.1. The other environmental aspects noted above are considered in more detail in Section 4.2.1 through to Section 4.2.4.

4.2.1 NOISE AND VIBRATION

Potential noise and vibration from construction processes and activities have been assessed by the noise and vibration assessment conducted by Wilkinson Murray. The assessment identified the activities likely to exceed noise and/or vibration goals at identified sensitive receivers.

The construction contractor will prepare a Noise and Vibration Management Plan for the project and this will be based on the Preliminary Construction Noise and Vibration Management Plan prepared by Wilkinson Murray. The plan will form part of the Construction Environmental Management Plan (refer Figure 3-1) and will include details of mitigation, management and monitoring. The plan will be used to manage impacts from all activities, with particular reference to those activities that might generate emissions greater than the noise goals.

The controls and safeguards implemented will be reviewed at a number of stages during the excavation period in response to revised methods and equipment, or monitoring and evaluation of actual impacts.

The following measures would be employed to address the impacts of airborne noise and vibration from construction activities:

- The employee and contractor induction will inform all site personnel about noise management measures, construction hours and nearest sensitive receivers. All employees are responsible for managing noise from their work activities and working in a manner to minimise noise.
- Limit construction works other than approved 24hr activities to 7.00am -6.00pm Monday to Friday and 8.00am-3.00pm Saturday.
- Ensure that plant and equipment is well maintained and carry out maintenance as required.
- Implement all reasonable and feasible noise source controls to reduce noise from plant and equipment during construction.
- Notice of works will be provided to relevant affected residents at least 5 days prior to commencing construction activities. Complaints dealt with in a timely manner.
- Carry out environmental noise monitoring and keep records in accordance with the Construction noise and vibration management plan.

- Maintain a log of noise management practices and monitoring, and provide reports where necessary.
- Undertake supplementary monitoring to identify the source of any non-conformance, and/or engineering or operational modifications to avoid any recurrence.

4.2.2 AIR QUALITY AND ODOUR

Air quality and odour impacts from construction activities such as earthworks can affect human and environmental wellbeing. Accordingly, management controls are required to minimise and control the effects of air pollution generated from site activities on adjacent receptors, the travelling public and workers. The primary source of emissions is likely to be particulate emissions during soil excavation and profiling.

The construction contractor will prepare a Air Quality Management Plan for the project. This plan will form part of the Construction Environmental Management Plan (refer Figure 3-1) and will include details of mitigation, management and monitoring.

It is noted that levels of chemical emissions will be well below applicable chemical assessment criteria and malodorous constituents will be well below levels at which potential odours may be observed. This is a consequence of the low levels of impact in surface soils on the Barangaroo Central site and strict chemical acceptance criteria for material imported to the site (refer to *Air Quality and Health Impact Assessment - Barangaroo Central Waterfront Promenade and Barangaroo Central Interim Public Domain*, JBS Environmental, 2012).

Measures to address impacts of dust and equipment emissions would include:

- Directional water sprays and mist units to minimise particulate generation.
- Reduce excavation / material handling activities during periods of non-favourable meteorological conditions.
- Keep Front End Loader and Excavator buckets free of residual material.
- Restrict vehicle speeds on site to 10 km/h for all travel on site haul routes.
- Construction and ongoing maintenance of a trackout control device ('cattle grid').
- Construction and operation of a wheel wash for vehicles exiting site.
- Do not overfill vehicles.
- Cover all loads with tarpaulin prior to movement.
- Availability of roadway sweeper vehicles to remove any sediment / particulates as accumulated form wheel tracks on public roads.
- Inspection of exhaust emissions to identify excessive visible exhaust emissions. Where visible / excessive emissions identified, decommissioning of equipment and undertaking maintenance.

Air monitoring would be undertaken throughout the duration of earthworks, including:

- Real time air quality monitoring for PM10 will be undertaken at the site boundaries on a daily basis for the entire duration of works. Any exceedances of air quality criteria at the boundary (set as 50 µg/m3 attributable to the Barangaroo Central works), as detected by the real-time monitoring, requires either a reduction in the scale of construction works or additional air quality management controls.
- Real time air quality monitoring for odour will be undertaken at the site boundaries on a daily basis for the entire duration of works. Any detection of odours using a field olfactometer at the boundary, as detected by the real-time monitoring, will require immediate implementation of all available air quality controls. In lieu of additional controls, site works causing malodorous / chemical emissions will

need to be ceased (and if appropriate sealed / covered) and an assessment of additional air quality controls undertaken.

4.2.3 WATER QUALITY MANAGEMENT

The following principles would apply to the management of water quality during construction.

- Minimise site disturbance.
- Divert clean water around the site, or through the site without contamination.
- Control erosion.
- Control sediment.
- Stabilise soils following completion and / or suspension of construction activities.
- Monitor and evaluate the effectiveness of measures employed.

A detailed Soil and Water Management Plan will be prepared for the project prior to construction. This plan will form part of the Construction Environmental Management Plan (refer Figure 3-1) and will include details of mitigation, management and monitoring. The Soil and Water Management Plan will:

- Identify erosion, sedimentation and water quality issues potentially arising in order to minimise the adverse impacts of construction activities on local waterways and adjacent land.
- Consider volumes of water generated on site from design storms and groundwater.
- Detail the types, locations, specifications and capacity of measures to manage soil and water quality during construction, based on Blue Book and license criteria.
- Detail contingency plans in the case that runoff water exceeds the capacity of on-site measures to adequately treat to required standards.
- Details dewatering methods.
- Define stockpile locations, management, maximum heights.
- Include progressive Erosion and Sediment Control Plans that describe site-specific devices and controls to be employed for various sections/stages of construction.
- Include a detailed monitoring plan to identify monitoring methods, locations, frequency, duration.

4.2.4 WASTE AND CHEMICAL MANAGEMENT

A Preliminary Waste Management Plan has been prepared as a companion document to this PECMP. A detailed Waste Management Plan will be prepared prior to construction and will form part of the Construction Environmental Management Plan. It will reference:

- 'Waste Classification Guidelines'; and
- NSW Government's 'Waste Reduction and Purchasing Policy" (WRAPP).

The Waste Management Plan will:

- Confirm the waste streams that will be generated during the works.
- Detail for each waste stream:
  - the waste classification (refer Waste Classification Guidelines).
  - how and where the waste is to be reused, recycled or disposed of;
  - receptacles to be used for storage; and

- how and by whom the waste will be transported between generation, storage and point of reuse, recycling or disposal.
- include the methods for monitoring the implementation of the plan.

- Identify the need for section 143 Notices.
- Identify any exemptions under the *Protection of the Environment Operations Act 1997* (POEO Act);
- Identify licenced waste facilities that are to receive waste from the project.

A Waste Management Register will be maintained to record the type, amount and location of waste reused, recycled and disposed. The register will include:

- Type of waste and its classification.
- Quantity.
- How, when and where the waste was recycled, reused or disposed of.
- The name of any transporter and / or disposal site used.

Waste information that is reportable to the NSW Government under the WRAPP will be reported for the preceding financial year and at completion.

Hazardous materials

A hazardous material is one that poses a hazard to human health or the environment when improperly handled, stored or disposed of. The hazard may arise from acute or chronic toxicity or carcinogenicity of the substance or its corrosive or flammable nature.

Hazardous materials that may be encountered during construction work can be broadly identified and categorised as solid, liquid or gaseous:

- Solid hazardous materials are normally associated with activities involving hazardous spoil, construction materials and explosives.
- Liquid hazardous materials comprise flammable and combustible liquids and toxic chemicals including pesticides, insecticides and liquefied gases, acids, solvents, lime and degreasing agents.
- Gaseous materials which may be hazardous are flammable gases, toxic gases and gaseous emissions from construction works.

Details related to a substance's physical properties, flammability, toxicity, special precautions, transport and storage are detailed in a Material Safety Data Sheet (MSDS).

Bunding and spill management will be undertaken in accordance with:

- Relevant legislation and Australian Standards.
- EPA 'Bunding and Spill Management Guidelines'.
- WorkCover requirements and guidelines.

A current MSDS will be made available for any hazardous substance or dangerous good stored and handled at the premises. Controls detailed in the MSDS will be recorded in the Safe Work Method Statement relating to the activity that involves the use of the substance.

A Hazardous Substance Register will be maintained for all hazardous substances used on the site. Containers will be labelled. Prior to bringing any hazardous material on to site, the licensing requirements to store the material will be determined from the:

- Australian Standard for storage and handling of Hazardous Substances (AS1940-2004).
- Australian Dangerous Goods Code.

- Relevant MSDS.

A risk assessment will be performed on the use and disposal of the material, and the appropriate controls implemented.

Transporting dangerous goods

All waste materials moving to and from site will be tracked using dockets and receipts. Only licensed transporters will be used to move and dispose of waste materials.

When transferring dangerous goods measures will be taken to control spills, overflows and leaks, minimise static electricity and control vapour generation. If significant quantities are being transported, local authorities will be notified in case of an emergency situation or spill during transit.

Storing Hazardous Substances

All containers of hazardous chemicals including oil and fuel, will be stored in a bunded area so the capacity of the spillage containment compound is as follows:

- 0-10,000 - Volume of largest package plus 25%
- 10,001 – 100,000 L - Volume of largest package plus 10%
- Over 100,000 L Volume of largest package plus 5%

Or alternatively: 100% of largest container, or 10% of all containers in area with an additional 10% allowance

Other measures will include:

- Where possible, the bunded area will be covered to prevent rain and water filling the area, resulting in additional treatment requirements during disposal and management of the storage areas.
- The storage area will be clearly signposted.
- Where the storage area is part of a building, ventilation will be provided at floor and ceiling levels, of an adequate size to allow circulation of air, as per AS1940.
- Storage areas will be kept locked at all times and secured against unauthorised access and potential theft.
- Where different substances are stored in the same room, the MSDS will be consulted prior to storage to verify compatibility of substances. A bunded floor liner may also be required to prevent seepage and spillage.
- Non-compatible dangerous goods will be stored separately so that loss of containment will not cause a dangerous situation.
- Where practical, fuels and chemicals will not be stored or handled in the vicinity of natural or built waterways or water storage areas. All storage areas will be a minimum distance of 20 metres of natural or built drainage lines, flood prone areas or on slopes steeper than 1:10.
- All storage tanks containing hazardous substances will have the contents and volume clearly identified, be numbered if in a cluster, and have the appropriate Hazchem signs displayed to legislative requirements and AS 1319.
- Storage areas will be protected against damage from impact with vehicles, mobile plant etc.

In each area of the premises where dangerous goods are stored or handled, provision will be made for spill containment that will:

- Contain the spill of dangerous goods

- Enable spilled or leaked dangerous goods and any solid or liquid effluent arising from the incident to be cleaned up and disposed of or otherwise treated.
- Appropriate workforce training will be provided for spill management and the use of spill response kits and supplies.
- Incident reporting procedures will be followed in the event of a spill.
- Where sources of ionising radiation have been identified, they will be handled in accordance with the requirements of the relevant State radiation safety act and radiation safety regulations.

Disposing of Hazardous Waste

All unused or excess chemicals and materials will be removed and disposed of in accordance with the MSDS and waste disposal guidelines. Disposal of containers as well as any unused contents will be tracked via the waste disposal processes outlined in the process for Waste management.

5. ENVIRONMENTAL PERFORMANCE

5.1 ENVIRONMENTAL PERFORMANCE MANAGEMENT

5.1.1 INDUCTION AND TRAINING

The project induction will outline key environmental issues. All personnel working on the project, including sub-contractors, will be required to complete the induction prior to starting work, and will be provided with helmet stickers to show they have been inducted.

The project induction includes the following environmental aspects:

- key issues relating to the project and existing environment;
- concepts of due diligence and duty of care;
- relevant requirements of environmental documents and relevant conditions of environmental licences, permits and approvals;
- relevant CEMP issues, including environmental policy and EMS;
- site specific issues, such as: EPL requirements and noise.
- site-specific erosion and sedimentation controls, and use of spill kits to contain spills;
- environmental emergency plans, and incident reporting procedures for environmental harm/incidents

Task-specific training is required before staff and sub-contractors can commence high-risk activities, or work in environmentally sensitive areas. This includes:

- advanced training for staff installing and maintaining erosion and sediment controls, by a specialist soil conservationist.
- training on the management of odorous materials
- any other subjects listed in sub-plans.

Where necessary, toolbox meetings will be used to highlight specific environmental and community issues, which are relevant to site personnel.

5.1.2 ENVIRONMENTAL MONITORING

Environmental condition monitoring will be undertaken in accordance with an Environmental Monitoring Program to be developed by the construction contractor as part of the final Construction Environmental Management Plan.

The program will draw together all of the monitoring requirements set out in the:

- Minister's Conditions of Approval and Statement of Commitments.
- Environmental Protection Licence.
- Other regulatory instruments.
- CEMP and subplans.

Environmental monitoring will be managed as follows:

- Monitoring will be undertaken in accordance with EPA approved methods, Australian Standards or in the absence of either of these, industry acceptable procedures;
- Frequency of monitoring will be as stipulated in the Ecological Monitoring Program, relevant management plan, other regulatory requirement, Australian Standard etc;
- All monitoring results will be formally recorded as required by ISO 14001;
- Monitoring results exceeding the relevant limit/target will be managed as per the non-compliance and corrective action process;
- The Authority will be immediately advised of any non-conformances from monitoring; and
- Monitoring results will be reported quarterly.

5.1.3 ENVIRONMENTAL INSPECTIONS

An effective environmental inspection regime will be developed and implemented as part of the CEMP. The inspection regime would be modified as required and would have regard to the areas of moderate to high residual risk as identified in the aspects, impacts and risk register for the project.

Environmental inspection results would be collated in a register.

5.1.4 ENVIRONMENTAL AUDITS

Environmental audits will be conducted and reported. Audit timing and frequency will be planned to suit the status, importance and risk of the activities and areas to be audited. The audit schedule will be based on the significance of risks and results of previous audits and the procurement schedule. The audit program will include:

- Internal audits.
- External audits.
- Subcontractor audits.

5.1.5 COMPLIANCE MANAGEMENT

A Compliance Tracking Program will be implemented and will include:

- Periodic review of compliance with the Minister's Conditions of Approval, Statements of Commitments and other environmental documents and reporting to the Director-General as required.
- Provisions for notification of the Director-General prior to the commencement of construction and operation and of environmental incidents.
- A program of independent environmental audits.
- Mechanisms for reporting and recording incidents and actions.
- Procedures for rectifying non-compliances with the environmental assessment documents.

The reporting of environmental compliance performance will be managed as follows:

- The construction contractor will update the compliance status of the environmental compliance database, following inspections, audits, incidents, non compliance reports so that contemporary compliance status reports can be produced at any given time.
- The construction contractor will provide details to the Authority's management team in accordance with requirements as determined.

5.1.6 CORRECTIVE AND PREVENTATIVE ACTION

Any environmental non-compliance requires action. The process for addressing non-compliance will be as follows:

- Investigate Cause of Non Compliance.
- Agree Correction Action (Remedial Action) and Propose Corrective Action.
- Implement Correction Action (Remedial Action).
- Implement Corrective Action.

5.2 INCIDENT PLANNING AND MANAGEMENT

5.2.1 INCIDENT REPORTING

The construction contractor will develop an Incident and Emergency Response Plan for the project. The plan will classify different types of incidents and prescribe corresponding processes and actions.

5.2.2 REPORTING TO EPA AND OTHER AGENCIES

Incidents causing material harm to the environment will be reported immediately to EPA in accordance with the *Protection of the Environment Operations Act 1997* – Duty to Notify, and any requirements of an environmental protection licence.

Other reporting requirements are:

- the local authority for the area in which the pollution incident occurs,
- the Ministry of Health (Public Health Unit for the area in which the pollution incident occurs)
- the WorkCover Authority,
- Fire and Rescue NSW.

5.2.3 KEY ENVIRONMENTAL CONTACTS

Key personnel to contact in the event of environmental incidents will be included in the Incident and Emergency Response Plan for the project.

The incident reporting procedures and contact hierarchy in the Emergency Response and Incident Management Plan will be distributed to all project personnel through a number of avenues. The names and contact details of key environmental contacts will be included in:

- site inductions;
- sub-plans; and
- signs on and around the site.

6. CONCLUSION

This PECMP has described the construction process and the mitigation measures proposed to protect the environment during construction of the Barangaroo Central Waterfront Promenade and Interim Public Domain.

The PECMP is based on the level of detail available at this stage in the project. Construction activities and mitigation measures to protect the environment will be developed in further detail as the proposal progresses towards construction.