October
2010

Barangaroo Part 3A Project Application

HEADLAND PARK AND NORTHERN COVE
MAIN WORKS ENVIRONMENTAL ASSESSMENT

NSW GOVERNMENT

BARANGAROO
SYDNEY
AUSTRALIA

STATEMENT OF VALIDITY

Submission of Environmental Assessment
Prepared under Part 3A of the *Environmental Planning and Assessment Act 19719*

Environmental Assessment prepared by	
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Address	MG Planning Pty Ltd Suite 11, 340 Darling Street BALMAIN NSW 2041
In respect of	Barangaroo Headland Park and Northern Cove – Main Works
Applicant & Land Details	
Applicant name Applicant address	Barangaroo Delivery Authority 66 Harrington Street The Rocks NSW 2000
Lot No, DP	Refer Table 1 in report
Environmental Assessment	An environmental assessment is attached
Statement of Validity	I certify that I have prepared the contents of the environmental assessment in accordance with the Director-General's Requirements and Department of Planning letter dated 6 May 2010, and that to the best of my knowledge, the information contained in the environmental assessment is neither false nor misleading.
Signature	
Name Date	Helena Miller 5 November 2010

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GLOSSARY

Approved Concept Plan	The Concept Plan approved by the Minister on 9 February 2007
COPC	Constituents Of Potential Concern
CMP	Conservation Management Plan
DECCW	Department of Environment, Climate Change and Water
DGRs	Director-General's Environmental Assessment Requirements
EA	Environmental Assessment
EOI	Expression of Interest
EP&A Act	Environmental Planning and Assessment Act, 1979
ESD	Ecologically Sustainable Development
GFA	Gross Floor Area
HIS	Heritage Impact Statement
JWP	Johnson Pilton Walker
LEP	Local Environmental Plan
Major Development SEPP	State Environmental Planning Policy (Major Development) 2005
The Minister	The Minister for Planning
Modification	The modification proposed to the Approved Concept Plan pursuant to Section 75W of the EP&A Act
MoT	Ministry of Transport
PA	Part 3A Project Application
PWP	PWP Landscape Architecture
RAP	Remediation Action Plan
RFDP	Request for Detailed Proposals
RTA	Roads and Traffic Authority
Section 170 Register	A register of the heritage assets of a government agency established under Section 170 of the *Heritage Act, 1977*

SEPP	State Environmental Planning Policy
Terms of Approval	The terms of approval issued by the Minister for the Approved Concept Plan
TMAP	Transport Management and Accessibility Plan

EXECUTIVE SUMMARY

In 2005 the New South Wales Government announced its intention to renew the Barangaroo site as a new harbour precinct, providing both an extension of the city's commercial centre and parkland for the people of Sydney. In October 2007 the Minister for Planning (the Minister) approved a Concept Plan for the site which provides for 11 hectares of foreshore parkland together with a mix of commercial, tourist, retail, residential and community uses.

In November 2008 the Minister announced the establishment of a new authority to oversee and manage the $6 billion redevelopment of Barangaroo. The Barangaroo Delivery Authority brings together the required expertise to manage design and construction of the site and ensure the delivery of Barangaroo in a coordinated and financially responsible manner.

The approved Concept Plan for Barangaroo dedicates the northern end of the site to parkland and public open space, including a new major Headland Park and Northern Cove. The Concept Plan notes that the Headland Park *will create an iconic place that reflects its prominent location in the string of harbour headlands that include, among many others, Mrs Macquarie Point, Ballast Point, Balls Head and Goat Island* ("Barangaroo Consolidated Concept Plan 2007", Sydney Harbour Foreshore Authority, p.72).

Since 2007 work has progressed on the planning for Barangaroo. On 11 November 2009 the Minister approved a modification to the Concept Plan that was primarily aimed at achieving a more naturalised design for the northern headland. An extensive tender process for development of Stage 1 (Barangaroo South) of the development comprising Blocks 1 – 4 was also conducted. On 20 December 2009 Lend Lease was appointed as the preferred proponent to develop Stage 1 (Barangaroo South) of the site. Images of both the winning and runner-up proposals were displayed online while on 23 February 2010 the winning scheme was placed on public display.

In addition in February 2010 the public domain design team was announced to work with the Barangaroo Delivery Authority to design the new Headland Park and other public spaces.

In June 2010 a project application for Early Works to the Headland Park and Northern Cove was submitted for the Minister's determination. The application sought approval for site establishment works, demolition, site investigations, environmental protection measures, service modifications, removal and storage of Sydney Water Sewage Pumping Station superstructure, sandstone extraction and receipt, management and placement of up to 150,000m^3 of fill from Stage 1.

The Early Works Project Application is currently being assessed and had not been determined at the date of writing.

This project application seeks approval for the main works required to form and construct the Headland Park and Northern Cove following on from the Early Works. The scope of the Main Works includes:

- land formation utilising fill from Stage 1, ranging from the 150,000m^3 identified in the Early Works application to approximately 230,000m^3 (additional 80,000m^3) along with excavated material from the Headland Park site itself (120,000m^3) to build the headland up to finished levels for a nominal one metre topsoil layer (total fill of 350,000m^3)
- construction of structural earth retaining walls utilising sandstone based materials
- creation of a naturalistic shoreline and northern cove through excavation and formation of retaining walls using boulders etc
- general landscaping and planting
- construction of a network of pedestrian pathways connecting the foreshore walkway and surrounding areas
- construction of a shoreline promenade (dual use pedestrian path and cycleway)
- jetty / viewing platform and public wharf extending into the Northern Cove from the southern shoreline
- construction of a car park totalling up to 300 spaces within the headland with vehicular access from Towns Place and pedestrian access from various locations within Headland Park
- location and use of the former Sydney Water Sewage Pumping Station for the purposes of an amenities building
- construction of a space for a future use (cultural facility) comprising initially 75,000m^3 and ultimately up to 100,000m^3
- installation of relevant services and infrastructure
- construction of the services and piping/pumping infrastructure associated with the air conditioning system (cooling water inlet/ outlet) for the future cultural facility and car park, and
- site remediation for limited contamination of fill material previously identified on the Headland Park site.

The Sydney Harbour Control Tower will remain onsite and be operational in accordance with Sydney Ports Corporation's requirements until future modification for reuse or demolition is required. Any changes to the Sydney Harbour Control Tower will be the subject of a separate application.

This environmental assessment report includes a detailed assessment of the proposed Headland Park and Northern Cove Main Works against relevant legislation and controls. The proposed works are generally consistent with the approved Concept Plan and, subject to the adoption and implementation of relevant mitigation measures, will not result in any

unacceptable environmental impacts. A detailed assessment of the proposed works is included in Chapter 7 of the report and commitments detailed in Chapter 8.

1. INTRODUCTION

1.1 Overview of Project Application

Barangaroo (formerly East Darling Harbour) is a 22 hectare area of Sydney's harbour foreshore immediately adjoining the western edge of Sydney's CBD which has been identified for urban renewal by the NSW State Government. The redevelopment of the Barangaroo site with its 1.4km foreshore on Sydney Harbour will provide for approximately half of the site to be dedicated to open space and public domain with a new Headland Park at the northern end.

On 9 February 2007 the Minister for Planning approved the Concept Plan for the site and on 12 October 2007 the land was rezoned to facilitate its redevelopment via an amendment to Schedule 3 of the State Environmental Planning Policy (Major Development) 2005 ("Major Development SEPP").

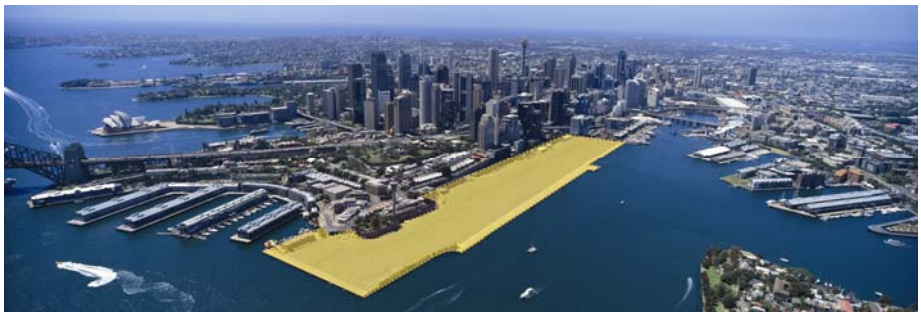


Figure 1: Site Location

The Concept Plan dedicates the northern end of the site to parkland and public open space. The proposed Headland Park and Northern Cove will be located in the northern part of the site and "will create an iconic place that reflects its prominent location in the string of harbour headlands that include, among many others, Mrs Macquarie Point, Ballast Point, Balls Head and Goat Island" ("Barangaroo Consolidated Concept Plan 2007", Sydney Harbour Foreshore Authority, p.72).

Since 2007 work has progressed on the planning for Barangaroo. On 11 November 2009 the Minister for Planning approved a modification to the Concept Plan that was primarily aimed at achieving a more naturalised design for the northern headland. An extensive tender process for development of Stage 1 (Barangaroo South) of the development comprising Blocks 1 – 4 was also conducted. On 20 December 2009 Lend Lease was appointed as the preferred proponent to develop Stage 1 (Barangaroo South) of the site. Images of both the winning and runner-up proposals were displayed online while on 23 February 2010 the winning scheme was placed on public display.

In addition in February 2010 the public domain design team was announced to work with the Barangaroo Delivery Authority to design the new Headland Park and other public spaces.

In June 2010 a project application for early works to the Headland Park and Northern Cove was submitted for the Minister's determination. The application sought approval for site establishment works, demolition, site investigations, environmental protection measures, service modifications, removal and storage of Sydney Water Sewage Pumping Station superstructure, sandstone extraction and receipt, management and retention of up to 150,000m^3 of fill from Stage 1.

The Early Works Project Application is currently being assessed and has not been determined at the date of writing.

Work has now progressed on the detailed design for the Headland Park and Northern Cove and accordingly this project application seeks approval for the construction of the Headland Park and North Cove. The proposed Headland Park and Northern Cove Main Works ('Main Works) include the following components:

- land formation utilising fill from Stage 1, ranging from the 150,000m^3 identified in the Early Works application to approximately 230,000m^3 (additional 80,000m^3) along with excavated material from the Headland Park site itself (120,000m^3) to build the headland up to finished levels for a nominal one metre topsoil layer (total fill of 350,000m^3)
- construction of structural earth retaining walls utilising sandstone based materials
- creation of a naturalistic shoreline and northern cove through excavation and formation of retaining walls using boulders etc
- general landscaping and planting
- construction of a network of pedestrian pathways connecting the foreshore walkway and surrounding areas
- construction of a shoreline promenade (dual use pedestrian path and cycleway)
- jetty / viewing platform and public wharf extending into the Northern Cove from the southern shoreline
- construction of a car park totalling up to 300 spaces within the headland with vehicular access from Towns Place and pedestrian access from various locations within Headland Park
- location and use of the former Sydney Water Sewage Pumping Station for the purposes of an amenities building
- construction of a space for a future use (cultural facility) comprising initially 75,000m^3 and ultimately up to 100,000m^3
- installation of relevant services and infrastructure
- construction of services and piping/pumping infrastructure associated with the air conditioning system (cooling water inlet/ outlet) for the future cultural facility and car park, and
- site remediation for limited contamination of fill material previously identified on the Headland Park site.

Plans illustrating the proposed 'Main Works' are included at Appendix 1. These plans are divided under the headings of landscape, architecture, construction staging, civil works etc for ease of reference. Where necessary these plans are also replicated in the technical reports attached as appendices to this Environmental Assessment.

The Director-General of the Department of Planning issued Environmental Assessment Requirements ("DGRs") for this Main Works Project Application (in combination with the Early Works Project Application) on 6 May 2010, a copy of which is provided at Appendix 2.

This report includes the following information relevant to the project and as set out in the DGRs:

- A Statement of Validity of the environmental assessment
- An executive summary
- A description of the proposed works and their relationship to the approved Concept Plan
- The existing planning provisions applying to the site, including the permissibility of the proposed works and how they will achieve planning objectives
- Assessment of the environmental impacts and key issues and proposed mitigation and management of any adverse impacts, and
- Statement of Commitments for the proposal outlining relevant environmental management and mitigation measures.

1.2 Background to Headland Park

On 27 March 2006 the Minister advised that the Barangaroo site was to be considered a potential State significant site for inclusion in Schedule 3 of Major Development SEPP and confirmed the project as a Major Project subject to Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act).

On 9 February 2007 the Minister approved the Concept Plan for the site and on 12 October 2007 the land was rezoned to facilitate its redevelopment via an amendment to Schedule 3 of the Major Development SEPP. The Approved Concept Plan provides definition to the project principles and establishes the detailed planning framework which will be used by the Minister to assess future development proposals within the Barangaroo site.

The Concept Plan as originally approved by the Minister for Planning contemplated an urban structure comprising 11 hectares of foreshore promenade and public domain, street patterns and development blocks. The public domain included a new Headland Park at the northern end of Barangaroo, new Northern Cove and Southern Cove water insertions, car parking under the Headland Park and community access to the park.

On 11 November 2009 the Minister approved a modification to the Concept Plan that was primarily aimed at achieving a more naturalised design for the northern headland. The

modification was prepared in response to the Minister's Terms of Approval requiring further detailed design for the Northern Headland and Northern Cove, particularly:

- the reinstatement of a headland at the northern end of the site with a naturalised shape and form including a build up of height and a generous landscaped connection to physically link Clyne Reserve, to allow direct pedestrian access from Argyle Place and appreciation of the landform of the former headland, and
- an enlargement of the northern cove and a greater naturalised shape, form and edges including treatment surrounding the cove.

The approved modified design for the Headland Park and Northern Cove also resulted in the following amendments to the Approved Concept Plan:

- the removal of Block 8 and part of Block 7, and
- subject to heritage impact assessment and consideration of options for re-use/relocation, in principle agreement to the demolition of three items which are listed on Sydney Ports and Sydney Water Section 170 Heritage Registers - the Sydney Ports Harbour Control Tower, the Sydney Water Sewage Pumping Station and the sandstone seawall along the north-western edge of the site.

Figure 2 shows the Headland Park in further detail.

Figure 2: Concept Plan Modification - Headland Park and Northern Cove

A copy of the Instrument of Approval for the Headland Park Modification is included at Appendix 3.

In June 2010 a project application for early works to the Headland Park and Northern Cove was submitted for the Minister's determination. The application sought approval for site establishment works, demolition, site investigations, environmental protection measures, service modifications, removal and storage of Sydney Water Sewage Pumping Station superstructure, sandstone extraction and receipt, management and retention of up to 150,000m^3 of fill from Stage 1.

The Early Works Project Application is currently being assessed by the Department of Planning and had not been determined at the date of writing.

1.3 Environmental Assessment Process

This project application is an application under Part 3A of the EP&A Act. Part 3A of the EP&A Act applies to projects which generally have been declared major development or are located on a state significant site either by the Major Development SEPP or by order of the Minister. The Minister is generally the consent authority for Part 3A projects.

The Major Development SEPP identifies the Barangaroo site as a State Significant site and accordingly Part 12 of Schedule 3 contains the primary planning provisions applying to the site.

Under Part 3A of the EP&A Act an applicant may apply to the Minister for approval to undertake a project. The Director General issues environmental assessment requirements in relation to a project and the environmental assessment must be prepared in accordance with these requirements. This assessment may also include a statement of commitments. Following a test of adequacy the environmental assessment is placed on public exhibition for a period of not less than 30 days and the applicant must give consideration to submissions made. A submissions report or preferred project report is then prepared by the applicant for assessment by the Department of Planning with a recommendation to then go to the Minister for determination.

Where a Concept Plan has previously been approved a project application should be consistent with the Concept Plan or a modification to the Concept Plan is required. As noted above a Concept Plan has been approved for the Barangaroo site and the proposed 'Main Works' are consistent with that Concept Plan (as modified).

1.4 Project Team

The project team for the preparation of this environmental assessment for the Headland Park and Northern Cove Main Works project application has comprised:

Proponent	Barangaroo Delivery Authority
Landscape Architecture and Urban Design	PWP Landscape Architecture
Architecture and Visual Analysis	Johnson Pilton Walker
Urban Planning	MG Planning Pty Ltd
Delivery Advisor, and Construction Management	Infrasol Group
Geotechnical Investigation	Douglas Partners
Traffic and Transport	Halcrow
Heritage	Conybeare Morrison
Infrastructure and Services	WSP Lincolne Scott, Warren Smith & Partners, Webb Australia and Robert Bird Group
Soil and Water	WSP Environment and Energy
Air Quality, Health and Odour	JBS Environmental
Remediation	JBS Environmental, Bill Ryall Consultancy and Graeme Nyland of Environ Australia (Site Auditor)
Noise and Vibration	Acoustic Logic Consultancy
Archaeology	Austral Archaeology
Acid Sulfate Soils	JBS Environmental
Maritime Design and Navigational and Water Safety	Hyder Consulting
Quantity Surveyor	Altus Page Kirkland
Recreation and Community Planning	Elton Consulting
Waste Management	JBS Environmental
Wind analysis	Windtech Consultants
Access Review	Morris Goding
ESD	Built Ecology

2. SITE ANALYSIS

2.1 Site Location and Context

Barangaroo is located on the north western edge of the Sydney Central Business District, bounded by Sydney Harbour to the west and north; the historic precinct of Millers Point for the northern half, The Rocks and the Sydney Harbour Bridge approach to the east; and bounded to the south by a range of new development dominated by large CBD commercial tenants. It has a 1.4 kilometre harbour foreshore frontage, with an eastern street frontage to the Hungry Mile (Hickson Road).

Figure 3 Barangaroo Site

The Barangaroo site has been extensively and regularly modified over time to meet the changing requirements of trade and commerce for the city, and the changing technologies for cargo handling. The hardstand apron visible today was constructed in stages from the 1960s as

a response to containerisation of shipping cargo. In the process the original Millers Point headland was cut away and the shore sheds that had defined the site as a 19th and 20th century harbour port were demolished. The site today therefore provides little physical connection to either its natural or industrial past. The site contains only one landscaped area (Munn Street Reserve) located to the north of Dalgety's Bond Store.

Most recently, much of the site has been cleared of buildings in preparation for its redevelopment.

The site of the Headland Park is surrounded by water to the north and west and occupies an area of approximately 6ha situated at the northern tip of the Barangaroo Precinct. The site lies immediately adjacent to the curtilage of the relocated Moores Wharf and the sandstone cliff of Millers Point which rises approximately 18m above as shown on Figure 5. The proposed Northern Cove is to be located to the south of the Headland Park.

To facilitate early works at Barangaroo South the cruise passenger terminal at Wharf 8 has been demolished and a temporary terminal has been established south of the Headland Park/Northern Cove site. The temporary facility will house the cruise berthing operations for approximately two years until the new facility is completed.

Figure 4: Aerial view of temporary cruise passenger terminal (Source: http://www.nearmap.com)

Figure 5: Headland Park and Northern Cove location

The northern-most part of the shoreline originally jutted into the harbour to the west forming a headland with a large hill on the point (refer Figure 6). However, today the headland has been largely removed. Behind the site today there is a large sheer cliff; originally the rocky landscape would have joined the shoreline much less dramatically. Nearby Balls Head and Berry Island Reserve are comparable to the topography of the original shoreline.

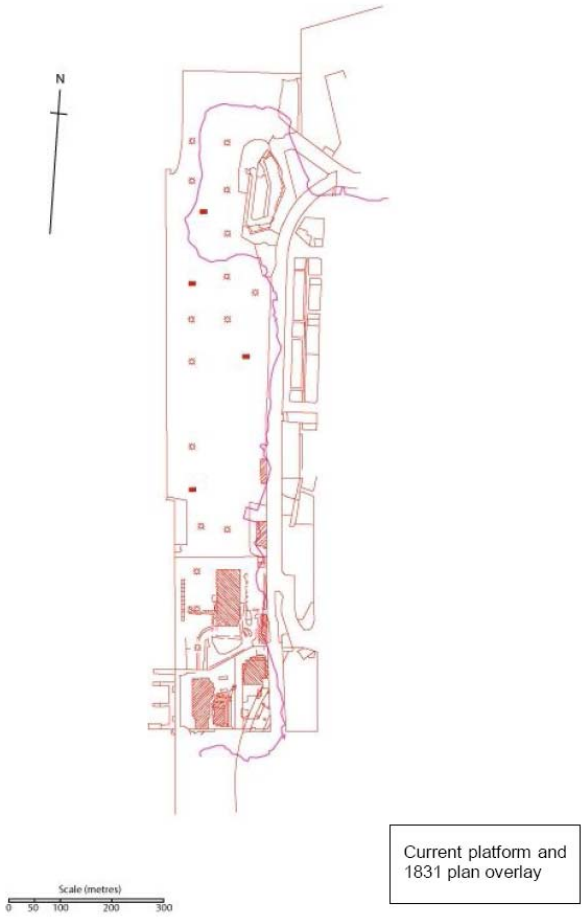


Figure 6: Overlay of 1831 headland outline over existing form (Source: AAMP, Austral Archaeology, April 2010)

2.2 Legal Description and Ownership

The Barangaroo site's legal description and ownership are as shown in Table 1 and Figure 7.

Table 1: Barangaroo Legal Description and Ownership

Legal Description	Land Ownership
Lot 1 DP 876514	Marine Ministerial Holding Corporation
Lot 2 DP 876514	Sydney Ports Corporation
Lot 3 DP 876514	Barangaroo Delivery Authority
Lot 4 DP 876514	Sydney Ports Corporation
Lot 5 DP 876514	Barangaroo Delivery Authority
Lot 6 DP 876514	Marine Ministerial Holding Corporation
Lot 7 DP 43776	Crown (Gov. Gaz. 30.7.1982 Fol 3503)
Lot 100 DP 838323	Maritime Authority of NSW
Lot 7 DP 869022	The State of NSW
Lot 6 DP 869022	Maritime Authority of NSW

Figure 7: Cadastral Details

This Headland Park Main Works application only applies to that part of the Barangaroo site shown in Table 2.

Table 2: Barangaroo Headland Park Legal Description and Ownership

Legal Description	Land Ownership
Lot 1 DP 876514	Marine Ministerial Holding Corporation
Lot 4 DP 876514	Sydney Ports Corporation
Part Lot 5 DP 876514	Barangaroo Delivery Authority
Lot 6 DP 876514	Marine Ministerial Holding Corporation
Part Lot 7 DP 43776	Crown (Gov. Gaz. 30.7.1982 Fol 3503)
Lot 7 DP 869022	The State of New South Wales
Lot 6 DP 869022	Maritime Authority of NSW

It should be noted that all the proposed works, the subject of this application, are to be undertaken within the boundary of the existing Barangaroo site and do not extend into the Harbour outside of the extent of existing apron area (refer plans at Appendix 1).

2.3 Existing Development

The Headland Park and Northern Cove site is a large, gently sloping hard stand apron (RL+2.4 to +3.2), having been created through cutting of the indigenous sandstone landform, filling and construction of seawalls and concrete decking. Since the demolition of large-scale storage sheds related to cargo operations in early 2008, few physical elements remain on site. Views of the site are shown below.

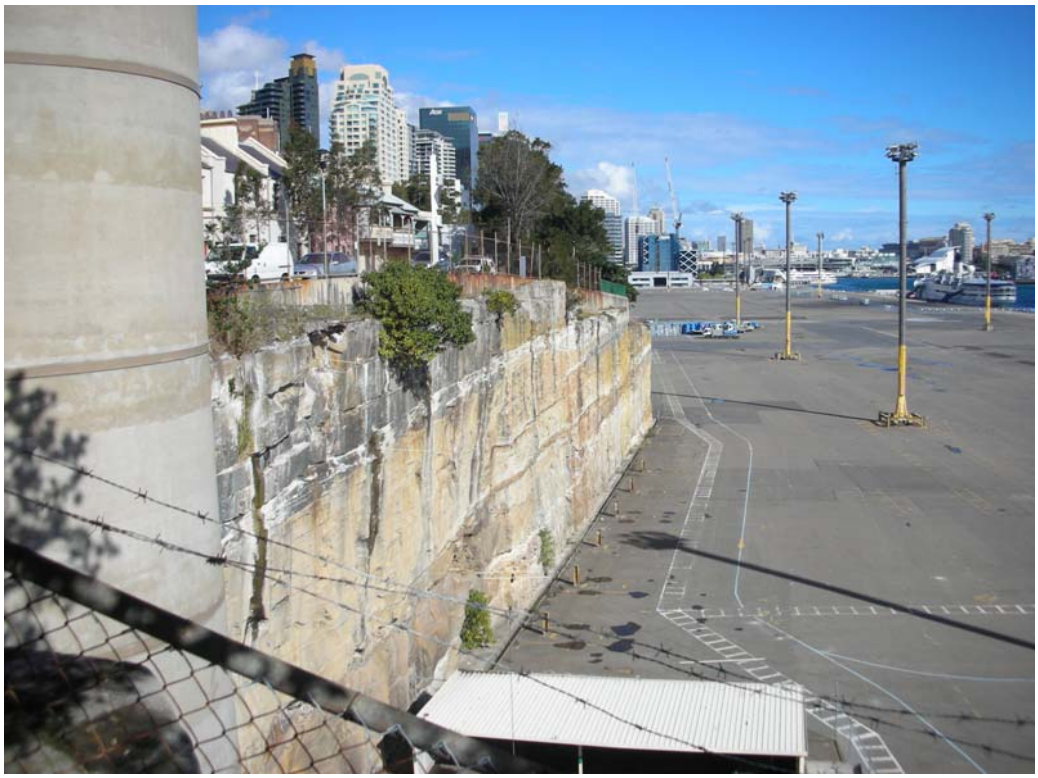
View from Balls Head of headland with Goat Island in foreground

View of site from East Balmain

View over site looking north-west from Clyne Reserve

View from top of headland looking north across the site showing Clyne Reserve

View of Clyne Reserve from Dalgety Road



View from Sydney Ports Harbour Control Tower looking towards southern part of Barangaroo site

2.4 Surrounding Development

The northern part of the Headland Park site adjoins the curtilage of the relocated Moores Wharf to the north east and the sandstone cliff of Millers Point to the east which rises approximately 18m above the site. Sydney Harbour is located immediately north and west of the site and the Hungry Mile (Hickson Road) runs along the eastern edge of the site. Further to the east above the Hungry Mile (Hickson Road) is the historic Millers Point precinct which is predominantly a residential area characterised by small terraces. Further to the east are a range of commercial and tourism uses including Observatory Hill and the Bond Building. To the south the site is adjoined by Darling Harbour Wharf 5 which currently accommodates the Temporary Cruise Passenger Terminal.

The Barangaroo Foreshore Walk, which was opened in late 2009, traverses the site adjacent to the harbour's edge. The walkway is an interim arrangement to allow public access to Barangaroo as the site develops and evolves. The walkway connects King Street Wharf to the south with Towns Place to the north and provides a series of east west connections. The Walk is delineated by temporary fencing which runs the length of the site and which can be moved as required (including when passenger cruise ships are in berth).

2.5 Existing Zoning

The Barangaroo site is zoned part B4 Mixed Use and part RE1 Public Recreation under the Major Development SEPP and the adjoining waterway is zoned W1 Maritime Waters under Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (refer zoning plan at Figure 8). The zoning is discussed further in Chapter 4.

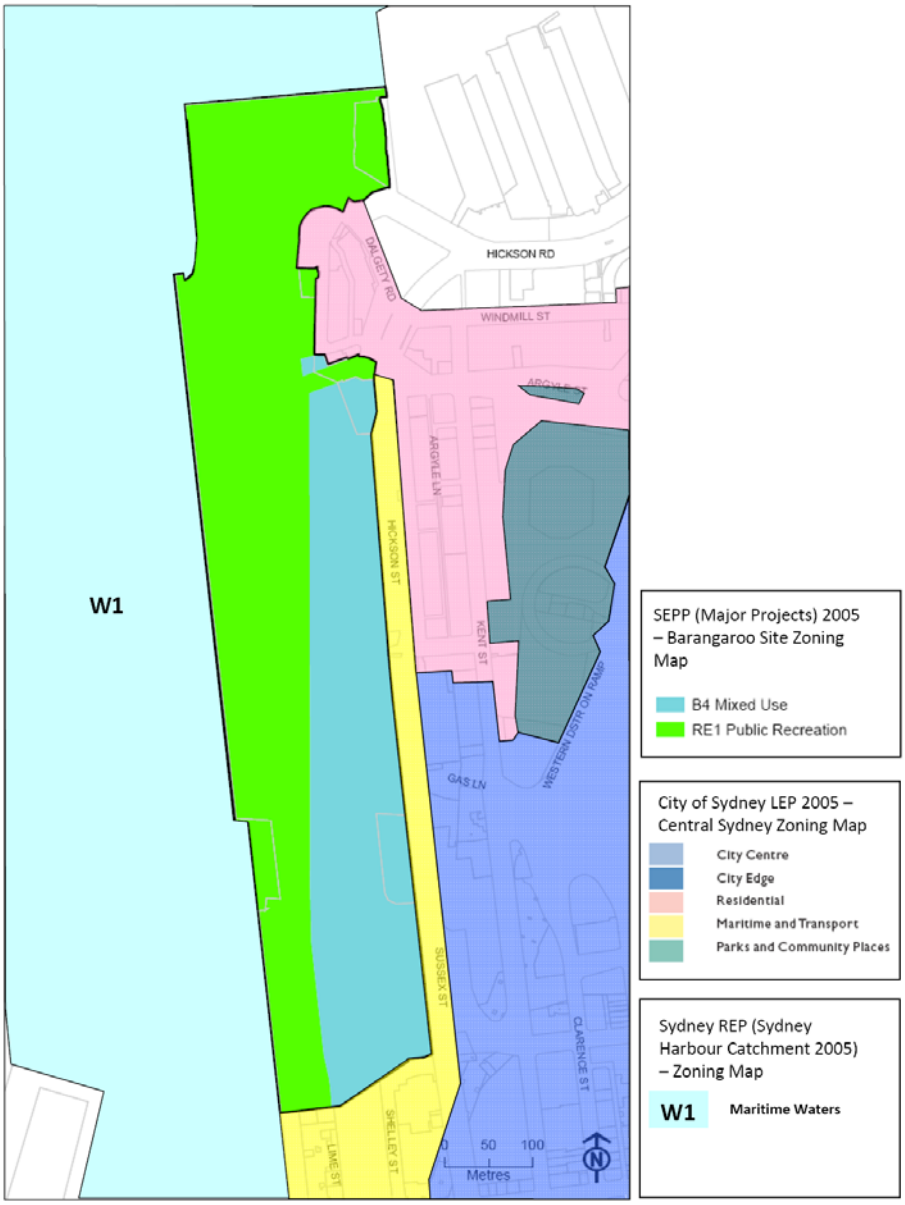


Figure 8: Compilation Zoning Plan

3. DIRECTOR-GENERAL'S REQUIREMENTS

The Director-General of the Department of Planning issued Environmental Assessment Requirements (DGRs) for this Headland Park Main Works Project Application on 6 May 2010 (refer Appendix 2). Combined DGRs were issued for both the Main Works and Early Works applications.

Table 3 provides a summary of the individual matters listed in the DGRs and where these are addressed in this report or in supplementary material provide as appendices. It should be noted that this project application is only concerned with the proposed Main Works scope and not with the Early Works for the Headland Park and Northern Cove. The Headland Park Early Works is the subject of a separate project application which is being assessed by the Department of Planning at the time of writing. Accordingly requirements that are not applicable to the Main Works have been identified herein and notation made that these were addressed in the Project Application / Preferred Project Report for the Headland Park Early Works.

Table 3: Director-General's Environmental Assessment Requirements

Item	Environmental Assessment Requirement	Section
1. Relevant EPIs, policies and guidelines	▪ Planning provisions applying to the site, including permissibility and the provisions of all plans and policies including: - State Environmental Planning Policy (Major Development) 2005; - State Environmental Planning Policy 55 - Remediation of Land; - Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005; - Sydney Harbour Foreshores and Waterways Area Development Control Plan 2005; - NSW State Plan, Sydney Metropolitan Strategy and the draft Sydney City Subregional Strategy; and - An outline of the nature and extent of any non-compliance with relevant environmental planning instruments, plans and guidelines and justification for any non-compliance.	Section 4 Section 4.4 Section 4.4 Section 4.4 Section 4.4 Section 4.3 Section 4 as above
2. Concept Plan	▪ The EA shall demonstrate consistency with the terms of approval of Concept Plan MP06_0162 (as amended) and justify any areas of inconsistency.	Section 4.5
3. Urban Design and Public Domain (in relation to MP10_0048)	▪ A Public Domain Plan is to be prepared for the Headland Park and Northern Cove, which is to address: - all planning, accessibility and design issues related to the connectivity of the Headland Park to its surrounding environment, including integration of walking and cycling connections within and to the site; - event management and recreational capacity, including passive and active opportunities; - proposals and options to increase cultural experiences at the Headland Park; - measures to provide for diverse activation of the Headland Park while being sensitive to local community needs; - Crime Prevention Through Environmental Design (CPTED) safety strategies; - heritage conservation and adaptive reuse as part of the urban and landscape design, including management and interpretation; - sustainability program for the Headland Park at design, construction and operations stages; and - compliance with the Disability Discrimination Act. ▪ An event plan of management is to be developed to support the proposal for events in the public domain, which will also need to inform traffic management. ▪ Proposals and options to increase cultural experiences at the Headland Park are to be supported by a local and regional Cultural Needs Analysis.	Plans at Appendix 1 and Public Domain Plan and Headland Park Public Domain Sub-Plan at Appendices 10 and 12 respectively. To be prepared as part of future Plan of Management for Park Appendix 11 – Overview of Recreation Planning Issues
4. Landscape Design	▪ The EA is to demonstrate that the final landform shape of the Headland Park has been determined by relevant design principles, rather than an engineering/fill driven outcome. Such principles may include:	Plans at Appendix 1 and Public Domain Plan and Headland Park Public Domain Sub-Plan at Appendices 10 and 12

Table 3: Director-General's Environmental Assessment Requirements

Item	Environmental Assessment Requirement	Section
	- finished levels on the eastern edge of Headland Park should align with, and not exceed, the levels of adjacent streets and public domain; - views over the Headland Park are to be maintained, particularly from adjacent streets and public open spaces; - level grade access into the Headland Park is to be maximised; - the gradient is to be designed to maximise accessibility and the gradient transition from central parkland to Headland Park is to provide accessible walking and cycle paths, and grading should create a variety of topographic experiences, including maximising useable passive recreation spaces; - any structures within the Headland Park (including a possible cultural facility) are to integrate with the landscape design of the public domain to maximise opportunities for activation of the surrounding parkland; - accessible paths to all public/cultural facilities within the Headland Park are to be provided from the central parkland (stage 2) area.	respectively.
	▪ Detailed documentation of the proposed grading and finished levels is to be provided with the Project Applications, including detailed spot levels and multiple sections through the site particularly relating to useable spaces and access points. Further in relation to MP10_0048	Refer Appendix 1
	▪ A detailed landscape design plan is to be prepared for the Headland Park and Northern Cove, incorporating, among other matters: - a hierarchy of spaces; - detailed levels, edge conditions and pedestrian pathways; - materials and plantings (including planting of non invasive plant species); - street furniture; - lighting; - public art; - a way finding strategy; - an Interpretation Strategy; and - signage.	Refer Appendix 1
5. Visual Impact and Views	▪ A visual impact assessment is to be provided of the proposed final design of the Headland Park, including any proposed buildings and structures, when viewed from key vantage points (including, but not limited to, from McMahons Point (Blues Point), Pyrmont, Balmain East, Walsh Bay and Millers Point). Photomontage images are to be prepared to demonstrate the impact of the proposed works.	Refer Section 7.11 and Appendix 24
6. Traffic Management and Accessibility	▪ Assess the likely impacts from the proposed works on surrounding areas and residents during the construction, demolition and excavation phases (including the impact on	Refer Section 7.6 and Appendix 20

Table 3: Director-General's Environmental Assessment Requirements

Item	Environmental Assessment Requirement	Section
Impacts	nearby intersections and the need/associated funding for upgrading or road improvement works (if required)), major arterial and local road networks, local public transport (including proposed light rail on Hickson Road), pedestrians and cyclists in the vicinity of the site. ▪ Assess the cumulative impacts associated with other construction activities on the Barangaroo site. ▪ Details of anticipated truck movements to and from the site. ▪ Details of access arrangements for workers to/from the site, emergency vehicles and service vehicle movements. ▪ Details of construction vehicle access, movements and queuing. ▪ Details of any proposed transportation of waste materials via the Harbour and proposed locations for handling materials. ▪ Navigation and safety impacts on other water based traffic and ferry commuter services from any barging of contaminated materials, including navigation in and around Darling Island, King Street Wharf, Johnstons Bay and White Bay. ▪ Impact of shoreline works (particularly the creation of the Northern Cove) on navigation in Sydney Harbour. Further in relation to MP10_0048 ▪ Justification for the headland car park, including quantum of parking spaces, and its relationship and function with the Barangaroo site, with regard to public transport usage and mode split assumptions. ▪ Likely traffic impacts on local street network and intersections. ▪ Pedestrian and cycle accessibility. ▪ Details on the use and management of the car parking area. ▪ Potential provision for a water taxi stop. ▪ Provision for taxis and coaches. ▪ Potential for integration with light rail along Hickson Road, as announced by the Government in the Metropolitan Transport Plan. ▪ Demonstrate how the entry and exit to the headland car park will not have a detrimental impact upon visual amenity and pedestrian safety. ▪ Traffic and accessibility impacts and transport management for major events or cultural activities (including pedestrian movements) held at the Headland Park and Northern Cove.	Refer Section 7.6 and Appendix 20 .
7 Remediation Action Plan (in relation to MP10_0047)	The Environmental Assessment must include a site wide Remediation Action Plan and a detailed Remediation Action Works Plan(s) for the relevant section(s) of the site. The Remediation Action Works Plan(s) must be prepared in accordance with the Guidelines for Consultants Reporting on Contaminated Sites (NSW EPA 1997), the relevant components of other guidelines made or approved under section 105 of the Contaminated Land Management Act 1997 and also include: ▪ Characterisation of the nature and extent of contaminated	Refer Sections 4.4.3, 7.1 and Appendices 6 and 7

Table 3: Director-General's Environmental Assessment Requirements

Item	Environmental Assessment Requirement	Section
	material. ▪ A description of the overall remediation strategy for the site, including the: - objectives of the remediation strategy; - proposed staging of the strategy; and - relationship between the various stages of the strategy. ▪ Details of the proposed remediation process, including on-site and off-site treatment methodologies and the location, and transportation options, of any off-site treatment facility, and details of contingency processes. ▪ Details of the proposed remediation management measures, including justification of the remediation criteria to be applied to all or respective parts of the site and proposed disposal or re-use of materials and management of wastewater, including agreements for disposal of trade wastes, including treated water from the contaminated areas. ▪ Plans of any proposed containment cell(s) for contaminated material, including: - demonstration that the design and integrity of the cells would be consistent with best practice standards; - demonstration that any material incompatibilities between the cell(s) and material to be stored in the cell(s) have been identified; - management procedures to address incompatibility issues must be provided; and - demonstration that the cell(s) would adequately contain the materials to be stored without impacting on the surrounding environment. ▪ Site validation plan. ▪ Details of compliance with the Contaminated Land Management Act 1997 and remediation to address the current regulation on the site. ▪ Final landform following remediation and the suitability of fill material. ▪ On-going management and responsibility of the site following remediation.	
	The Remediation Action Works Plan(s) must clearly demonstrate that the site will be remediated to a standard commensurate with the final intended land use. The plans must be audited by an EPA Accredited Sites Auditor, and include a site audit statement detailing the findings of the audit.	As above
	Proposed remediation criteria must be developed consistently with National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM). Where contaminants are present on the site that are not listed under the NEPM, specific remediation criteria for those contaminants must be derived having regard to relevant NSW standards, national standards, then international standards and justification for the use of any criterion not currently endorsed by the NSW	As above

Table 3: Director-General's Environmental Assessment Requirements

Item	Environmental Assessment Requirement	Section
	Department of Environment, Climate Change and Water. The validation of the remediation of the Barangaroo site, including the containment at Headland Park will need to be subject of a Site Audit undertaken by a NSW EPA accredited site auditor.	 As above – Refer letter from site auditor at Appendix 6
8 Soil and Water	▪ Assess impacts on water quality of Sydney Harbour and proposed management, mitigation and monitoring measures. ▪ Erosion and sediment controls during remediation and excavation. ▪ Details of water quality monitoring program for Sydney Harbour, with a focus on turbidity and key contaminants. ▪ Assess the impacts of the proposal on surface and groundwater hydrology and quality. ▪ Assess the potential impacts on marine vegetation and aquatic ecology. ▪ Management measures for any barging of any excavated or contaminated material. ▪ Stormwater management and strategies during construction. ▪ Assess impacts on estuarine circulation, estuarine water quality and aquatic ecology of land formation works (including impacts on aquatic vegetation from direct smothering and any changes that may result from altered hydrological regimes of surrounding waters and bays). Any modification of estuarine foreshores (including the incorporation of measures to improve the habitat value of newly created waters (such as environmentally friendly seawalls) should consider Environmentally Friendly Seawalls - A Guide to Improving the Environmental Value of Seawalls and Seawall-lined Foreshores in Estuaries (DECC, 2009). ▪ Assess the potential impacts on aquatic habitat from altered hydrological regimes, contaminated sediments and potential acid sulphate soils from dredging activities whilst constructing the Northern Cove. ▪ The discharge of stormwater or other water should be assessed by comparison to the relevant water quality objectives and environmental values for Sydney Harbour estuarine waters, see: http://www.environment.nsw.gov.au/ieo/index.htm for NSW Water Quality Objectives; and refer to related Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000): http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality. ▪ Consideration of the collection, treatment and management of contaminated surface and groundwater across the site. No contaminated or treated site waters (surface, collected	Refer Section 7.3 and Appendices 13 and 14 Refer Section 7.14 Appendices 13 and 14 Refer Section7.3.2 and Appendix 13 Refer Section7.3.2 and Appendix 13 Refer Section 7.3 and Appendices 13 and 14 Refer Section 7.3 and Appendices 13 and 14

Table 3: Director-General's Environmental Assessment Requirements

Item	Environmental Assessment Requirement	Section
	groundwater, or contaminated construction waters) are permitted to enter Sydney Harbour and should be discharged under a trade waste agreement with Sydney Water.	
9 Waste Management	▪ Provide details of the quantity and type of liquid and non-liquid waste generated, handled, processed or disposed of on-site. Waste must be classified according to the DECCW's Waste Classification Guidelines 2008.	Refer Section 7.14.3 and Appendix 27
	▪ Provide details of the quantity, type and specifications for all output products proposed to be produced. The description should include the physical, chemical and biological characteristics (including contaminant concentrations) of those output products as well as relevant accredited standards against which the products would comply.	As above
	▪ Provide details of intended (or potential) end uses for output products and the relevant product standards used against which those products would be assessed.	As above
	▪ Provide details of the layout, the treatment process and the environmental controls of the proposal.	As above
	▪ Provide details of liquid waste and non-liquid waste management, including: - the transportation, assessment and handling of waste arriving at or generated at the site; - any stockpiling of wastes or recovered materials at the site; - any waste processing related to the proposal, including reuse, recycling, reprocessing or treatment both on- and off-site; - the method for disposing of all wastes or recovered materials; - the emissions arising from the handling, storage, processing and reprocessing of waste; and - the proposed controls for managing the environmental impacts of these activities.	As above
	▪ Provide details of spoil disposal (if applicable) with particular attention to: - the quantity of spoil material likely to be generated; - proposed strategies for the handling, stockpiling, reuse/recycling and disposal of spoil; - the need to maximise reuse of spoil material in the construction industry; - identification of the history of spoil material and whether there is any likelihood of contaminated material, and if so, measures for the management of any contaminated material; and - designation of transportation routes for transport of spoil.	As above
	▪ Provide details of procedures for the assessment, handling, storage, transport and disposal of all hazardous and dangerous materials used, stored, processed or disposed of, in addition to the requirements for liquid and non-liquid wastes.	As above

Table 3: Director-General's Environmental Assessment Requirements

Item	Environmental Assessment Requirement	Section
	▪ Provide details of the type and quantity of any chemical substances to be used or stored and describe arrangements for their safe use and storage. ▪ In documenting or describing the composition of output products and/or wastes generated, reference should be made to DECCW's Waste Classification Guidelines 2008.	As above As above
10 Air, Noise and Odour Impacts	▪ Identify potential air quality, noise and odour impacts and appropriate mitigation measures. ▪ An assessment of odour from the excavation, transport and storage of contaminated sediments. ▪ Details of an air quality monitoring program, including the identification of air quality criteria. ▪ In particular the following must be addressed: <u>Air and Odour</u> The Environmental Assessment must include an Air Quality Impact Assessment that is prepared strictly in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales 2005, available at: http://www.environment.nsw.gov.au/resources/air/ammodelling05361.pdf. The Air Quality Impact Assessment must also make appropriate reference to the Assessment and Management of Odour from Stationary Sources in NSW: Technical Framework 2006 and Assessment and Management of Odour from Stationary Sources in NSW: Technical Notes 2006, available at: http://www.environment.nsw.gov.au/air/odour.htm. The key air quality issues for the proposal will depend on the methods used to manage and remediate the contaminated material. Potential matters that must be covered in the Air Quality Impact Assessment include, where applicable: ▪ the identification of the pollutants of concern, including individual toxic air pollutants, dust and odours; ▪ the identification and assessment of all relevant fugitive and point source emissions; ▪ appropriate coverage of all aspects of the remediation, including the excavation, storage, transport and treatment of contaminated material; and ▪ proposed air quality management and monitoring procedures during remediation. The Air Quality Impact Assessment must consider the requirements of the Protection of the Environment Operations (Clean Air) Regulation 2002. <u>Noise</u> The Environmental Assessment should include an assessment of noise and vibration impacts, prepared in consultation with DECCW. All feasible and reasonable noise impact mitigation	Refer Section 7.7 and Appendix 21 As above As above Refer Section 7.5 and Appendix 19

Table 3: Director-General's Environmental Assessment Requirements

Item	Environmental Assessment Requirement	Section
	measures should be implemented. The assessment should be prepared in accordance with the NSW government's Interim Construction Noise Guideline, Industrial Noise Policy and Application Notes, Environmental Criteria for Road Traffic Noise and Assessing Vibration: A Technical Guide, as appropriate, available at http://www.environment.nsw.gov.au/noise/.	
11 Health Impacts	▪ Assessment of the health implications of the projects (including extraction of sediments, off-site transport and treatment as well as disposal of sediments), during and following remediation, including details of human exposure scenarios and demonstration that the projects will not have unacceptable acute or chronic health effects.	Refer Section 7.7 and Appendix 21
12 Climate Change and Sea Level Rise	▪ An assessment of the risks associated with sea level rise on the proposal as set out in the draft NSW Coastal Planning Guideline: Adapting to Sea Level Rise.	Refer Section 7.16 and Appendix 17
13 Heritage	▪ An assessment of the likely impacts of the proposal on heritage and archaeological items and proposed conservation – including the MWS&DB Sewage Pumping Station, existing sandstone seawall and Sydney Ports Harbour Control Tower – and mitigation measures.	Refer Section 7.8 and Appendix 5 and Appendix 30 for CMP for Sewage Pumping Station 0014
14 Environmental, Construction and Site Management Plan	The EA 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; ▪ Visual impacts, with particular regard to the Temporary Cruise Passenger Terminal; ▪ Water quality management for the site; and ▪ Waste and chemical management.	Refer Section 7.14 and Appendix 26
15 Infrastructure and Services Provision	▪ Detail the existing infrastructure and services on site and outline what infrastructure and services will be decommissioned. ▪ Outline proposed infrastructure and services, including sustainability infrastructure and wastewater treatment facility and identify possible impacts. ▪ Provide information on the required water and wastewater services and any augmentation that may be required for the proposed development. ▪ Detail measures to mitigate the impacts of the proposal on any remaining infrastructure items, including proposed relocation. ▪ Provide an Integrated Water Management Plan, which should include any proposed alternative water supply, proposed end uses of potable and non-potable water,	Refer Appendix 14 Refer Appendices 13 and 14 Refer Appendix 14 Refer Appendix 14 Refer Appendix 14

Table 3: Director-General's Environmental Assessment Requirements

Item	Environmental Assessment Requirement	Section
	demonstration of water sensitive urban design and water conservation measures.	
16 Temporary Structures	▪ Detail the proposed temporary structures on site, including sheds, compounds, and hoardings and identify possible visual and amenity impacts. ▪ Detail measures to mitigate the impacts of the temporary structures on roads, streets and public domain areas.	Refer Section 6.5.6 and Appendix 26
17 Staging	Details regarding the staging of the proposed development.	Refer Appendix 1
18 Ecologically Sustainable Development (ESD)	Identify how the development will incorporate ESD principles in the design, construction and ongoing operation phases of the development including water sensitive urban design measures, water re-use, energy efficiency, energy minimisation/generation, recycling and waste disposal.	Refer Section 7.15 and Appendix 17
19 Consultation	Undertake an appropriate and justified level of consultation in accordance with the Department's Major Project Community Consultation Guidelines October 2007.	Refer Section 5 and Appendix 9

4. PLANNING FRAMEWORK

The proposed Main Works for the Headland Park and Northern Cove are subject to both Commonwealth and NSW legislation and associated regulation and policy. These are addressed below.

4.1 Commonwealth Legislation

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* applies to the subject site. This Act requires approval from the Federal Minister for the Environment to carry out a 'controlled action' where it is likely to have a significant impact on a 'matter of national environmental significance'. Matters of National Environmental Significance include among other matters listed threatened species, ecological communities and migratory species.

There are no known matters of National Environmental Significance occurring on or in the vicinity of the proposed site. Therefore it is considered that referral of the project to the Commonwealth Minister for the Environment, to determine if it is a 'controlled action', is not required.

4.2 NSW Legislation

The primary NSW legislation relevant to the proposal is as follows:

- *Environmental Planning and Assessment Act 1979,* and
- *Protection of the Environment Operations Act 1997*

4.2.1 Environmental Planning and Assessment Act 1979

Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) applies to the proposed development. Part 3A applies to projects which generally have been declared major development or are located on a state significant site either by State Environmental Planning Policy (Major Development) 2005 (Major Development SEPP) or by order of the Minister. The Minister is generally the consent authority for Part 3A projects.

The Barangaroo site is a state significant site as provided under the Major Development SEPP (refer section 4.4.1 below) and therefore clause 75D of the EP&A Act provides that the Minister may approve a project on the subject land under Part 3A.

Part 3A authorises a Concept Plan application to be made for a project or part thereof. A Concept Plan application is generally subject to the same requirements as a project application and approval of a Concept Plan may require the submission of a later project application for more detailed stages or parts of the project. A Concept Plan has been approved for the Barangaroo site (refer section 4.5 below for further detail). Accordingly this project application is submitted in accordance with the approved Concept Plan.

Clause 75U provides that approvals / licences required under other legislation as set out below are not required where an approval has been issued under Part 3A:

- the concurrence under Part 3 of the *Coastal Protection Act 1979* of the Minister administering that Part of the Act
- a permit under sections 201, 205 or 219 of the *Fisheries Management Act 1994*
- an approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*
- a permit under section 87 or a consent under section 90 of the *National Parks and Wildlife Act 1974*
- an authorisation referred to in section 12 of the *Native Vegetation Act 2003* (or under any Act to be repealed by that Act) to clear native vegetation or State protected land
- a permit under Part 3A of the *Rivers and Foreshores Improvement Act 1948*
- a bush fire safety authority under section 100B of the *Rural Fires Act 1997*, and
- a water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the *Water Management Act 2000*.

Accordingly approvals under the above legislation as would otherwise be required are not required and relevant matters are assessed in the consideration of this project application.

4.2.2 Protection of the Environment Operations Act 1997 (POEO Act)

The proposed Headland Park and Northern Cove Main Works incorporates the following scheduled activities under Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act):

- extractive activities – land based extractive activity
- contaminated soil treatment, and
- crushing, grinding or separating.

Under sections 48, 49 and Schedule 1 of the POEO Act a licence is required to carry out a scheduled activity. Further under section 122 of the POEO Act a licence is also required for non-scheduled activities that involve the pollution of waters. It is likely that a licence would be required in this regard for hydroblasting of sandstone blocks to shape and contour the Headland Park shoreline. This process will involve discharge to water and would be undertaken in accordance with relevant criteria.

The process for requiring environment protection licences under the POEO Act is separate to the Part 3A approval process and is not suspended by section 75U of the EP&A Act. The Barangaroo Delivery Authority will therefore be required to obtain a licence for relevant scheduled activities and prior to commencement of any discharge to waters. Accordingly the proposal has been assessed in accordance with the relevant policies and guidelines issued by the Department of Environment, Climate Change and Water (DECCW). These issues are addressed in Chapter 7 and relevant technical reports.

4.3 Strategic Plans

4.3.1 NSW State Plan

The proposed development of the Barangaroo site in line with the approved Concept Plan is consistent with the principles outlined in the State Plan. Specifically the proposed Headland Park and Northern Cove Main Works will allow for the development of a major new headland park on the western edge of the Sydney CBD. This is consistent with the Plan's policies of providing for healthy communities, promoting stronger communities and supporting business and jobs. The development of the Headland Park will provide a new foreshore parkland for the people of Sydney including new workers and residents within the Barangaroo site and from further afield.

4.3.2 Sydney Metropolitan Strategy

The Sydney Metropolitan Strategy (City of Cities: A Plan for Sydney's Future, 2005) provides a broad overarching framework to facilitate and manage growth and development within the Sydney metropolitan area 25 years into the future. The Strategy is aimed at supporting continued economic growth while balancing social and environmental impacts. It has five key aims: enhancing liveability; strengthening economic competitiveness, ensuing fairness, protecting the environment and improving governance. The proposed Headland Park is consistent with these aims in particular enhancing liveability.

4.3.3 Sustainable Sydney 2030

The City of Sydney has prepared a strategic plan for Sydney entitled "Sustainable Sydney 2030". The vision for Sydney is threefold, a city that is: Green; Global; and Connected. It proposes a city that is:

> *GREEN with a minimal environmental impact, green with trees, parks, gardens and linked open spaces, green by example and green by reputation.*
>
> *GLOBAL in economic orientation, global in links and knowledge exchange, global and open-minded in outlook and attitude.*
>
> *CONNECTED physically by walking, cycling and high quality public transport, connected 'virtually' by world–class telecommunications, connected to communities through a sense of belonging and social well being, and connected to other spheres of government and to those with an interest in the City.*

The proposed development is consistent with this vision and will provide for the development of the Headland Park which will be a major new green space within the CBD. The Parkland, will support and along with the remainder of the redevelopment of the Barangaroo site, enhance the Sydney CBD as a global, connected city.

4.4 Statutory Planning

The primary statutory planning instruments applicable to the proposed development / subject land are as follows:

- State Environmental Planning Policy (Major Development) 2005
- State Environmental Planning Policy (Infrastructure) 2007
- State Environmental Planning Policy No.55 – Remediation of Land, and
- Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.

Compliance with these is detailed below:

4.4.1 State Environmental Planning Policy (Major Development) 2005

The Barangaroo site is listed as a State Significant Site under Schedule 3 of the Major Development SEPP. The planning controls for Barangaroo are contained in Part 12 of Schedule 3.

Clause 3, Part 12 provides that the only other environmental planning instruments that apply to Barangaroo are other State Environmental Planning Policies (and deemed SEPPs). These are discussed below.

Clause 5, Part 12 – Part 3A Projects states that development within the Barangaroo site that has a capital investment of more than $5 million (other than certain specified development) is a project to which Part 3A applies. The proposed development is therefore a project having a capital investment value of $92,508,280 (as detailed in the estimate provided by Altus Page Kirkland at Appendix 4).

Clause 7, Part 12 - Land Use Zones provides that the subject land is within zone RE1 Public Recreation (refer Figure 9) and requires that the consent authority must have regard to the objectives for development in a zone when determining an application within that zone. The objectives of the RE1 zone are:

(a) to enable land to be used for public open space or recreational purposes,
(b) to provide a range of recreational settings and activities and compatible land uses,
(c) to protect and enhance the natural environment for recreational purposes,
(d) to ensure the vitality and safety of the community and public domain,
(e) to promote and maintain public access to and along the foreshore,
(f) to allow land beneath the finished surface of the public domain to be used for car parking associated with development on land within Zone B4 Mixed Use if it can be demonstrated that any such use will not detract from the primary use of the land for public open space or recreational purposes,
(g) to allow the public domain to be enhanced by a variety of compatible land uses in a manner that contributes positively to, and does not dominate, the primary use of the land for public open space or recreational purposes,
(h) to allow land to be used in conjunction with the transportation of passengers by water.

In the subject zone the following development may be carried out with consent:

charter and tourism boating facilities; community facilities; earth works; entertainment facilities; environmental facilities; environmental protection works; food and drink premises; function centres; information and education facilities; jetties; kiosks; markets; passenger transport facilities; public entertainment; public halls; recreation areas; recreation facilities (indoor); recreation facilities (outdoor); roads; telecommunications facilities; telecommunications networks; temporary structures; transport depots; underground car parks.

All other development is prohibited.

The proposed Headland Park and Northern Cove Main Works which includes earth works, environmental protection works, a recreation area, the construction of a space for a cultural space (details of the cultural use to be the subject of a future development application) and an underground car park are permissible with consent. The proposed works are consistent with the objectives of the zone.

Figure 9: Site Zoning

Section 75E(4) of the Act provides that a proponent may apply for approval of part of a project that is a 'declared project' to which Part 3A applies as outlined in Clause 6. The Barangaroo Concept Plan as approved, provides for:

> *(2) Approximately 11 hectares of new public open space/public domain, with a range of formal and information spaces serving separate recreational functions and including a 1.4km public foreshore promenade……..*

The proposed Headland Park and Northern Cove Main Works provides for redevelopment of the northern part of the Barangaroo site, the establishment of the Headland Park and the formation of the Northern Cove. Accordingly the proposed works are permissible with consent on the subject land.

Clause 12, Part 12 – Demolition within Zone RE1 Public Recreation provides that demolition may be carried out with consent on land within Zone RE1 Public Recreation. This project application seeks consent for demolition of part of the remnant hardstand (for extraction pit), removal of part of the existing apron with reconfiguration of the shoreline etc on site as described in Chapter 6.

Clause 15, Part 12 - Public Utility Undertakings provides that development for the purposes of public utility undertakings that is carried out on land within the Barangaroo site does not require development consent. However approval is sought for these proposed works as part of the subject Part 3A project application.

Clause 21, Part 12 provides that a person must not, undertake works that affect a heritage item except with the consent of the consent authority. The proposed development includes location of the Sydney Water Sewage Pumping Station superstructure for the purposes of an amenities building on the north eastern part of the site in the vicinity of Moore's Wharf. Approval is sought for the location and the use but the actual works to the building will be subject to a future application. The Sydney Water Sewage Pumping Station is a heritage item listed on Sydney Water and Sydney Port's Section 170 registers (Heritage Act 1977). Removal of the superstructure from its original location on site (and temporary storage) formed part of the Early Works Project Application.

In addition the proposed works have the potential to impact on the following heritage listed items:

- Sandstone Seawall at north-west of site
- Sydney Ports Harbour Control Tower
- Sandstone Wall adjoining Grafton Bond Store
- Munn Street Terraces
- Dalgety's Bond Store, and
- Moore's Wharf Building

A heritage impact statement has been prepared to assess the impact of the proposed works on the above heritage items on the site (excluding works to SPS0014 which are subject to a future application) and within the vicinity and is including at Appendix 5. This matter is addressed in further detail in section 7.9.

There are no other provisions of the Major Development SEPP that are relevant to the proposed Headland Park and Northern Cove Main Works.

4.4.2 State Environmental Planning Policy (Infrastructure) 2007

SEPP (Infrastructure) 2007 (Division 12 Parks and Public Reserves) provides for a range of development (including pathways, amenities, visitor centres, landscaping, environmental management works etc) to be undertaken in a public reserve under the care of or vested in a Council without consent. The subject land does not yet form a public reserve and is not in the care of or vested in the Council therefore this provision does not apply. Consent is however being sought for these works are part of this Project Application.

SEPP (Infrastructure) 2007 also provides for a range of other infrastructure to be undertaken by a public authority without consent. This includes sewerage, stormwater, electricity, telecommunications, gas reticulation etc. However as the proposed infrastructure works form part of the project application consent is being sought for these works.

There are no other provisions in the Infrastructure SEPP that are relevant to the proposed Headland Park and Northern Cove Main Works.

4.4.3 State Environmental Planning Policy No.55 – Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) provides a State-wide planning approach to the remediation of contaminated land by consideration of whether the land is contaminated and, if it is contaminated, whether it can be made suitable for the proposed purpose.

In accordance with the requirements of SEPP No 55 and to inform the preparation of the Barangaroo Concept Plan, a range of environmental and geotechnical investigations have been undertaken and previously submitted to address contamination on the site. Contaminated materials have been identified within the Park due to historical filling and reclamation activities, but groundwater has been shown to be only marginally impacted and to require no remediation. In accordance with ESD principles, it has been determined that the contamination within the fill materials can be managed in situ by ensuring the fill materials are capped so that users of the Park have no exposure to the contaminants and by implementation of a long-term Environmental Management Plan.

Where development works on the Park require removal of fill materials, they are required to be classified. Materials that meet criteria for open space land use are able to be used in any location on the Park, materials that are classified as “General Solid Waste” can be placed into the engineered containment cell to be constructed on the Park, but materials classified as

"Restricted Solid Waste" or "Hazardous Waste" are required to be disposed off-site into a landfill licensed to receive the appropriate class of waste.

A site wide Remediation Action Plan (RAP) has been prepared for Barangaroo by Environ Australia Pty Ltd and has been previously submitted with the Headland Park Early Works application. The overarching Remediation Action Plan was the subject of a recent audit (Site Audit Statement GN 439A) and was determined by the site auditor to have fulfilled the requirements of SEPP 55 and the EPA (1997) Guidelines for Consultants Reporting on Contaminated Sites.

The Director General's Requirements in relation to the proposed Headland Park and Northern Cove Main Works require a detailed remediation action works plan. Further the DGRs require that such a plan must be audited by an accredited site auditor and a site audit statement must be prepared.

Advice for this Headland Park and Northern Cove Main Works application provided by the site auditor for Barangaroo (refer Appendix 6) indicates that a draft Remediation Action Plan (RAP) (Appendix 7) and draft Human Health and Environmental Risk Assessment (HHERA) have been prepared for the Headland Park and Northern Cove and submitted for review. Whilst the detailed review of the draft RAP and draft HHERA has not yet been completed the letter concludes that the proposed remediation and validation approach is considered generally appropriate and that the proposed remediation strategies outlined in the Draft RAP are generally consistent with the Overarching RAP. It further notes that the process for remediation of the site comprises:

1. Environmental investigations, conducted in 2006-2008.
2. Definition of remediation goals through preparation of a Human Health and Ecological Risk Assessment (HHERA). A draft has been prepared and is in the early stage of review.
3. Preparation of a RAP. A draft RAP has been prepared (refer Appendix 7) and is in the process of review.
4. Finalisation of the HHERA.
5. A data gap assessment will need to be conducted, probably followed by additional soil and groundwater investigations.
6. Finalisation of RAP.
7. Detailed design of Headland Park and associated features.
8. Preparation of a Remedial Works Plan (RWP) including technical details on implementation of the RAP.

The site auditor's letter indicates that a Part B Site Audit Statement will be prepared following completion of the above steps and that a Part A Site Audit Statement regarding the suitability of the site for its intended use would be completed following completion of the remediation. It has been agreed with the DECCW that the Part B Site Audit Statement will be provided to the Department of Planning prior to the commencement of remediation works. A commitment to this effect has been included in the statement of commitments (refer Chapter 8).

Accordingly it is considered that the requirements of SEPP 55 have been met.

4.4.4 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

Although only State Environmental Planning Policies apply to the Barangaroo site Regional Environmental Plans are considered to be "deemed" SEPPs and therefore apply.

The site is located within 'Foreshores and Waterways Area' as defined in Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (Sydney Harbour Catchment REP). In addition the waterway (west of the site) is zoned W1 Maritime Waters under the REP although no development proposed as part of the subject application extends outside of the Barangaroo site. The Sydney Harbour Catchment REP does not contain any specific provisions relevant to the proposed development.

4.5 Approved Concept Plan

The instrument of approval for the Barangaroo Concept Plan as amended on 11 November 2009 provides:

A1 Development Description

Concept approval is granted only to the carrying out of the development solely within the Concept Plan area as described in the documents titled "East Darling Harbour State Significant Site Proposal, Concept Plan & Environmental Assessment (Volume 1 & 2) prepared by JBA Urban planning Consultants & SHFA (dated October 2006), amended by Barangaroo Part 3A Modification Report (Volume 1 & 2) prepared by MG Planning Pty Ltd & SHFA (dated June 2008) and amended by Barangaroo Part 3A Modification Report – Headland Park and Northern Cove prepared by MG Planning Pty Ltd on behalf of Sydney Harbour Foreshore Authority and dated January 2009 including :

- *A mixed use development involving a maximum of 489,500m^2 gross floor area (GFA), comprised of;*
  - *(a) A maximum of 97,075m^2 (or 25%) and a minimum of 58,245m^2 (or 15%) residential GFA;*
  - *(b) A maximum of 50,000m^2 GFA for tourist uses;*
  - *(c) A maximum of 39,000m^2 GFA for retail uses; and*
  - *(d) A minimum of 2,000m^2 GFA for community uses.*
- ***Approximately 11 hectares of new public open space public domain with a range of formal and informal open spaces serving separate recreational functions and including a 1.4km public foreshore promenade;***
- *A maximum of 8,500m^2 GFA for a passenger terminal and a maximum of 3,000m^2 GFA for active uses that support the public domain within the public recreation zone.*
- *Built form design principles, maximum building heights and GFA for each development block within the mixed use zone.*
- ***Public domain landscape concept, including parks, streets and pedestrian connections.***

- ***Alteration of the existing seawalls and creation of a partial new shoreline to the harbour.***

Terms of approval relevant to the subject Headland Park and Northern Cove Main Works include:

A4 Determination of Future Applications

(1) The determination of future applications for development is to be generally consistent with the terms of approval of Concept Plan No. 06_0162 as described in Part A of Schedule 1, and subject to the modifications of approval set out in parts A, B & C of Schedule 2, except as provided in (2) below:

B1 Public Domain – Northern Headland

(1) Noting the jury report recommendation on the competition winning design scheme, further detailed design plans for the northern headland are to be provided to the Department prior to or concurrently with lodgement of the first project application for major public domain works. These are to be to the written satisfaction of the Director General.

(2) The plans identified in (1) above are to address the following requirements and objectives:

- *(a) The reinstatement of a headland at the northern end of the site within a naturalised shape and form including a build up of height and a general landscaped connection to physically link Clyne Reserve, to allow direct pedestrian access from Argyle Place and appreciation of the landform of the former headland;*
- *(b) Encourage pedestrian permeability along the foreshore, with links to the Hungry Mile (Hickson Road), Argyle Place, Towns Place and "Globe Street";*
- *(c) Ensure adequate surveillance of the park to enhance security while limiting vehicular access into and through the park;*
- *(d) A welcoming aspect when approaching the northern headland from the south along "Globe Street" and the Hungry Mile (Hickson Road), in landform, materials, accessibility and view lines;*
- *(e) Public safety through the day and night considering surveillance, lighting, planting and materials; and*
- *(f) The impact on and the treatment of the Sewage Pumping Station.*

(3) The above redesign may include provision of a public car parking within the headland.

B2 Public Domain – Northern Cove

(1) Noting the jury report recommendations on the competition winning design scheme, further detailed design plans for the Northern Cove located opposite Munn Street are to be provided to the Department prior to or concurrently with the lodgement of the first project application for major public domain works. These are to be to the written satisfaction of the Director General.

(2) The plans identified in (1) above are to address the following requirements and objectives:

(a) An enlargement of the water intrusion; and

(b) A greater naturalised shape, form and edges including treatment surrounding the cove.

B10 Lightweight Bridge, Floating Dock or Pontoon

The construction of a lightweight bridge, floating dock or pontoon to facilitate pedestrian movement over the Northern Cove to continue the axis of Globe Street is to be investigated during the preparation of the further detailed design plans for the Northern Cove and these plans are to be provided to the Department prior to or concurrently with the lodgement of the first project application for major public domain works in the vicinity of the Northern Cove.

The proposed Headland Park and Northern Cove Main Works have regard to the Concept Plan terms of approval outlined above as are relevant to the proposal. The works constitute an application for major public domain works to create a new Headland Park and Northern Cove. Accordingly requirements under B1, B2 and B10 in relation to the submissions of additional detailed design plan are called into effect by the subject project application. Detailed design plans illustrating compliance with B1, B2 and B10 have been prepared by Johnson Pilton Walker and PWP Landscape Architects and are included at Appendix 1. Notably the proposed design achieves these requirements as set out in Table 4.

Table 4: Assessment Against Concept Plan Terms of Approval

Instrument of Approval Requirements and Objectives	**Compliance**
B1 Public Domain – Northern Headland	
B1(2)(a) The reinstatement of a headland at the northern end of the site within a naturalised shape and form including a build up of height and a general landscaped connection to physically link Clyne Reserve, to allow direct pedestrian access from Argyle Place and appreciation of the landform of the former headland;	Consistent – main works application proposes naturalised shape to the headland with a build up of height reminiscent of the original topography of the site and surrounding harbour headlands. The design provides for a landscape connection linking Clyne Reserve with the harbour and enabling an appreciation of the former headland form. A statement of design intent has been prepared by Johnson Pilton Walker and PWP Landscape Architecture (refer Appendix 8) which addresses compliance with this requirement in detail.
B1(2)(b) Encourage pedestrian permeability along the foreshore, with links to the Hungry Mile (Hickson Road), Argyle Place, Towns Place and "Globe Street";	Consistent – the proposed design provides for pedestrian connections from Argyle Place (via Merriman Street or Munns Place) and Towns Place. In addition connections are proposed along the foreshore walkway to Globe street and the Hungry Mile (Hickson Road) (refer Appendix 1).
B1(2)(c) Ensure adequate surveillance of the park to enhance security while limiting vehicular access into and through the park;	As outlined in the Design Statement (refer Appendix 8) surveillance of the park will be provided through: ▪ Provision of clear sightlines from neighbouring properties on Merriman, Bettington and High

	Streets and Hickson Road into the public domain ▪ Provision of clear views for vehicles on Hickson Road through the site to the Northern Cove ▪ Provision of a wide foreshore promenade and open public spaces with clear sightlines throughout the public domain ▪ effective lighting of pathways and open space areas ▪ minimising the use of shrub planting alongside pathways and ensuring clear landscaping beneath large trees so to not provide offenders with a place to hide or entrap victims, and ▪ use of electronic surveillance equipment. No vehicular access (other than maintenance vehicles will be allowed within the park.
B1(2)(d) A welcoming aspect when approaching the northern headland from the south along "Globe Street" and the Hungry Mile (Hickson Road), in landform, materials, accessibility and view lines; *Public safety through the day and night considering surveillance, lighting, planting and materials; and*	The Headland Park has been designed to be separate yet connected to the central and southern parts of the Barangaroo site. By the physical form it will form a separate headland bounded by the Northern Cove to the south however connected via the continuous foreshore promenade that extends the full extent of the Barangaroo site. The viewing platform proposed from the southern shore of the Cove provides for an extension of "Globe Street" and a welcoming address to the Park. The design rationale for the Parkland is further detailed in the Design Statement at Appendix 8.
B1(2)(e) The impact on and the treatment of the Sewage Pumping Station.	The Early Works Project Application provided for the removal of the Sewage Pumping Station superstructure and temporary storage on site for later adaptive reuse. This Main Works application proposes use of the superstructure as an amenities building to be located in the north eastern corner of the site in the vicinity of Moore's Wharf. The heritage impact statement at Appendix 5 addresses the potential impact of the proposed location and use on the item.
B1(3) The above redesign may include provision of a public car parking within the headland.	Consistent – a 300 space car park is proposed within the headland as part of this Main Works Project Application.
B2 Public Domain - Northern Cove	
B2(2)(a) An enlargement of the water intrusion;	Consistent – the proposed Main Works design provides for an enlarged Northern Cove (1.4ha surface area compared with an area of 0.7ha as approved in the original Concept Plan. This was later increased to an area of 1.8ha in the Headland Park Modification however with further detailed design development this has not been refined to 1.4 ha). The proposed Northern Cove size and design will contribute to articulation of the headland and enable

	the shoreline to enter the site providing opportunities for recreational boating access and interaction with the water.
B2(2)(b) A greater naturalised shape, form and edges including treatment surrounding the cove.	Consistent – the proposed shape, form and edged of the Headland Park has been modelled on achieving a naturalised form including the edge treatment to the Northern Cove. The shoreline comprises rocky shores reminiscent of the original shoreline and the headland profile comprises steep bluffs consistent with the historic landform of the area and reminiscent of other harbour headlands. The design intent is further detailed in the design statement prepared by the designers Johnson Pilton Walker and PWP Landscape Architecture (refer Appendix 8).
B10 Lightweight Bridge, Floating Dock or Pontoon	
B10 The construction of a lightweight bridge, floating dock or pontoon to facilitate pedestrian movement over the Northern Cove to continue the axis of Globe Street is to be investigated during the preparation of the further detailed design plans for the Northern Cove and these plans are to be provided to the Department prior to or concurrently with the lodgement of the first project application for major public domain works in the vicinity of the Northern Cove	During the design process consideration has been given to the provision of a pedestrian bridge over the Northern Cove to facilitate pedestrian movement on the axis of Globe Street. The decision has been taken not to pursue this option in favour of an open cove that will allow for recreational boating access and the preserve the visual amenity of the water intrusion. The importance of the Globe Street access has been incorporated into the design as a visual corridor with a viewing platform which extends into the Cove on the southern side and the placement of the pathway which provides access to the Cultural Facility on the northern side. This provides a visual connection aligning with the sandstone cutting. It is therefore considered that this requirement has been satisfied.

The Statement of Commitments for the Approved Concept Plan also included a number of plans that were to be prepared and submitted to the Barangaroo Taskforce or equivalent body prior to the lodgement of any relevant project application other than for demolition or early / site preparation work and remediation. Compliance with requirements relevant to the current Headland Park and Northern Cove Main Works project application is set out in Table 5.

Table 5: Compliance with Statement of Commitments

Commitment	Requirement	To be Submitted to	Date Submitted	Compliance
1-6	Design Excellence Strategy	Reference Group	5/11/10	Yes
7-8, 12, 13, 15, 19	Public Domain Plan(s) (including Public Art Strategy)	Reference Group	5/11/10	Yes
7-8, 16	TMAP	Reference Group	5/11/10	Yes
7-8, 18	Community and Social Plan	Reference Group	5/11/10	Yes

Commitment	Requirement	To be Submitted to	Date Submitted	Compliance
7-8, 20, 21	Utility Services Infrastructure Plan	Reference Group	5/11/10	Yes
12A, 13	Headland Park Sub Plan	DoP (part of Project Application for HP)	Current PA (refer Appendix 12)	Yes
12B	HP Recreation Plan	DoP (part of Project Application for HP)	Current PA (refer Appendix 11)	Yes
14	Draft Public Art Strategy	Reference Group	5/11/10	Yes
22, 23, 24, 25	Integrated Water Management Plan	Reference Group	5/11/10	Yes
48	Heritage Impact Statement for Sewerage Pumping Station	DoP (part of Project Application relating to sewer pump station)	Current PA (refer Appendix 5)	Yes
57	Heritage Impact Statement for Sandstone Seawall	DoP (part of Project Application relating to sandstone seawall)	Current PA (refer Appendix 5)	Yes
59	Heritage Impact Statement for Harbour Control Tower	DoP (part of Project Application relating to Harbour Control Tower)	Current PA (refer Appendix 5)	Yes
60	Archaeological Assessment	DoP (part of Project Application involving surface disturbance)	Submitted with Headland Park Early Works Application	Yes
60A	Archaeological Research Design	DoP (part of Project Application involving impact)	Current PA (refer Appendix 22)	Yes
72-75	Remediation Action Plan	DoP (part of Project Application involving surface disturbance)	Current PA (refer Appendix 7)	Yes
83	Noise impact Assessment and Mitigation report	DoP (part of Project Application for HP)	Current PA (refer Appendix 19)	Yes
89	Construction Management Plan	DoP (part of Project Application for HP)	Current PA (refer Appendix 26)	Yes

5. CONSULTATION

The Barangaroo Planning Reference Group has been established to ensure a transparent, cooperative and coordinated planning approval process that facilitates the timely delivery of determinations for the Barangaroo site. The Reference Group comprises the following authorities:

- Department of Planning
- City of Sydney
- Sydney Water
- Roads and Traffic Authority (RTA)
- NSW Transport and Infrastructure
- Housing NSW
- NSW Maritime
- Sydney Harbour Foreshore Authority
- Department of Premier and Cabinet
- Sydney Ferries, and
- Sydney Ports Corporation.

The Reference Group met on 4 March 2010, 18 March 2010, 28 April 2010 and 16 June 2010. The Headland Park and Northern Cove design and scope of the subject project application was discussed at these meetings in addition to other matters. Following completion of this project application and the subsequent determination of the proposal, the Barangaroo Planning Reference Group will be briefed on the timing of the proposed works and any items that may be relevant to each particular Authority.

5.1 Technical Working Groups

To satisfy a range of commitments outlined in the Concept Plan approval and to provide input into future project applications for the Barangaroo site, the Barangaroo Delivery Authority has established a series of technical working groups. The working groups comprise the Barangaroo Delivery Authority, relevant government agencies, Council, and Lend Lease as the developer of Stage 1. The technical working groups and their respective memberships are outlined in Table 4.

An Energy Australia Liaison Group has also been convened including representatives of the Barangaroo Delivery Authority, Lend Lease and Energy Australia to facilitate the design and implementation necessary to supply and reticulate energy for Barangaroo and to assist in establishing new sustainability benchmarks.

Relevant technical working groups have been consulted on the proposed Headland Park and Northern Cove Main Works at various meetings as outlined in the Consultation Report at

Appendix 9. Issues raised by members of the working groups have been addressed in this project application.

Table 6 Technical Working Groups

Technical Working Group	Membership
Built Form	▪ Barangaroo Delivery Authority ▪ Lend Lease ▪ City of Sydney
Public Domain	▪ Barangaroo Delivery Authority ▪ Lend Lease ▪ Sydney Harbour Foreshore Authority ▪ NSW Maritime ▪ City of Sydney
Transport and Access	▪ Barangaroo Delivery Authority ▪ Lend Lease ▪ NSW Transport and Infrastructure ▪ City of Sydney
Community Development	▪ Barangaroo Delivery Authority ▪ Lend Lease ▪ Department of Housing ▪ City of Sydney
Physical Infrastructure	▪ Barangaroo Delivery Authority ▪ Lend Lease ▪ Sydney Water ▪ City of Sydney ▪ Department of Environment, Climate Change and Water
Investment	▪ Barangaroo Delivery Authority ▪ Lend Lease ▪ Department of Industry and Investment
Remediation	▪ Barangaroo Delivery Authority ▪ Lend Lease ▪ Department of Environment, Climate Change and Water

Further consultation with relevant agencies has also been undertaken by the Department of Planning in the preparation of Director General's Requirements (DGRs) for the project application. Copies of agencies responses were forwarded to the Barangaroo Delivery Authority by the Department and have been considered in the preparation this project application.

5.2 Community Consultation

As per commitments 99 and 101 of the Concept Plan approval, the Barangaroo Delivery Authority is continuing to consult with the community about the proposed redevelopment of the Barangaroo site. Recent consultation is summarised in the consultation report at Appendix 9 prepared by the Barangaroo Delivery Authority and has included:

- a public display between 24 February and 31 March 2010 with over 10,000 inquires either through people visiting the display or online (feedback forms were available)
- a public presentation on 23 February 2010
- an online forum
- four community forums between 4 and 24 May 2010 across Sydney, and
- a series of letterbox drops of newsletters to households in the Millers East Balmain, Walsh Bay the Rocks and Pyrmont areas.

Specifically in relation to the proposed Headland Park and Northern Cove Main Works the proposed design was released to the public on 10 July 2010, with an Open Day on site, and also via the media and on the Barangaroo website. Approximately 250 people attended the Open Day, and people were provided with feedback forms in order to submit their feedback on the Headland Park and Northern Cove design.

Respondents generally agreed with the design intent to create an informal and primarily passive, recreational parkland as a place for socialising and low key activity. There were some suggestions for more active uses such as climbing, a water park and a skateboard facility.

The most favoured aspects of the design developed to date were:

- the addition of a new large green space into the city
- that the headland park contains few buildings
- the recreation of the old shoreline, and
- revegetation of the site with native plants.

The ability to cater to a range of uses, the linking foreshore promenade and providing access to the water, were also noted.

Issues relating to Headland Park that didn't appeal to people or were identified as requiring more work included:

- the level of protection in poor weather
- the height of the restored headland profile
- the desirability/feasibility of re-establishing a naturalised headland and shoreline, and
- lack of facilities for more active recreation

The proposed cultural space gave rise to a number of suggestions. While some felt this was a good idea and that it helped to retain the stone cliff face, others commented that it should not be underground. There were also some comments that if any such facility were to be provided, it should not be at the expense of provision of open space. There were many suggestions as to potential uses including a place to celebrate indigenous and/or Australian culture and as a flexible multipurpose venue for a range of performing arts.

Meetings have also been held with the Millers Point Residential Action Group (27 May 2010 (Early Works Application), 13 July 2010 and 10 August 2010) and Merriman Street residents on 3 June 2010 (Early Works Application) and on 10 August regarding the Main Works Application.

In addition a cultural community forum was held on 1 September 2010 where the community was encouraged to contribute their ideas, thoughts and suggestions about how Barangaroo can be a culturally vibrant precinct that works for all of Sydney. The forum was attended by around 220 people and included key representatives from the cultural and arts industry participating in a panel discussion. Peter Walker of Peter Walker and Partners (PWP) presented the detailed design of the Headland Park including the proposed cultural space within the headland. Key themes to emerge from the Forum were:

- Accessibility
- Indigenous heritage – acknowledgement and celebration
- Entertainment and events
- Iconic public artworks, and
- There should be a mix of cultural uses to service and range of interests.

Issues raised in the community consultations to date that are relevant to the proposed Headland Park and Northern Cove Main Works include:

- Activation - There is keen community interest in the type of leisure opportunities to be provided within Headland Park. A range of views have been expressed from providing new green open space in the city to ensuring the park is a destination which attracts visitors from across Sydney, Australia and internationally. It was considered important the park provides a range of active and passive leisure opportunities.
- Safety and Security - the need to ensure safety and security within the parkland at night has been raised. This has included discussions about the potential opening hours.
- Accessibility - The ease of access to the park, through walking, cycling and public transport, has been raised as an important issue.
- Quality of Fill - The creation of a naturalistic Headland Park requires a significant amount of fill. Best practice sustainability involves the minimal removal of materials from construction sites. Headland Park will be formed by the materials excavated from the Northern and Southern Coves and the basements of the southern precinct.
- Connections to Merriman Street - Questions have been raised about how Headland Park will link to Merriman Street and respect the privacy of residents
- Respect for Millers Point Heritage and Maritime History – It has been suggested that the transformation of Barangaroo should acknowledge the heritage of both the local area and its maritime industrial history.
- Entry Points from the Carpark - The current Concept Plan approval includes options for entry to the car park under Headland Park from the Hungry Mile (Hickson Road) and Dalgety Road.. Residents have queried whether there will be access from Merriman Street.

- Traffic Generation - The issue of traffic generation as a result of the inclusion of a car park within the headland has also been raised.
- Location of air vents for the underground car park - Concern was raised about the location of air vents for the underground car park in relation to Merriman Street.
- Future of Sydney Ports Control Tower - The future of the Sydney Ports Control Tower is still being determined. There have been some suggestions it could be used as an attraction or viewing point. It has also been suggested that it could contain a heritage/history element as an attraction
- Construction impacts - Some neighbouring residents have indicated concern about construction impacts including dust, noise and vibration (especially in relation to heritage properties)
- Dust from storage of fill - Dust has been raised as a significant concern, especially in relation to the transport and storage of large quantities of fill.
- Weather protection - The level of protection from wind and rain within the Headland Park has been queried.
- Height of restored Headland Profile - The height of the restored Headland profile was raised as a concern by some residents with it being viewed as a little steep.

These matters have been addressed in further detail (including a response to each issue) in the community consultation report at Appendix 9 and throughout this project application.

6. PROJECT DESCRIPTION

6.1 Overview

This Project Application seeks approval for works to create the Headland Park and Northern Cove. The development proposal comprises the redevelopment of the northern part (Stage 3) of the Barangaroo site for a new public park in the form of a naturalistic headland with future cultural space and car parking within the headland and the creation of a new water intervention, the Northern Cove.

The Northern Cove will continue the naturalistic approach of a rocky shoreline until it reaches the northern edge of Barangaroo Central where a more formal edge treatment will be employed. The cove is designed to allow access for most leisure craft including small yachts, kayaks and motor boats.

The proposal includes all works required to construct the final landform including the park and northern cove and seeks approval for the final land use. In addition the works include construction of a car park with up to 300 spaces and a space for a future use (as a cultural facility which will be subject to a separate project application) within the Headland (i.e. below finished ground level adjacent to the existing sandstone cutting). Works include:

- land formation utilising fill from Stage 1, ranging from the 150,000m^3 identified in the Early Works application to approximately 230,000m^3 (additional 80,000m^3) along with excavated material from the Headland Park site itself (120,000m^3) to build the headland up to finished levels for a nominal one metre topsoil layer (total fill of 350,000m^3)
- construction of structural earth retaining walls utilising sandstone based materials
- creation of a naturalistic shoreline and northern cove through excavation and formation of retaining walls using boulders etc
- general landscaping and planting
- construction of a network of pedestrian pathways connecting the foreshore walkway and surrounding areas
- construction of a shoreline promenade (dual use pedestrian path and cycleway)
- jetty / viewing platform and public wharf extending into the Northern Cove from the southern shoreline
- construction of a car park totalling up to 300 spaces within the headland with vehicular access from Towns Place and pedestrian access from various locations within Headland Park
- location and use of the former Sydney Water Sewage Pumping Station for the purposes of an amenities building
- construction of a space for a future use (cultural facility) comprising initially 75,000m^3 and ultimately up to 100,000m^3
- installation of relevant services and infrastructure

- construction of the services and piping/pumping infrastructure associated with the air conditioning system (cooling water inlet/ outlet) for the future cultural facility and car park, and
- site remediation for limited contamination of fill material previously identified on the Headland Park site.

The Sydney Harbour Control Tower will remain onsite and be operational in accordance with Sydney Ports Corporation's requirements until future modification for reuse or demolition is required. Any changes to the Sydney Harbour Control Tower will be the subject of a separate application.

Drawings showing the proposed Headland Park and Northern Cove Main Works are provided at Appendix 1. These plans are divided under the headings of landscape and architecture, services and construction staging for ease of reference. Detailed technical plans are also included in technical report which form appendices to this report.

6.2 Park Design

6.2.1 Design Philosophy

The Headland Park and Northern Cove will be one of the most iconic and significant precincts for the city featuring some of the most memorable views of the city and the harbour. Barangaroo's Headland Park is the most northerly promontory of Sydney city. The parkland juts into Sydney Harbour in a spectacular location as one of an archipelago of harbour headlands that include Manns Point, Blues Point, Balls Head, Mrs Macquarie's Chair, Balmain as well as Goat, Cockatoo and Garden Islands and Fort Denison. It will create a picturesque landscape complementing the other harbour headlands. The aim is to inspire excellence for a timeless place that stimulates civic pride.

To achieve this vision eight objectives have been adopted for the Headland Park:

Objective 1 – Excellence - Create a memorable Headland Park that captures the community's imagination and pride through design excellence.

Objective 2 – Stimulate patronage - Establish attractive parklands that encourage public use.

Objective 3 – Connected - Ensure the parkland spaces are very well connected to the surroundings; physically, visually and socially.

Objective 4 – Cultural experiences - Include significant cultural experiences in the parklands.

Objective 5 – Diverse and sensitive - Provide parklands that have a range of diverse uses that are sensitive to local communities.

Objective 6 – Enhance safety - Enhance safety through design and management.

Objective 7 – Respect heritage - Respect the history of the place through interpretation of the natural and cultural landscape.

Objective 8 – Sustainability - Improve the sustainability of the parklands and surrounding area of influence through social equity, management and innovation.

These objectives have been distilled down in the design process into key governing principles which have guided the design development of the Headland Park (refer Barangaroo Public Domain Plan at Appendix 10).

A detailed design statement which articulates the design philosophy and response has been prepared by the designers, Johnson Pilton Walker and PWP Landscape Architecture (refer Appendix 8). The statement outlines the design development phase which has progressed from the general design included in the Concept Plan, the more evolved design of the Headland Park modification to the final design now proposed to be constructed.

6.2.2 Cultural and Recreational Needs

The governing principles for the Headland Park envisage a naturalistic headland that will cater primarily for informal recreational activities. The combination of headland, foreshore and 'natural' settings in the park, and its location adjacent to the Sydney central business district and situated on Sydney Harbour, offer unique and significant opportunities for a range of activities to be enjoyed by a wide spectrum of users. Indeed, the Headland Park will make an important contribution to satisfying the demonstrated informal recreation needs of the City's increasing number of residents, workers and visitors. In addition to catering to passive recreation needs the Park will also provide the potential for cultural activities inside the space for future use within the headland.

To guide the design of the Headland Park an outline of Recreation Planning Issues report has been prepared by Elton Associates (refer Appendix 11). The report identifies expected users of the Headland Park and key recreational participation trends that are to be met in the design of the parkland and the overall recreational offerings within the Barangaroo site. Generally the Headland Park has been designed to cater to the passive recreation needs of city workers, residents, tourists and the broader Sydney community.

Having regard to the analysis of recreation needs and potential users it is intended that the Headland Park will be open to the public 24 hours a day, 7 days a week. Use of the park is expected to peak at various times depending on the demands of the various user groups and during special events. Activation of the parkland spaces has been incorporated into the design by:

- provision of a range of spaces, both open spaces and spaces enclosed by a 'walls and rooms' planting design,
- provision of park user support facilities, such as toilets and seating, and
- encouragement of activities and events through promotion and management initiatives.

Cultural uses will also be an important aspect of ensuring Barangaroo is an active and vital part of the city. The Barangaroo Delivery Authority is presently undertaking a number of processes to understand the range of potential cultural and community uses that may have "good fit" with Barangaroo and could be accommodated at a number of locations across the site. These include: working with Communities NSW and the Greater Sydney Partnership to undertake a

cultural audit and gap analysis; a community forum on 1 September focusing on cultural activation of Barangaroo, a web based forum promoting broad community discussion on cultural uses at Barangaroo, and a six week submissions process seeking detailed proposals on cultural and other uses at Barangaroo.

The outcomes of these various processes will inform planning cultural uses within the Headland Park and the future cultural facility within the headland.

6.2.3 Landscape Design

The new Headland Park proposed at the northern end of the Barangaroo site will enhance the collection of City Centre green spaces, particularly on the western edge. It will reconnect the Millers Point neighbourhood to the harbour, Argyle Street and the Munn St Reserve as it was in 1836, eliminating the barriers that have been created by industrial development. The park will be naturalistic in character and provide passive recreation and disabled access down to the foreshore from the highpoint at Merriman Street, Munn Reserve and Clyne Reserve.

The landscape vision and objectives are outlined in the Design Statement prepared by the designers: Johnson Pilton Walker and PWP Landscape Architecture (refer Appendix 8). This is consistent with the Barangaroo Public Domain Plan (Appendix 10) and Headland Park Public Domain Sub-Plan (Appendix 12).

The design of the Parkland as described by the designers is as follows:

> *Thus the overall morphology of the park is that of a landform sloping gradually upwards at a grade of approximately 1:5 from the north near Moore's Wharf and rising to an upper 'bluff' at the level of Merriman Street and falling more steeply at about 1 in 1.5 to the west and south. Around this headland is a relatively flat apron which extends to the water's edge with a curtilage of a naturalistic rocky shoreline. The 'plan form' of the park has been generated from an approximation of the 1836 shoreline (i.e. from a point in time before Millers Point began to be altered by human activity). This line is marked in the design by a low wall separating the pedestrian and cycle paths which form a grand foreshore promenade linking Walsh Bay to Barangaroo Central and Barangaroo South and thence to Darling Harbour and beyond. These paths will be constructed from sandstone.*
>
> *The character of the landscape of the northern slopes and the upper bluff will be one of large shade trees in irrigated grassland. The steep slopes on the western and southern slopes will be very densely planted with endemic tree and shrub species (which are described in more detail elsewhere).*
>
> *At the north the park is terminated by a harbour re-entrant at Moore's Wharf. The northern slopes are designed for passive use for casual seating and picnicking and they will form a grandstand for large crowds enjoying major harbour events such as the New Year's Eve fireworks. A sinuous path, designed at accessible grades rises up the slope to the upper area which will have gentle grades suitable for informal ball games, kite flying and the like. The path system has been designed around the edges of the upper bluff and there are three connections to the local area – two from Merriman Street and one from Clyne Reserve, all at grade. There will be a further connection with the park from the*

Munn Street Reserve. The major park entrances will be from Towns Place in the north and from the Hungry Mile at the south. The entire park is accessible, either via the gently graded path from the north or via an internal lift system from the south.

The two major path systems (i.e. the Foreshore Promenade and the upper pathway) are connected by two major stairways, one at the southwest, the other at the southeast. These grand stairways will be constructed from rock excavated from the site. A subsidiary path system will run through the native planting areas as a 'bush walk' which will have a much more informal character with rock outcrops and gravel surfacing similar to the type of path found on other Sydney headlands such as those on Berry Island. There will be a wide variety of views obtained from all of the pathways – sometimes panoramic, sometimes filtered, but all carefully considered to take advantage of the wonders of Sydney Harbour.

The southern end of the site is terminated by the Northern Cove which will continue the naturalistic approach of a rocky shoreline until it reaches the northern edge of Barangaroo Central where a more formal edge treatment will be employed. The cove is designed to allow access for most leisure craft (refer separate reports) including small yachts, kayaks and motor boats.

Whilst the external form and treatment of the site is based on an interpretation of the pre-settlement headland, the design incorporates an internal carpark for 300 vehicles and a flexible internal space to accommodate a future cultural facility whose use has not yet been determined. The form of these 'architectural' facilities is subservient to the landform design (i.e. the form of the internal spaces has been driven by the landform above rather than the landform responding to the form of the architecture). As such the design is unique. The basic intent of the cultural space is to express the morphology of the sandstone headland by leaving the sandstone cliff exposed similar in manner to the existing wall in The Bond building on Hickson Road. This will create a space with the potential to provide a venue as evocative as the Tate Modern's Turbine Hall or (locally) the Cockatoo Island halls. The carpark is accessed from Towns Place in the north (refer Traffic Report) and this access also provides for a future loading dock for the cultural space.

The design allows flexibility for sustainable design by utilizing increasing layers of environmental control, from naturally ventilated public circulation zones to, where appropriate, more tightly controlled gallery spaces or the like. Fresh air can be drawn in along the 'slot' on the Merriman Street edge and exhausted through a plenum on the western edge of the structure. Skylights through to the upper parklands will bring in daylight and greater visual connection to the outside

Figures 10 and 11 show the outline of the proposed landform overlaid on the existing site topography.

Figure 10: Representation of proposed landform over existing site looking south (Source: Public Domain Sub-Plan, JPW and PWP, Oct. 2010)

Figure 11: Representation of proposed landform over existing site looking east (Source: Public Domain Sub-Plan, JPW and PWP, Oct.2010)

6.2.4 Headland Profile and Levels

The Barangaroo headland has been designed as a naturalistic headland reflecting the 1836 shoreline (i.e. from a point in time before Millers Point began to be altered by human activity) completing the ring of prominent harbour headlands and islands formed by Blues Point, Balls Head, Ballast Point, Illoura Reserve and Goat Island (Mel Mel). It will also reconnect the shoreline and pedestrian open space link with Clyne Reserve, Argyle Place and Observatory Hill to the east.

The overall morphology of the park is that of a landform sloping gradually upwards at a grade of approximately 1:5 from the north near Moore's Wharf and rising to an upper 'bluff' at the level of Merriman Street and falling more steeply at about 1 in 1.5 to the west and south. Around this headland is a relatively flat apron which extends to the water's edge with a curtilage of a naturalistic rocky shoreline.

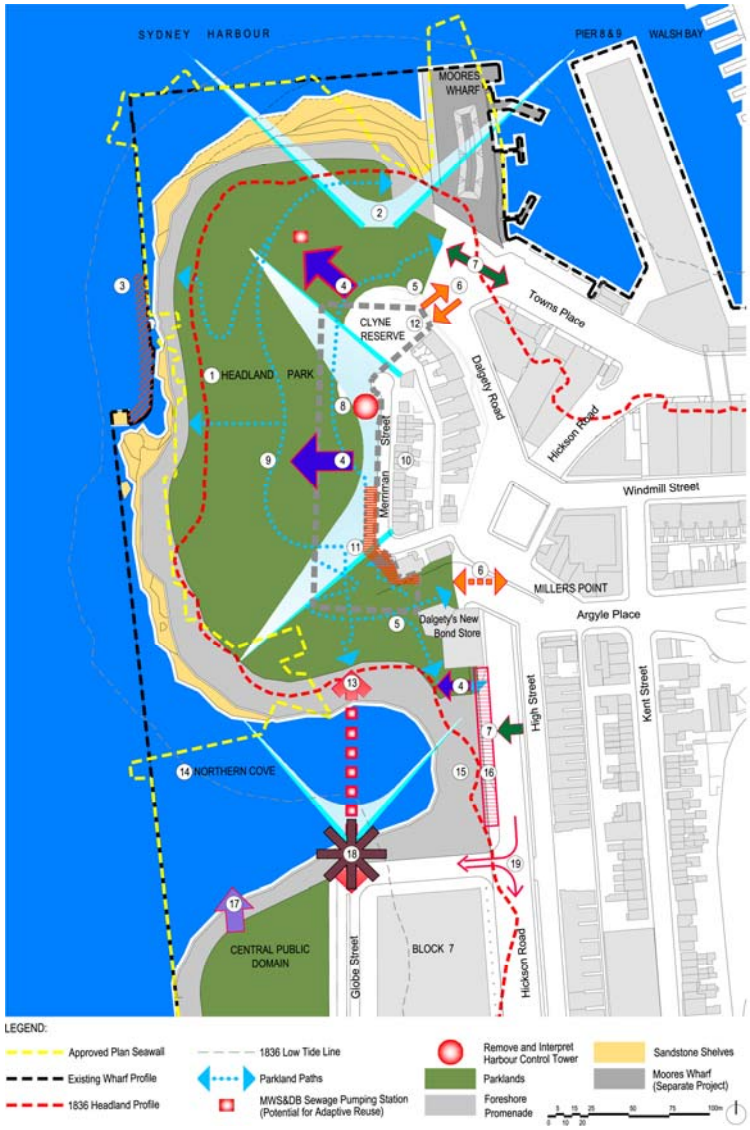
The proposed new headland profile has a maximum RL of 20.5 at its highest point adjacent to Merriman Street. Merriman Street has an RL of 19-20 adjacent to the highest point of the park therefore the maximum height is generally consistent with this level. In this regard it should be noted that the maximum RL of 20.5 is only proposed in the location of the upper bluff area with the landform sloping gently down to the north (with levels therefore being lower than Merriman Street) and more steeply down to the west.

The proposed headland profile is also generally consistent with the levels approved within the Concept Plan Headland Park modification (MP06_0162 MOD 3) which indicates a maximum height of approximately RL 20 but which provides flexibility for future detailed design development.

Statement of Commitment 104 from the Instrument of Approval provides that:

> 104 *The future detailed design of the Headland Park including the northern cove, Globe Street and adjacent Block 7 is to be prepared in accordance with the Headland Park Urban Design Framework and Preferred Project Parkland Objectives detailed in "Barangaroo Headland Parklands Urban Design Report" prepared by Conybeare Morrison (August 2009).*

The Headland Park Urban Design Framework is shown in Figure 12 below.



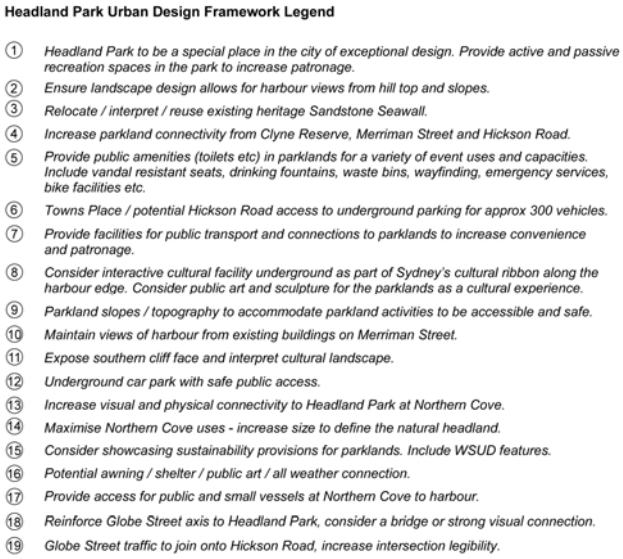


Figure 12: Headland Park Urban Design Framework (Source: Barangaroo Headland Parklands Urban Design Report, Conybeare Morrison, August 2009)

The final design, the subject of this Main Works Project Application, is generally consistent with the urban design framework. The design is also consistent with the Preferred Project Parkland Objectives as detailed below.

Objective 1: Excellence	
OBJECTIVE	**Create a memorable Headland Park that captures the community's imagination and pride through design excellence.**
INTENTION	***The Headland Park is to be a special place in the city.*** *The location and size of the new parklands set up opportunities for the Headland Park to complement the archipelago of headlands in Sydney Harbour as part of the city's fabric.* Similar to other harbour edge icons such as Mrs Macquarie's Chair, Botanic Gardens, Sydney Opera House, Dawes Point, Sydney Harbour Bridge and others; Barangaroo Parklands should be of iconic status and a world class amenity for everybody's enjoyment as a destination.
CONSISTENCY	Consistent - The Headland Park and Northern Cove will be one of the most iconic and significant precincts for the city featuring some of the most memorable views of the city and the harbour. Barangaroo's Headland Park is the most northerly promontory of Sydney city. The parkland juts into Sydney Harbour in a spectacular location as one of an archipelago of harbour headlands that include Manns Point, Blues Point, Balls Head, Mrs Macquarie's Chair, Balmain as well as Goat, Cockatoo and Garden Islands and Fort Denison. It will create a picturesque landscape complementing the other harbour headlands. The aim is to inspire excellence for a timeless place that stimulates civic pride.
Objective 2: Encourage Patronage	
OBJECTIVE	**Establish attractive parklands that encourage public use.**

INTENTION	***The parklands are for everybody's use****; strategies are required to increase patronage.* • Maximising public **use and activation** of all parkland spaces is a priority that will assist with improving safety. • **Attract the** broad **public** to the parklands and harbour edge throughout the week, activation at all times is required. • **Ensure** universal **access** requirements are addressed in the design of all parkland spaces. Steep parkland spaces restrict public use. • Accommodate **a variety of large and small public events.** Conveniently located public amenities are required throughout the parklands with appropriate capacity resolution.
CONSISTENCY	Consistent – The proposed Headland Park design will be highly attractive and accessible thus encouraging public use. It has been designed to meet the demands of a range of users and to ensure activity throughout the week. It is appropriate to accommodate a range of large and small events and will be the subject of a future Plan of Management to address operational matters.
Objective 3: Connected	
OBJECTIVE	**Ensure the parkland spaces are very well connected to the surroundings; physically, visually and socially.**
INTENTION	***All parts of the parklands are to be connected*** *to the city, local areas and neighbouring amenities.* • Connections **invite usage and life** in the precinct. • **The foreshore edge is to be inviting**, comfortable, interesting and pleasant waterfront edge that encourages use. • The continuous foreshore promenade through the parklands should **define the north-western edge of the city**. • Millers Point, Walsh Bay, Dawes Point and Barangaroo are to be **interconnected and well-connected** to Sydney CBD and all other areas to **increase parkland patronage**. • A visual or physical connection for Globe Street axis is to be considered across Northern Cove. This could include a bridge or axial, spatial or visual relationship that would create a **'welcoming amenity'** or feature. • **Accessible public transport** facilities are required to improve connectivity and patronage. • **Provide private vehicular parking** under the headland to encourage **patronage**.
CONSISTENCY	Consistent - The parkland has been designed to be highly accessible from within the Barangaroo site, surrounding streets, the CBD and more broadly from throughout Sydney and beyond. The proposed ferry wharf at Barangaroo South and the proposed light rail will ensure the site is highly accessible via public transport. The design provides for connections with the Globe street axis and private vehicle parking under the headland to encourage park usage.
Objective 4: Cultural Experience	
OBJECTIVE	**Include significant cultural experiences in the parklands.**
INTENTION	*The parklands should* ***include cultural experiences*** *as part of the 'cultural ribbon' through the city.* Consider creating a **facility under the headland** and develop a cultural experience commensurate with the status of the location.
CONSISTENCY	Consistent - The proposed design provides for a future cultural facility within the headland. The use and fitout of this will be the subject of a future project application.

Objective 5 – Diverse and Sensitive	
OBJECTIVE	**Provide parklands that have a range of diverse uses that are sensitive to local communities.**
INTENTION	*The Headland Park should include **passive and active recreation** spaces with a diversity in activities that is sensitive to neighbouring areas.* • The parklands need to provide **active and passive recreation uses**. The diversity of amenities could include outdoor education and leisure facilities. All activities must be compatible and consistent with parkland uses. • Parkland activities should be sensitive to the surrounding community including visual, noise and general amenity considerations.
CONSISTENCY	Consistent – The proposed headland park will provide for passive recreation uses with the future Central Parklands will provide for more active uses. The proposed design of the parkland provides for a range of passive recreation spaces including walking, picnicking etc. It is sensitive to surrounding areas and will not result in adverse amenity impacts to its neighbours.
Objective 6: Enhance Safety	
OBJECTIVE	**Enhance safety through design and management.**
INTENTION	***The Parklands must be safe at all times and for all users.** Safety is a major parkland priority.* • All active and passive recreational spaces, connections and amenities of the parklands are to **include enhanced safety measures.** • **Increase the visibility** of all areas through landscape design, topographic form, vegetation (plant) location and selection to enhance safety through surveillance. • Obligations in relation to occupation, health and safety standards, environmental safeguards, quality standards and building codes will apply to parkland design, construction and operations. • Safety facilities are to be built into the design of the parklands including illumination, active and passive surveillance and emergency response facilities, consistent with the natural qualities of the parklands.
CONSISTENCY	Consistent -The Headland Park has been designed employing **Crime Prevention Through Environmental Design (CPTED) safety strategies** and has been assessed accordingly (refer section 7.12 for further detail) .
Objective 7: Respect Heritage	
OBJECTIVE	**Respect the history of the place through interpretation of the natural and cultural landscape.**
INTENTION	*An **inspirational approach to revealing the heritag**e of the precinct to users is required. The location has a rich natural and cultural history which is significant in the development of the city and the nation.* • Interpretation of the **ancient natural landscape** should be revealed in the Headland Park. • Respecting the **cultural geography** through interpretation, including Aboriginal and non-Aboriginal heritage and the continuing cultural manifestations, will assist users in understand the importance of the area to the development of the city and the nation. • Specific **heritage strategies are required for existing heritage** features
CONSISTENCY	Consistent – the design of the parkland reflects the site's natural landscape and cultural heritage and provides opportunities for interpretation (refer sections 7.8 and 7.9 for further detail).

Objective 8: Sustainability	
OBJECTIVE	**Improve the sustainability of the parklands and surrounding area of influence through social equity, management (auditing) and innovation.**
INTENTION	*Increasing the sustainability of the parklands and **showcasing sustainability features** is required to ensure the parkland legacy.* • Due to the Headland Park's scale, location, social, economic value and importance, the parklands should demonstrate an **exemplar sustainable approach**. • **Provide services and programs** at the cutting edge of sustainable design and management. • Parkland space is a scarce resource for the growing population of the CBD. Increasing the sustainability (social economic and environmental) of the parklands for the benefit of future generations is to be achieved through **innovation**. • Facilities for the **management and maintenance** of the parklands are required to be accommodated within the precinct. • Parkland infrastructure is required to focus on improving its **long term use, improving sustainable provisions and being integrated** with other stages of development. • Infrastructure provisions should adopt a **'systems approach'**. This could include waste from one process being transformed on site to a resource for another process.
CONSISTENCY	Consistent - The proposed design of the parkland will deliver a precinct which values the well being of people and the planet by: • Being water positive • Generating zero waste • Achieving carbon neutrality • Promoting community wellbeing, and • 100% renewable energy generation for the public domain. Details of the proposed sustainability measures are included at Section 7.15 below.

6.2.5 Accessibility

The Barangaroo Headland has been envisaged as a place for residents and visitors from across the diverse communities of Sydney. It is to be accessible to all parts of Sydney, through different means of transportation, at different times of day and anticipating all possible needs. The arrival experience, be it by car through the underground carpark, by light rail along the Hungry Mile or on foot along the foreshore promenade is integral to the overall experience.

The entries into Barangaroo Headland are scaled to different needs as follows;

Primary Entries

- Main entry points from the foreshore promenade and Towns Place
- Sized to accommodate large crowd movements
- Location of main visitor amenities and services

Secondary Entries

- Expand the permeability of the headland and providing access to Millers Point
- Connections to adjacent public spaces of Munn and Clyne Reserves

Tertiary Entries

- Finer grained neighbourhood community connections
- Intimate footpaths to discourage large crowd use

The main access to Wynyard station and the CBD beyond is through the new City Walk pedestrian link from Barangaroo South. There will be a series of east - west connections across the Hungry Mile escarpment to re-stitch the precinct back to the city. The Foreshore Promenade and the Hungry Mile are the main north south connections. Cyclist will have access to a new dedicated cycleway along the Hungry Mile as well as recreational routes through the parklands and along the foreshore.

Public transport access to Barangaroo Headland is significantly enhanced by the proposed new ferry terminal at Barangaroo South and light rail along the Hungry Mile.

Figure 13: Headland Park Access Hierarchy (Source: Public Domain Sub Plan, JPW and PWP, Oct. 2010)

6.2.6 Pedestrian Network

The Headland Park itself will contain a series of connected pathways linking the Park with the future cultural facility, existing areas to the east, Barangaroo Central and South to the south, and The Rocks to the north. Equitable access and spaces accessible to all is provided in the Park and the future cultural space.

Figure 14: Headland Park pathway network (Source: Public Domain plan, JPW and PWP, Oct. 2010)

6.3 Park buildings and other structures

Buildings and other structures proposed within in the Headland Park include:

- the construction of a space within the Headland for a future community use with an initial capacity of 75,000m^3 and maximum capacity of 100,000m^3 incorporating car parking for up to 300 cars
- installation and use of the relocated Sydney Water Sewage Pumping Station superstructure at the north eastern extent of the site in the vicinity of Moore's Wharf for an amenities building. Approval is sought for the location and the use but the actual works to the building will be subject to a future application., and
- Café/kiosk (oyster bar) adjacent to the viewing platform extending from the southern shoreline of the Northern Cove (subject to future application).

6.3.1 Car Park

As noted above it is proposed that an internal space be created within the newly formed headland profile that will accommodate an area ultimately of up to 100,000m^3 with an initial size of up to 75,000m^3. The design concept for the car park and cultural space is illustrated in Appendix 1. In summary the lower levels of this space would accommodate car parking for up to 300 cars in 4 half levels at RL: -1, 0.50, 2.0 and 3.5 with a simple one way circulation system. The car park is proposed to have a footprint of 10,000-20,000m^2. The total proposed numbers of cars to be accommodated within the car park is 300 and as such is consistent with the approved Concept Plan.

The car park would be accessed by vehicles off Towns Place via a new entrance road. Pedestrian access is proposed from various locations within Headland Park through a network of pedestrian pathways. Direct pedestrian access would also be provided from the future cultural facility. The car park would draw in fresh air along the thermal mass of the sandstone escarpment and the used air exhausted through the western air plenum (refer Figure 15).

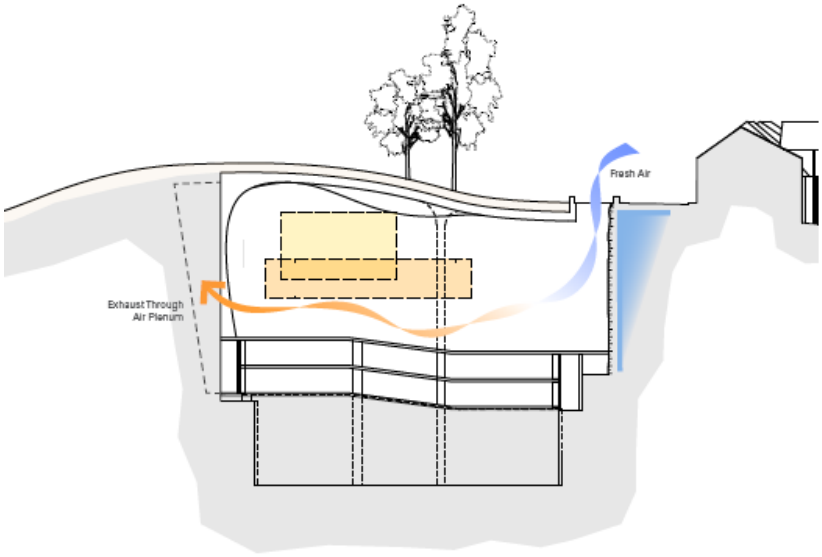


Figure 15: Cross Section of proposed car park and cultural space (Source: Public Domain Plan, JPW & PWP, Oct. 2010)

6.3.2 Cultural Space

Above the proposed car park it is proposed that a void space be created within the headland profile adjacent to the sandstone cutting for a future use as a cultural space. The plans at Appendix 1 illustrate the design concept for the cultural space. The design of the cultural space provides for a flexible framework that can be developed incrementally. It provides an internal space initially of up to 75,000m^3 with a maximum volume of 100,000 m^3. The space is conceived to have an atrium area 10m wide with glass roof over the full height above existing ground level adjacent to the Millers Point sandstone escarpment (cutting) to reveal and allow interpretation of this existing site feature (refer section at Appendix 1). This would allow daylight into the space and natural ventilation. In the initial stage the space would be constructed as a simple core and shell and could potentially have an interim use (subject to future approval) for events such as the Biennale of Sydney or the Sydney Festival. Further work would be undertaken to determine the future cultural use depending on what Sydney needs and how any proposed use would enhance the park.

The layout and use of the cultural space is yet to be determined and would be the subject of a future project application. However for the purposes of this project application consent is sought for a cultural space area as shown on the plans at Appendix 1. The space represents a maximum area of 100,000m^3.

In summary, it is proposed that a space will be constructed within the headland adjacent to the sandstone cutting which will allow for a future community use. In the first stage (as part of this project application) the lower levels of this space would accommodate a carpark with a capacity of 300 cars within a 10,000m^2 – 20,000m^2 footprint. It is intended that a second stage could allow for the expansion of the area consistent with the final landform design, increasing the space to up to 100,000m^3

6.3.3 Sewage Pumping Station Location and Use

The proposal includes the relocation of the historic Sewage Pumping Station (SPS) superstructure (which was proposed to be removed as a whole and stored in a temporary location as part of the Early Works application) to the north eastern boundary of the site in the vicinity of Moore's Wharf. It is proposed that the superstructure be used as an amenities building. Approval is sought for the location and the use but the actual works to the building will be subject to a future application. The heritage impact of the proposed location and use has been considered in the Heritage Impact Statement prepared by Conybeare Morrison at Appendix 5. The proposed use will be entirely within the existing structure of the SPS thus allowing the structure to be viewed and interpreted in the round and providing an economic and practical use for the buildings and retaining the buildings association within the site.

6.4 Park Operation

6.4.1 Future Ownership and Maintenance

It is proposed that the new Headland Park will be owned by the Barangaroo Delivery Authority but managed on a day to day basis by the State Government. The State Government currently has ownership, operational and management responsibilities for key Sydney Harbour sites including The Rocks and Darling Harbour and has particular expertise relevant to the ongoing management of the parkland. In addition to land owned by the State Government it also currently manages other government land including the Circular Quay Wharves, King Street Wharf Precinct and Luna Park. The management arrangements would be clarified in the Plan of Management to be prepared for the Parkland.

6.4.2 Hours of Operation

It is proposed that the new Headland Park will be open to the public 24 hours a day 7 days a week.

6.4.3 Operational Management

A plan of management will be prepared to guide the ongoing operations and management of the Headland Park prior to opening of the park to the public. The plan of management would outline matters such as the vision for the parkland, key objectives, identify specific areas and appropriate uses, hours of operation and security arrangements, event management measures (including timing and size of event, expected numbers, risk emergency and security management, waste management) etc. A commitment has therefore been in the Statement of Commitments at Chapter 8 to this effect.

6.5 Construction

6.5.1 Excavation, Filling and Land Formation

To create the final landform excavation of the shoreline and Northern Cove and the filling of the site to form the headland is to be undertaken.

The main area of excavation relates to the creation of the naturalistic shoreline and the Northern Cove with excavation proposed to a level two metres below sea level (Reduced Level -2.0 metres) to create the new shoreline and cove. Other minor landside excavation is also envisaged. In total it is estimated that up to 120,000m^3 of excavation will be undertaken as part of the proposed Main Works on the Headland Park site.

The proposed filling for the Main Works is in addition to the receipt and placement of up to 150,000m^3 of fill from Stage 1 as provided for in the Early Works Project Application. Fill created on site through excavation of the shoreline and Northern Cove will be used to form the final landform in addition to a further 80,000m^3 to be transported from Stage 1.

In total there is approximately 350,000m^3 of general fill to be placed including top soil. Table 7 summarises the proposed fill requirements in addition to provisional allowance for materials that may need to be imported to the site should material not be suitable.

Table 7 Earthworks, fill and import requirements

	Stage 1	Stage 3	Total	Import / Export (provisional)
Early Works	150,000m^3	0	150,000m^3	0
Main Works	80,000m^3	120,000m^3	200,000m^3	▪ 10,000m^3 topsoil* (import) ▪ 1,000m^3 bulk natural sandstone (import) ▪ 35,000m^3 fill** (import additional from Stage 1/export unsuitable material off site) ▪ 21,000m^3 rock armour*** (import)
Total	230,000m^3	120,000m^3	350,000m^3	67,000m^3

* Should Stage 1 not provide adequate materials for topsoil then importation from an external source will be required

** Should excavation of the Northern Cove provide unsuitable materials then it will require removal from site. In this case more general fill from Stage 1 will be required

*** Should sandstone excavation at Stage 3 not provide suitable rock armour, additional material may need to be imported. This would correspondingly reduce the amount of sandstone excavated.

Total material imported from Stage 1 is estimated to be up to 230,000m^3 (including the 150,000m^3 the subject of the Early Works application plus a further 80,000m^3 as part of the Main Works).

As part of the shoreline works, the existing heritage listed sandstone seawall (western side) will be stabilised and partially dismantled to RL 2.0m. Retrieved sandstone blocks will be reused on site and incorporated into the Headland Park works.

Temporary retaining walls and infrastructure works will be removed as part of the proposed works.

A detailed description of the proposed headland formation is included in the Soil and Water report at Appendix 13.

6.5.2 Services and Infrastructure

Details of the proposed services and infrastructure are outlined in the plans at Appendix 1 and in the infrastructure reports at Appendix 14 (Infrastructure Services Cover Report, Integrated Water Management Plan, Lighting Electrical and Telecommunications Infrastructure Report and Infrastructure Service Provisions – Civil Works Report). In summary the proposed works include:

<u>Stormwater</u>

The overall philosophy for drainage of the Barangaroo Headland Park stormwater is as follows:

- Provision of a network of bio-retention swales of an overall nominal width of 3.6metres inclusive of the banks at high level to contain high flows up to the 1 in 100 Year ARI event from the Upper Bluff;
- Provision of a network of half round 300mm wide dish drains and 150mm subsoil drainage with interconnecting pits and pipes as shown on Drawing MW-WSP-H-1039 to adequately drain low flow and moderate flows up to the 20 Year event within the terraced lower slopes of the park;
- Provision of a network of bio-retention swales of an overall nominal width of 3.6metres inclusive of the banks at the toe of the grass zone of the park where it meets the two level bicycle and walking paths.

The stormwater drainage inlet pits are located at approximately 20 to 30 metre centres and are finished flush with the grassed surface. The swale will be fitted out with surface planting consisting of sedges of 0.8m in approximate height and specific backfill capable of providing filtration and stormwater treatment. The cross section of the swale will typically have a 1.2m base width and a maximum water depth of 300m with batters of slope not exceeding 1:3 vertical to horizontal. The surface runoff will be collected within the swale up to the 1 in 100 Year event and will filter through the backfill medium and be collected within a two cell wide Atlantis Flo- Channel box drain. Stormwater drained on site will be treated in accordance with National Best Practice standards. Stormwater will be captured in a 1250kL tank and re-used on site for non-potable water uses including, and predominantly for irrigation. Further details of the water balance are provided in the Integrated Water Management Report (refer Appendix 14). Stormwater drainage plans are provided at Appendix 1.

Sewage Works

Sewage works proposed at part of this Main Works application include the decommissioning and re-use of existing services as well as the construction of new services. Works include the following:

- Decommissioning of the existing SPS0014 super structure and relocation for adaptive reuse within the Barangaroo site (part of Early Works application);
- Possible reuse of SPS0014 substructure as a water tank or backfilling of this SPS0014 substructure
- Decommissioning of the existing Sydney Water 300mm diameter gravity reticulation sewers traversing the site from the Hungry Mile and Towns Place;
- Decommissioning of the existing Sydney Water 400mm diameter overflow sewer discharging to Darling Harbour;
- Diversion of the existing 150mm diameter Bettington Street sewer onto the Hungry Mile and connection into the new gravity system within the Hungry Mile;
- Construction of approximately 760 meters of new gravity reticulation sewer by traditional construction or micro-tunnelling from Towns Place (intersection Dalgety Road) in a south east and southerly direction along the Hungry Mile and connection to SPS1129;

- Construction of approximately 100m^3 of additional overflow storage to increase the detention time within SPS1129 and satisfy Sydney Water requirements;
- Review by Sydney Water of the pumping machinery capacity and possible upgrade of the flow capacity by an impeller upgrade, installation of an additional pump or complete upgrade of the existing pumping machinery;
- Possible upgrade of the existing electrical equipment and communication equipment, i.e. SCADA.

Further details of the sewage works are outlined in the Integrated Water Management Plan at Appendix 14 and plans at Appendix 1.

Electrical and Lighting

The proposed electrical works include:

- Establishment of the Underground Carpark and the future Cultural Centre shell-only, including establishment of chamber substation for permanent supply.
- Establishment of new sewer pump station.
- Establishment of on-site renewable energy generation in the form of photovoltaics where possible.
- Foreshore promenade and café/kiosk (oyster bar)
- Parkland and Upper Bluff interconnections to Merriman Street.
- Re-configuration of electrical supply to the Maritime Control Tower.

To minimise energy consumption of the site the following infrastructure services will be provided:

- A minimum of 20% of car space will be electric vehicle parking stations
- Efficient lighting systems
- BMS control of services and sub metering
- Low energy ventilation and air-conditioning systems.
- CO monitoring and variable speed drives on fans on each level of the carpark will be used to adjust the level of ventilation required to maintain safe conditions. Patrons will be encouraged to use the upper floors of the carpark when not at capacity which will allow the lower level carpark ventilation to be minimized.
- The light fittings will be fitted with dimmable ballasts which will be controlled by photocells to maintain required light level over life of lamp, saving energy and extending the life of the lamps. Light levels will be adjusted to provide comfortable conditions down to a minimum of 40 Lux as required by the standard.
- Carpark lighting will be controlled by time clock and occupancy sensors allowing separate control of each carpark level. Patrons will be encouraged to use the upper floors of the carpark when not at capacity which will allow L2 carpark lighting to be minimized.
- Harbour heat rejection.

Further details of the electrical and lighting works are outlined in the Lighting, Electrical and Communications Report at Appendix 14 and plans at Appendix 1.

Communications

The proposed communications infrastructure works includes security and ICT infrastructure. A system shall be provided for the public domain/carpark which will include CCTV monitoring, access control, communications links (with external monitoring) and a building distributor room to accommodate the main distribution frames (MDF) and provider head end equipment.

External lighting in the Public Domain will be adjusted to meet the minimum level required for effective CCTV operation. External passive security will be provided, by bounding perimeter landscape features and lighting.

The Communications infrastructure to be provided in the Barangaroo Precinct shall support the goals of the City of Sydney Sustainable Sydney 2030 policy initiatives. The ICT infrastructure shall include site wide pit and pipe system with optical fibre, a Management Control System complete with interfaces to sustainable and energy infrastructure and localised displays for the monitoring and reporting of sustainable initiatives impacts.

Further details of the communications works are outlined in the Lighting, Electrical and Communications Report at Appendix 14 and plans at Appendix 1.

Civil works

The civil infrastructure works include the provision of fill batter slopes set up at a ratio of 1:1.5 where tensile reinforcement is proposed. Temporary erosion and sediment control measures will be implemented for the earthworks construction phase. Temporary measures are likely to include:

- Construction access controls
- Temporary basins
- Silt control fencing
- Control drainage measures

Further details of the civil works are outlined in the Infrastructure Service Provisions – Civil Works Report (Robert Bird Group, October 2010) at Appendix 14 and plans at Appendix 1.

6.5.3 Waterfront & Maritime Design and Engineering

The design for the Headland Park is to create a headland similar to other major headlands in Sydney Harbour. At the shoreline these parks are typified by horizontal rock platforms and pools stepping down into the harbour with underwater slopes and cliffs dropping to the harbour floor. The design replicates this form, with rock quarried on the site used to form the platforms. The existing quay line formed by concrete caissons is to be cut down and the fill material behind excavated to form the new harbour floor. The harbour floor and submerged embankment will be protected by rock armour.

Above Low Water

For visible sections of the shoreline a naturalistic structure is proposed. A moderate slope will be created (approximately 1 in 3 to 1 in 4) with large flat rocks forming steps and rock pools. The large sandstone rocks required to create the landform will be sourced from site as part of

the quarrying activities. The rocks that form the edge will be fixed on a gravel bed of approximately one metre, and then further secured by forcing down with an excavator bucket.

Below Low Water

On the western and northern sides of the site, the proposed shoreline is close to or above the existing caissons. These caissons retain the fill behind them, under the existing hardstand area and cannot be removed. It is therefore proposed to retain as much of the existing caisson structures as possible cutting them down to just below the lowest tide level.

The proposed methodology is to remove sand fill within the front row of caisson compartments down to 0.8 metres below the design finished levels, place 0.8 metres of concrete over existing sand fill, pumped into place by tremie methods. This will lock the existing caisson structure together at that level. The caisson wall will then be demolished down to the design level. The top of the caissons are not structural so that local deterioration of the concrete and reinforcement will not be an issue. The back row of caisson compartments will be excavated to one metre below the design level and filled with one metre of rock armour over geotextile fabric.

Embankment and New Harbour Floor

For the section below low water an embankment with rock ballast (armour, rip rap) facing solution is proposed.

The construction methodology for the new shoreline and Northern Cove is detailed in the Maritime Design Report prepared by Hyder Consulting at Appendix 15 and also summarised in the Soil and Water Report prepared by WSP Environment and Energy at Appendix 13. Detailed plans of the Maritime Works are included at Appendix 1.

6.5.4 Hours of Construction Work

The proposed construction hours for the Headland Park and Northern Cove Main Works activities are as follows:

Monday – Friday:	7:00am-6:00pm
Saturday:	8:00am-3:00pm

No works or deliveries will take place on Sundays and public holidays.

Certain exceptions to these hours apply for low level audible works, delivery of oversize loads or certain materials as required for safety reasons and for emergency response. Furthermore, certain construction activities may be allowed to occur outside the hours above on a planned basis with the prior written approval of the Director-General or as provided for under separate legislation.

6.5.5 Staging

The main works phase of the Headland Park and Northern Cove construction requires staging and sequencing in order to deliver the park in the most efficient and effective way, thereby maximising value for money to government, to coordinate with the supply of fill and to deliver the parkland with the timeframe committed to by Government. Broadly, the Main Works will be constructed in distinct phases and within each phase sequencing of the works will be necessary. Table 8 outlines the proposed sequencing of key activities taking account of works which form part of the previous Early Works application.

Table 8 Main Works Staging and Sequencing

Key Stages	Sequencing of Key Activities
Main Works from April 2011	Continue receipt of approved fill from Stage 1 until no longer required
	Commence new shoreline construction
	Commence Northern Cove excavation
	Fill placed in the Sandstone extraction pit
Buildings and Landscaping from April 2012	Carpark and structures
	Hard and soft landscaping
	Excavate Northern Cove and construct new Shoreline
	Construct public wharf facility
	Soft and hard landscape maintenance
Establishment Period 2014 to 2017	Decreasing degree of maintenance as Hard and Soft landscape elements 'settle-in'

Plans illustrating this construction sequencing are at Appendix 1.

6.5.6 Temporary facilities and structures

The construction contractor(s) would require significant working areas to undertake various preparatory activities and to temporarily store materials for use in the Headland Park. Some of the principle activities that would occur within the works areas include:

- office and administrative functions
- parking for staff and construction vehicles
- workshops and maintenance areas
- storage and handling of sandstone and other rock for landscaping and armouring purposes
- storage and handling of fill and topsoil, and
- environmental management.

This would result in the following temporary structures during construction:

- office compounds, including amenities areas for the workforce, a materials testing area

- water treatment facilities, such as sediment basins, overflow tanks and associated water connections
- stockpiles within low retaining walls to prevent the spread of stockpiled material
- site hoardings and fencing, and
- bunded temporary waste storage areas.

The office compound would be located at the south-eastern end of the site, between the current locations of Gates 4 and 5 and adjacent to Hickson Road. This would include amenities facilities for the construction workforce, parking, temporary waste storage and a materials testing area.

Water treatment facilities would be located on the western and northern edges of the site adjacent to Darling Harbour, where stormwater runoff from construction areas can be directed to sediment basins and overflow ponds. These may be re-located during construction to allow for earthworks or foreshore recession works.

Sandstone stockpiles would be located near the north shore of the Northern Cove, which is between the construction site and the temporary Cruise Passenger Terminal, and also on the north shore of the site near Moore's Wharf. Fill, topsoil and rock armour materials would be temporarily stockpiled adjacent to earthworks ongoing at the time of placement.

Hoardings and fencing would be used to secure the construction site. Hoarding types and locations would be:

- Type A – Adjacent to Gates 3 & 4 along Towns Place, Hungry Mile, Merriman Street, Clyne Reserve and Munn Reserve, and
- Type B – the northern, western and southern edges of the construction site.

Type A hoardings would permit visibility into the site, incorporate branding to identify the project, provide the necessary contact details for enquiries and complaints, provide for update information relating to the site progress, and would minimise obstructive views and graffiti opportunities

Type B hoardings would permit high visibility into the site through transparency accessible raised platforms for pedestrians. They would incorporate branding on signage, provide the necessary contact details for enquiries, provide for multiple locations of updated information relating to the site progress, and allow for graphics visible from close up and at a distance.

6.6 Sea Water Cooling System

It is proposed that the future Cultural Facility and underground car park accommodate a seawater cooled air conditioning system. While it is expected that this facility will not be built for 3-4 years it is necessary to construct the services and piping/pumping infrastructure associated with the air conditioning system (cooling water inlet/ outlet) as part of the current

development. The concept is shown in Figure 16 with cooling water inlet / outlet included in the current proposed works and incorporated into the plans at Appendix 1.

Further details on the sea water cooling system are included in the Integrated Water Management Plan at Appendix 14 and the Soil and Water Management Report at Appendix 13.

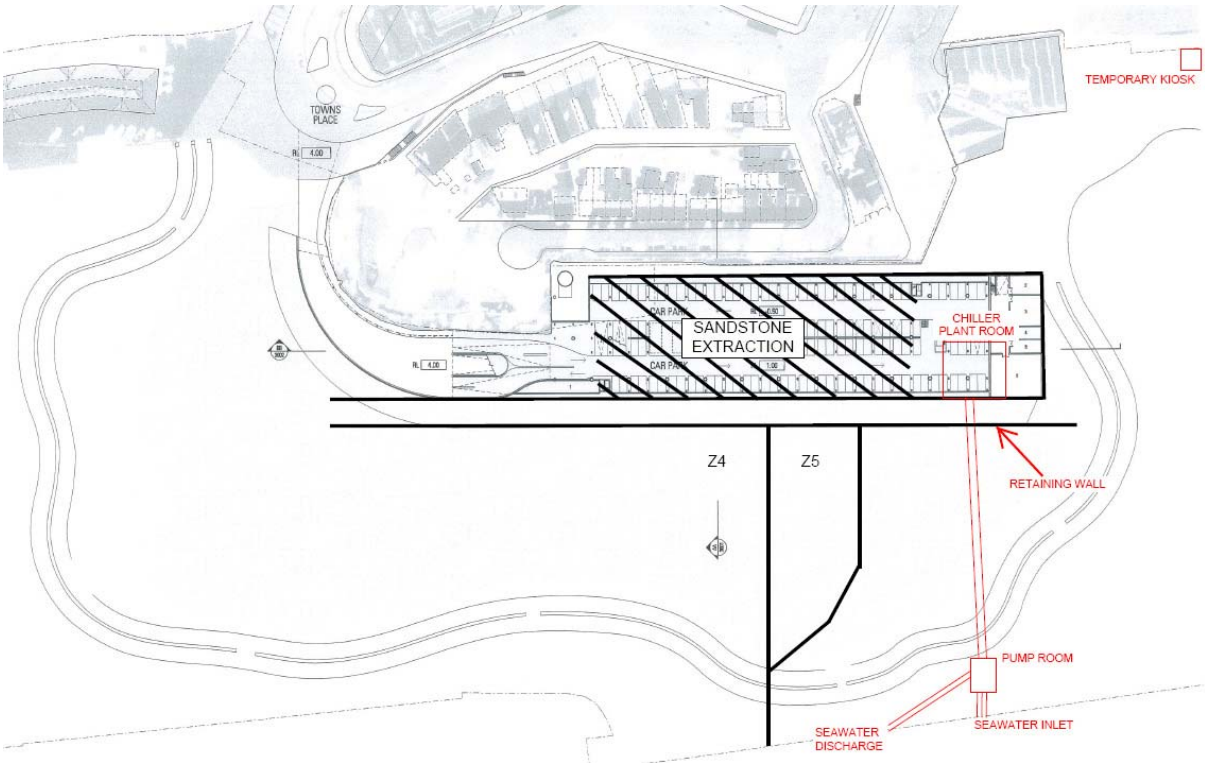


Figure 16: Sea Water Cooling Concept Plan (Source: Soil and Water Report, WSP Environment & Energy, Oct. 2010)

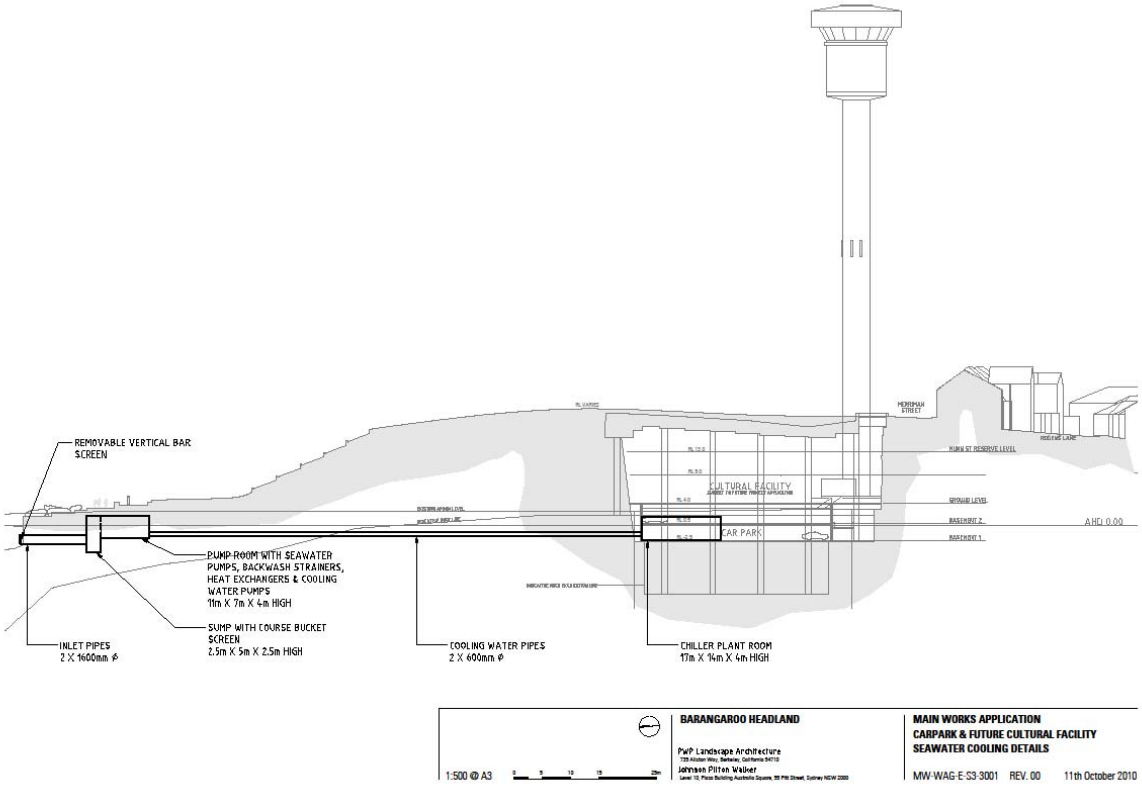


Figure 17: Sea Water Cooling Section (Source: PWP and JPW, Oct. 2010)

7. ENVIRONMENTAL ASSESSMENT

This section provides an assessment of the proposed Headland Park and Northern Cove Main Works in relation to potential environmental impacts. It also outlines proposed mitigation measures to address any identified impacts.

7.1 Contamination

Previous environmental investigations conducted on the Headland Park Site have identified limited soil contamination, being restricted to Total Petroleum Hydrocarbon (TPH), Polycyclic Aromatic Hydrocarbon (PAH) and metal impacted fill materials, primarily around former Warehouse 3. No significant groundwater contamination has been identified on the Headland Park Site.

Given contamination previously identified on site a draft Remediation Action Plan (RAP) has been prepared for the Headland Park and Northern Cove (refer Appendix 7) by JBS Environmental incorporating both the Early and Main Works stages of site development. Whilst the draft RAP primarily relates to the remediation of contamination within the Headland Park Site, suitable site materials from other parts of the Barangaroo Project Site will be used to recreate the naturalistic Headland Park landform as per section 6.5.1. The RAP therefore considers the broader contamination issues on the Barangaroo Project Site and outlines the procedures for the acceptance of other site materials onto the Headland Park Site.

The contamination issues identified across the broader Barangaroo Project Site are principally associated with fill materials, natural soil and groundwater within the footprint of a former gasworks (located on the Stage 1 Development), namely:

- TPH, Benzene, Toluene, Ethylbenzene & Xylene (BTEX) and PAH impacted fill materials, soils and groundwater;
- Cyanide impacted fill materials, soil and groundwater;
- Phenol and ammonia impacted fill materials, soil and groundwater;
- Minor quantities of asbestos impacted fill materials; and
- Metal impacted fill materials, soil and groundwater (lead, cadmium, copper & zinc).

The footprint of the former gasworks has been declared by the NSW Department of Environment Climate Change and Water (DECCW) as a Remediation Site and is referred to in this RAP as the “Declaration Area”. The Declaration Area is not within the Headland Park Site.

The currently anticipated extent of in-situ contamination requiring remediation at the Headland Park Site extends across an approximate area of 15 000 m^2 and comprises an approximate in-situ (unbulked) volume of 20 000 m^3.

The overarching RAP for the Barangaroo site requires the preparation of RAPs for each part of the site and subsequently remedial works plans (RWPs). A RWP will be prepared for the Headland Park and Northern Cove consistent with the draft RAP following finalisation of the Headland Park Human Health and Ecological Risk Assessment (HHERA) and finalisation of the park design, along with the completion of any additional delineation/data gap investigations.

The RAP proposes a remediation/management approach for the subject site (incorporating as noted above both the Early and Main Works stages) as follows:

Demolition and Earthworks

- On-site reuse/placement of impacted fill materials generated as part of the site excavations including any materials from the broader Barangaroo Project Site that meet the Site Acceptance Criteria established in the RAP. No highly impacted gasworks-related fill materials from within the Stage 1 Development will be accepted on the Headland Park Site.

Sewer Upgrade Work

- On-site reuse/placement of excavation materials generated as part of the sewerage upgrade works, but excluding any highly impacted gasworks-related materials from the Barangaroo Project Site. The risk of encountering highly impacted gasworks-related fill materials is considered to be low.
- Characterisation and off-site treatment and/or disposal at licensed waste facilities, of materials generated as part of the sewerage upgrade works which do not meet the Site Acceptance Criteria.
- Characterisation and release to either stormwater, or sewer or off-site disposal of groundwater collected during the excavation of the sewage overflow storage.

Sandstone Extraction Program

- On-site reuse/placement of impacted fill materials generated as part of the sandstone extraction program.
- On-site testing of collected groundwater during the sandstone extraction program, followed by release to stormwater in accordance with regulatory requirements.

Remediation Works within Headland Park Site

- Excavation of “hotspots” of contaminated soils, followed by on-site management in accordance with the requirements established in the HHERA;
- Excavation of “hotspots” of contaminated soils, followed by classification and offsite disposal of materials which are not able to be managed on-site in accordance with the requirements established in the Headland Park HHERA; and
- (Likely) ongoing monitoring of groundwater.

Receipt and Placement of Materials from the broader Barangaroo Project Site

- On-site reuse/placement of impacted fill material sourced from the broader Barangaroo Project Site that are demonstrated to meet Site Acceptance Criteria established in this RAP to form part of the naturalistic headland.
- On-site management in accordance with the provisions contained in the final Headland Park HHERA and the associated engineering controls required to be documented and included in the RWP for the Headland Park Site, which include seepage water prevention, collection and treatment.

As outlined in the Draft RAP (Appendix 7) materials will only be retained or accepted on the Headland Park Site if they meet the Site Acceptance Criteria. This has been defined for the following categories of materials:

- Site Materials – fill/soil/rock materials sourced from land within the Barangaroo Project Site; and
- Imported Materials – fill/soil/rock materials imported onto the Barangaroo Project Site as part of the creation of Headland Park which have been sourced from land other than the Barangaroo Project Site.

The preliminary criteria as set out in the Draft RAP (refer Appendix 7) are as follows:

> *Site Acceptance Criteria for Site Materials*
> *Site Materials will only be retained or accepted on the Headland Park Site if:*
> 1. *The concentrations of contaminants within the materials meet the risk-based criteria* [established] *in the Headland Park HHERA; and*
> 2. *Are not Tar Containing Materials as defined in Section 6.2.1* [of the Draft RAP (refer Appendix 7)]*, or Treated Tar Containing Materials.*
>
> *The following statistical criteria shall be applied to the soil data when assessing against the Site Acceptance Criteria:*
> - *The upper 95% confidence limit on the mean concentration for each analyte (calculated for samples collected from consistent soil horizons, stratigraphy or material types) must be below the adopted criterion for each COPC* [Constituents of Potential Concern]*;*
> - *No single analyte concentration shall exceed 250% of the adopted criterion for each COPC; and*
> - *The standard deviation of the results must be less than 50% of the criterion for each COPC.*
>
> *The draft risk-based soil criteria for the Headland Park Site for ex-situ soils to be placed within the Headland Park naturalistic landform and in-situ soils beneath the existing site surface are presented in the Table 6.3 and Table 6.4* [of the Draft RAP]*, respectively. The final risk-based soil criteria for the Headland Park Site will be documented in the RWP once the Headland Park HHERA has been reviewed/accepted by the Site Auditor.*

Site Acceptance Criteria for Imported Materials

Imported materials will only be accepted on the Headland Park Site if they:

- *meet the definition of Virgin Excavated Natural Material (VENM) as defined in relevant legislation, noting that all reported concentrations of organic constituents should be below the laboratory limits of reporting and the reported concentrations of inorganic constituents consistent with published background levels (NEPC 1999); or*
- *meet the definition of Excavated Natural Material (ENM) as defined in relevant regulations.*

Where materials are reused on the Headland Park Site, then this will require ongoing management via the development and implementation of an appropriate Long Term Environmental Management Plan (LTEMP), which will be prepared upon completion of the validation report. A validation program has been developed to verify that the remediation works achieve the intended objectives.

The Headland Park draft RAP concludes that the proposed actions outlined therein conform to the requirements of the Contaminated Sites Guidelines for the NSW Site Auditor Scheme (2nd Edition) (DEC 2006) because they are: technically feasible; environmentally justifiable; and consistent with relevant laws policies and guidelines endorsed by NSW DECCW. It further concludes that subject to the successful implementation of the measures and recommendations outlined in the RAP the Headland Park Site can be made suitable for the intended uses and that the risks posed by contamination arising from the creation of Headland Park and Northern Cove can be managed in such a way to as to be adequately protective of human health and the environment.

A letter has been provided by the Site Auditor (refer Appendix 6) which summarises contamination assessments undertaken to date and notes the receipt of the draft RAP and HHERA for review. Whilst the detailed review of the draft RAP and HHERA has not yet been finalised the letter concludes that the proposed remediation and validation approach is considered generally appropriate and that the proposed remediation strategies in the Draft RAP are generally consistent with the Overarching RAP. It further notes that the process for remediation of the site. Further detail on the site auditor's advice is provided in section 4.4.3 above which relates to compliance with SEPP 55. It confirms that the site can and will be made safe for the proposed use.

Having regard to the above it is considered that an appropriate process for remediation of the site is in place and appropriate steps will be taken as directed and overseen by the site auditor to ensure that the site will be made suitable for the intended use.

7.1.1 Mitigation Measures

To mitigate any potential adverse impacts as a result of the proposed creation of the Headland Park and Northern Cove in relation to contamination the following mitigation measures will be employed:

- Preparation of HHERA, to establish the risk based criteria which form part of the Site Acceptance Criteria for the Headland Park Site;

- Preparation of a Remediation Environmental Management Plan (REMP), to document the monitoring and management measures required to control the environmental impacts of the works and ensure the validation protocols are being addressed;
- Preparation of a Remediation Occupational Health and Safety Management Plan (ROHSMP), to document the procedures to be followed to manage the risks posed to the health of the remediation workforce; and
- Preparation of a Remediation Work Plan (RWP), to detail the precise remediation works to be undertaken following:
  - finalisation of the Headland Park and Northern Cove HHERA following review/acceptance by the appointed Site Auditor;
  - finalisation of the design of the Headland Park and the Cultural Facility/carpark;
  - review of the existing soil data for the Headland Park Site against the final insitu risk-based soil criteria and an assessment undertaken against nominated limits on decision errors in accordance with AS 4482.1- 2005, followed by additional investigations as required;
  - completion of any delineation investigations to more accurately estimate the extent of remediation required outside parts of the Headland Park Site which are not proposed to be excavated as part of the foreshore re-alignment excavations; and
  - completion of a survey by a registered surveyor showing the location of the in-situ soils, including elevation co-ordinates to m AHD.
- The REMP and the ROHSMP are required to contain a plan addressing plausible contingencies and both Plans are required to be certified by an independent, expert person and submitted for acceptance by the BDA prior to mobilisation onto the Headland Park Site. The RWP shall be prepared by the Remediation Consultant and reviewed/ accepted by the Site Auditor prior to the commencement of remedial works.
- Upon completion of the works on the Headland Park Site, a validation report and an ongoing Long Term Environmental Management Plan (LTEMP) for impacted materials retained beneath Headland Park are required to be submitted by the Remediation Consultant to the Site Auditor for certification that the Headland Park Site is suitable for the proposed uses, subject to implementation of the LTEMP.
- A Part B Site Audit Statement will be provided to the Department of Planning prior to the commencement of remediation works.

These matters have been included in the Statement of Commitments for the Main Works (refer Chapter 8 of this report).

7.2 Acid Sulfate Soils

The Barangaroo site has been identified in previous studies as being in an area of actual or potential acid sulfate soils (PASS). Acid sulfate soils (ASS) are soils that contain iron sulphides. They are typically found in low lying coastal areas, such as mangroves forests, salt marshes, estuaries, tidal lakes and coastal floodplains. If potential acid sulfate soil is exposed to air through land drainage or excavation, the iron sulphides in the soil react with oxygen in the air and produce sulphuric acid. The resulting soil is known as actual acid sulfate soil. Some of the acid can be neutralised by the soil itself, however, most of the acid moves through the soil contaminating the surrounding ground and surface waters.

As the proposed Main Works activities will involve disturbance of an area that is known to be in an area of actual or potential acid sulfate soils, an Acid Sulfate Soil Management Plan (ASSMP) has been prepared (JBS Environmental, October 2010) in accordance with the Acid Sulfate Soil Manual. The ASSMP (refer Appendix 16) documents the actions necessary to minimise and contain impacts to the environment associated with acidity during the removal of the PASS; and details the handling, treatment and management strategies for this material prior to its reuse at the Headland Park site. The measures outlined in the ASSMP must be applied to excavation of acid sulfate soils and potentially also to the pumping, handling and management of groundwater on site. The ASSMP does not apply to acid sulfate soils proposed to be received on to the site in fill excavated from Stage 1 of the Barangaroo development.

Management procedures to be undertaken for the excavation of natural soils on site include:

- Construction of a sufficiently sized designated ASS treatment area prior to commencement of excavation works;
- Excavation of material and immediate transfer to the designated ASS treatment area;
- Addition of neutralising agent (lime);
- Field sampling of treated material within designated ASS treatment area for pH to demonstrate appropriate treatment; and
- Additional assessment/mixing/treatment of soils where pH targets are not met.

A monitoring program including soil and water sampling is also proposed. An Occupational Health and Safety Management Plan (OHSMP) will also be required to be prepared to minimise the risks resulting from the proposed works, ensure all employees are provided with appropriate training, equipment and support to consistently perform their duties in a safe manner and to protect other site workers and the general public.

The ASSMP provides a methodology to manage the risks associated with the proposed activities which, when successfully implemented, will minimise the environmental risks associated with disturbance of the PASS materials.

7.2.1 Mitigation Measures

Given the known presence of actual or potential acid sulfate soils within the site and the potential for the subject Main Works activities to result in disturbance of those soils, an acid sulfate soils management plan has been prepared. Subject to successful implementation of the measures outlined in the Plan, it is considered that the environmental risks associated with disturbance of the PASS materials will be minimised.

7.3 Hydrology and Water Management

A Soil and Water Report (Appendix 13) has been prepared by WSP Environment and Energy to specifically address the DGRs relating to the potential hydrology and water management issues associated with the development. This assessment has regard to the proposed management, mitigation and monitoring measures outlined in the Integrated Water Management Plan at Appendix 14 and is summarised below. A Stormwater Concept Plan is also provided at Appendix 1.

7.3.1 Water Quality

Based on the proposed scope of works, impacts to water quality in Sydney Harbour will be as a result of surface water runoff/discharge via onsite stormwater outlets. Given that runoff water quality and sources will differ during the construction and post construction phases, the Soil and Water Report outlines measures to manage, mitigate and monitor associated impacts separately.

During the construction phase all surface water runoff from work areas will be captured in sedimentation basins/ overflow tanks, prior to discharge or disposal. Water will be reused where possible and if required, treated to meet requirements for discharge or disposal.

No contaminated or treated site waters exceeding the adopted water quality criteria are permitted to enter Sydney Harbour. Prior to any discharge of water from the sedimentation basin/ overflow tanks, the water quality at each location will be determined and assessed against relevant water quality guidelines.

The assessment of impacts will be based on comparisons between baseline data, collected prior to the Early Works program commencing, and data collected during all works. Following the commencement of works, routine water sampling will be conducted on a fortnightly basis, and after major storm events, to assess the impacts of the proposed works.

Groundwater encountered in excavation pits (or otherwise) will be sampled and assessed against the ANZECC (2000) Marine Water Quality Guidelines for the Protection of 95% of Species prior to transfer into sedimentation basins/ overflow tanks and discharged.

Any water exceeding the adopted ANZECC (2000) Marine Water Quality Guidelines for the Protection of 95% of Species is not permitted to enter Sydney Harbour and is to be discharged

under a trade waste agreement with Sydney Water or collected and disposed offsite by a NSW EPA approved waste contractor.

Regular water quality monitoring will be undertaken as above to monitor the effectiveness of erosion and sediment controls. Any discharges from the sedimentation basins/ overflow tanks into the Harbour will be recorded and maintained in a Water Discharge Register.

The impacts of the Main Works on water quality in the Sydney Harbour will be assessed regularly from all onsite stormwater/ runoff discharge outlets. If water quality parameters of samples collected from the stormwater outlets during site works exceed baseline levels and/or a trigger criteria' of 85% of the adopted ANZECC (2000) guideline value for any water quality parameter, discharges will cease and mitigation measures should be reviewed. Monthly reporting of water quality discharges will be undertaken.

Mitigation measures for stormwater impacts to the water quality of Sydney Harbour generated during the post-construction phase are outlined in the Integrated Water Management Plan (Appendix 14). Further, the ESD Report (Appendix 17) outlines water quality objectives for stormwater runoff.

Drainage from the site is to be re-used for on-site irrigation. Full details of the drainage design are included in the Integrated Water Management Plan (Appendix 14). Figure 18 shows schematically how the drainage is captured.

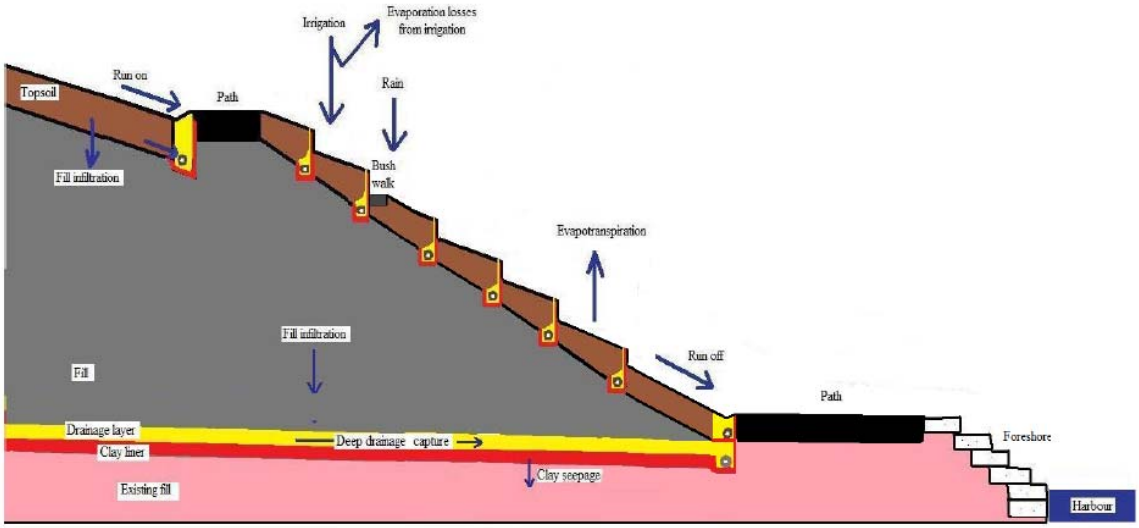


Figure 18: Schematic of water balance model showing various input components. (Source: Water Balance Report, AgEnviro Solutions, Sept 2010 in Attachment A of the Integrated Water Management Plan)

As shown in Figure 18, the park is essentially divided into three areas:

- the upper sections (mostly turf) where runoff and interface flow are captured in bioswales.
- the steeper sloped areas consisting mainly of indigenous plants, where runoff is captured in drains associated with the retaining walls and a lower bioswale,

- the lower sections of the site where the path surface runoff is captured.

Underlying the upper and steep slope sections of the site is a membrane drainage layer (and overlying proprietary drainage cell) that assists in drainage capture, with this water reused in the irrigation system.

Stormwater will be collected in tanks which are able to be topped up by blackwater recycle from Stage 1 or by fresh water supply when necessary.

Further details regarding surface and groundwater hydrology and quality are provided in the Soil and Water Report (Appendix 13).

7.3.2 Estuarine and Aquatic Ecology Impacts

The Soil and Water Report (Appendix 13) refers to a number of previous studies which have indicated that there is minimal marine vegetation adjacent to the park area. It notes that studies undertaken for the development at the southern end of the Barangaroo site found that:

> *The benthic habitat in Darling Harbour, adjacent to Barangaroo, consisted of silty sand. There was considerable bioturbation, likely from burrowing organisms like polychaete worms and invertebrate crustaceans. The substrate towards the southern end of the development, contained clay and was relatively undisturbed. This was in contrast with the middle and northern sections of the site, which contained higher percentage of silt. One solitary sponge was reported at Site 3, towards the northern end of the site.*

Previous studies also indicate no seagrass communities in the vicinity of the site and state that the general locality is likely to be unsuitable for seagrass community establishment.

The report concludes that it is highly unlikely that any species of threatened fauna listed under the *Threatened Species Conservation Act 1995* or the *Environment Protection Biodiversity Conservation Act 1999* would utilise this area.

The report recommends the installation of turbidity silt curtains during construction to provide effective turbidity mitigation. It notes that surface water controls proposed will prevent any significant adverse impact on the aquatic ecology of the harbour.

With respect to post construction, the report notes that the estuarine foreshores at the north and west sides of Barangaroo will be changed due to the creation of the new park foreshore. The proposed modifications which will render the site to a more natural state will provide shelter for aquatic species that was previously lacking.

The report also notes that the potential changes in the estuarine circulation and hydrological regimes in the surrounding harbour waters will be beneficial without any adverse impacts as a result of the changed foreshore.

A more detailed assessment of estuarine circulation impacts is provided in Appendix A of the Soil and Water Report (Appendix 13).

7.3.3 Seawater Cooling

The Soil and Water Report notes that seawater cooling has been used successfully in Sydney Harbour and without adverse environmental impacts. The recent Part 3A application for the Museum of Contemporary Art (MCA) highlighted the following features that need to be incorporated into the design of a seawater cooling system:

- Temperature differential between the intake and discharge – DECCW will accept < 2 degrees C which is part of the Barangaroo concept design.
- High velocity discharge to ensure that there is rapid dissipation of the discharge water temperature. The Barangaroo concept design discharge is near to the main channel through the harbour which will promote temperature dissipation.
- Adequate separation of the intake and discharge pipes – the MCA document recommends a minimum of 25m for their location. Modelling for the detailed design for Barangaroo will determine the adequacy of this and the previous condition.
- Use of an acceptable anti-fouling agent. The MCA report identifies Mexel 432 as being acceptable to DECCW. The Barangaroo detail design will address this and the suitable dosage concentrations and pipe residence times.
- Incorporation of suitable filters and cages on the intake pipe to prevent adverse impacts on marine life and humans.
- The intake to be below the low tide mark, but suitably above the harbour floor to avoid sediment impacts. The depth of the harbour at the proposed location in the Barangaroo concept design allows this to occur.
- Incorporation of a filter backwash system and a system to regularly maintain and clean the intake pipe.
- Use of adequate materials for the system to withstand the effects of the marine waters.

The Soil and Water Report concludes that if the detailed design for Barangaroo addresses these and other relevant design issues, then the seawater cooling system will not cause any adverse environmental impacts.

7.3.4 Mitigation Measures

The Soil and Water Report includes mitigation and monitoring requirements for surface and groundwater hydrology and quality, including water quality of the harbour. A Statement of Commitment to ensure these requirements are implemented has been included.

7.4 Navigation and Water Safety

A Navigation and Water Safety Report has been prepared by Hyder Consulting Pty Ltd (Appendix 18) which provides an assessment of the issues associated with the safe navigation of vessels within and adjacent to the Barangaroo Headland Park development site.

In relation to Sydney Ferries vessels and cruise ships, the report notes that these vessels will continue to navigate at some distance clear of the development site as per current harbour operations. Wake and propeller wash generated by passing vessels (including tug vessels supporting cruise ship navigation operations) has been considered in the concept design of the seawalls, rock armour and scour protection at the Barangaroo site (refer "Barangaroo Headland Park Maritime Works Concept Design Report" dated 15th June 2010 at Appendix 15).

Recreational craft of limited draft will be permitted to enter the Northern Cove area but not the Moore's Wharf Bay area. An assessment of predicted vessel draft limitation is provided in the Barangaroo Headland Park Maritime Works Concept Design Report (Appendix 15). All craft are expected to navigate clear of seawall and rock armour structures.

The only existing navigation mark within the development area is a fixed lit port beacon to the commercial shipping channel with no top mark. This mark is located on the existing wharf structure at the north-west corner of the site. As the development does not impact upon existing commercial shipping channel and ferry operations there is limited requirements for additional marks to facilitate these operations, other than the reinstatement of the fixed lit port beacon mark with possible added top mark. This mark would likely be reinstated on a new support column fixed to the modified corner caisson structure.

The sudden significant decrease in navigable depth at the alignment of the modified caisson structures at the mouth of the Northern Cove (RL-14m to RL-4m) warrants the provision of special navigational marks to advise recreational vessels of significant draft to refrain from attempting to enter the Cove.

Relevant matters identified in the Director-General's EA Requirements are addressed in Table 9.

The report notes that the following matters still require further consideration during the detailed design stage:

- Navaids are to be consistent with the navigational aids already in place in the harbour to avoid confusion. Therefore the requirements of SPC's harbour master, NSW Maritime and Sydney Ferries need to be confirmed through consultation with these parties;
- Navigation impacts associated with the construction of the Barangaroo development will need to be addressed in consultation with the relevant authorities;
- Any other features that may emerge through the finalisation of the design of the development, that could pose a hazard to safe navigation.

Table 9 Assessment of Maritime Issues in DGs EA Requirements

Issue Identified within Item 6 of the Director-General's Requirements	Maritime Designer's Response
Details of any proposed transportation of waste materials via the Harbour and proposed locations for handling materials	No waste materials are to be transported via the Harbour
Navigation and safety impacts on other water based traffic and ferry commuter services from any barging of contaminated materials, including navigation in and around Darling Island, King Street Wharf, Johnstons Bay and White Bay	No barging of contaminated materials is proposed
Impact of shoreline works (particularly the creation of the Northern Cove) on navigation in Sydney Harbour	Navigation impacts of shoreline works shall be reasonably minimised. The design of silt curtain arrangements and temporary aids to navigation shall be developed in consultation with SPC, NSW Maritime and other relevant authorities
Potential provision for a water taxi stop	A water taxi stop is proposed at a pontoon pier located within the Northern Cove. The facility shall be designed in accordance with the relevant guidelines and Australian Standards.

7.5 Noise and Vibration Impact

A Noise and Vibration Assessment (NVA) has been undertaken by Acoustic Logic Consultancy to quantify potential noise and vibration impacts from the proposed Main Works activities on the surrounding environment. A copy of the NVA is provided at Appendix 19.

Noise and vibration on site has been assessed having regard to:

- the DECCW Interim Construction Noise Guideline (ICNG) which nominates a methodology for assessing and managing construction noise (and vibration impacts),
- Australian Standard 2436-1981 "Guide to Noise control on Construction Maintenance and Demolition Site",
- the City of Sydney's "Construction Hours/Noise within the Central Business District Code of Practice" (1992), and
- the existing approval for demolition of structures at Barangaroo which adopted noise management level of background + 10dB(A) at all receiver locations.

The assessment incudes an assessment of the predicted impacts of the proposed activities on nearby potentially affected residential and commercial receivers including:

- Hickson Road – Commercial premises including offices;
- Merriman Street and Bettington Street – Residential premises;

- Sydney Ports Harbour Control Tower, Moore's Wharf building and surrounds, and Temporary Cruise Passenger Terminal;
- Dalgety Road – Residential premises;
- Windmill Street – Commercial premises including offices and cafés;
- Towns Place – Commercial premises including offices and cafés and residential premises;
- Argyle Place – Commercial premises including offices and cafés and residential premises;
- High Street – Residential premises; and
- Balmain Peninsula – Residential premises.

Further it includes an assessment of 24 hour activities, vibration impacts and impacts from traffic noise.

The construction of the Headland Park will by necessity involve noise and vibration impacts. The objective is to minimise those impacts as far as is feasible and reasonable. The NVA has identified that some processes are likely to generate noise levels that will require additional management according to the procedures outlined in the preliminary Noise and Vibration Management Plan (NVMP). The objective of the controls and safeguards in the NVMP is to ensure that all work is carried out in a highly controlled and predictable manner that will minimise emissions and protect the amenity of the sensitive receivers surrounding the site.

There are a number of key factors that need to be taken into account when considering the noise and vibration impacts of the Main Works:

- **Construction Noise Management:** As noted above, construction noise and vibration are assessed in accordance with the INCG. The Guideline does not recommend the use of noise limits. Rather management goals are developed and all feasible and reasonable work practices should be implemented to minimise noise impacts exceeding those goals.
- **Conceptual design:** The INCG does not require a detailed analysis of mitigation measures at the environmental assessment phase. Instead, it requires that a conceptual description of feasible and reasonable works practices to minimise noise impacts be provided. Testing of noise and vibration mitigation measures and implementation of appropriate measures are not feasible until such time as a Contractor has been appointed and a detailed analysis of work and mitigation methods can occur.
- **Noise and Vibration Management Plan:** The NVMP is preliminary only and will be refined once the Contractor is on site. The purpose of the preliminary NVMP is to identify a range of controls and safeguards which can be used to manage noise and vibration and to provide the overall management framework, having particular regard to the results of monitoring and evaluation of actual impacts.
- **Hours of work:** The hours of work are between 7am to 6pm Monday to Friday and 8am to 3pm Saturdays. Apart from the hours of 1pm to 3pm Saturday (when loud activities will not be undertaken), the hours of work are within the DECCW recommended construction times. The dewatering pump that operates 24 hours per day will be located

away from receivers, screened or enclosed to ensure it meets the 24 hour noise limit of 5 dB(A) above the night time background noise level.

Worst case noise levels from activities during normal working hours at the potentially most affected receivers have been predicted in order to identify those activities or plant that may cause noise levels to exceed the recommended management levels set out in the Noise and Vibration Assessment.

The report concludes that a number of the proposed activities (primarily excavator mounted hydraulic hammers, compactor and bulldozers during the earthwork operations) will exceed the noise affected management goal at receiver sites. In this regard it concludes that noise emissions should be minimised by adopting the mitigation measures as outlined in the proposed Noise and Vibration Management Plan (NVMP).

In relation to traffic noise, the assessment indicates that peak construction traffic generated by the proposal will result in marginal exceedences of the base noise goals set out in the DECCW "Environmental Criteria for Road Traffic Noise" (ECRTN). However, typical traffic movements (being a peak of 26 trips per day) will cause an increase in noise within the 2 dB(A) recommended in the ECRTN. The assessment concludes that adverse noise impact from heavy vehicle movements that would require specific management measures is not expected. Notwithstanding this, the site exit for vehicles leaving the site in a southerly direction should be located as far as possible to the south of the site to minimise vehicle noise impacts.

With respect to vibration, the assessment notes that the hydraulic hammering of rock will be minimised by the extensive use of rock saws however some rock hammering will still be necessary. Hammering and compaction are the only activities with the potential to produce ground vibration that may be perceptible at the receivers located around the site.

The potentially most impacted receivers are the Sydney Ports Harbour Control Tower, Moore's Wharf facility, residential receivers on Merriman, Bettington and High Streets, and the Universal Music commercial receiver. Safeguards are recommended for these receivers and are included in the NVMP.

7.5.1 Mitigation Measures

The NVMP (Appendix 19) outlines the development of controls and safeguards that would be applied to all activity on the site by the contractor. The objective of these controls is to ensure that all work is carried out in a highly controlled and predictable manner that will minimise emissions and protect the amenity of the sensitive receivers surrounding the site.

Potential noise and vibration emissions from likely processes and activities have been assessed. The assessment identified the activities likely to exceed noise and/or vibration goals. The NVMP 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 would be reviewed at a number of stages during the extraction period in response to revised methods and equipment, or monitoring and

evaluation of actual impacts. This management plan outlines the procedures that would be adopted by the contractor during the detailed planning and execution phases.

As noted above, the NVMP is preliminary only and will be refined once the Contractor is on site.

7.6 Traffic, Parking and Access

A traffic impact assessment and construction traffic management plan for the proposed Main Works has been prepared by Halcrow Pacific Pty Ltd (October 2010) and is provided at Appendix 20. The key findings of the assessment are considered below.

7.6.1 Traffic Generation

The Halcrow report notes that the proposed Headland Park is to be located in a constrained traffic and parking environment similar to that of Mrs Macquarie's Chair and parts of the Domain and Royal Botanic Gardens with demand for parking from these facilities being catered for along Art Gallery Road. While the traffic generation for these sites has not been evaluated it is considered that traffic volumes on a weekend will be similar to the Headland Park.

The report notes that it is unlikely that there will be strong demand for parking at the Headland Park car park from the activities at the southern and central parks of Barangaroo. This is mainly because the Headland Park car park will be located some distance away and the proposed charging rates will be high to discourage all day parking.

On this basis, the report concludes that the Headland Park car park will generate 120 two way peak hour trips in the PM period. Analysis shows that this level of traffic generation will not have any significant impact on operations of the traffic network and that traffic generated by the car park can be accommodated at Towns Place under the RTA's environmental limit for amenity.

In terms of major event transport the report notes that appropriate protocols will be applied similar to those used in The Rocks and other parts of the Sydney foreshore. The Barangaroo Delivery Authority will work with Events NSW, NSW Police, Transport NSW, the Roads and Traffic Authority and the City of Sydney in this regard.

7.6.2 Access and Circulation

The Headland Park will be accessed by pedestrians and service vehicles from both Towns Place and The Hungry Mile. The public car park will be accessed from a new roundabout at the junction of Towns Place and Dalgety Road.

The Halcrow report notes the car park is proposed to have a single access from Town Place but that that an alternative access from the Hungry Mile (Hickson Road) has been considered. It was determined that this alternative access was not appropriate as:

- The driveway would conflict with any light rail route along this section of roadway
- It would reduce the amenity of the northern cove and main entrance to the built space for a future use
- It would introduce pedestrian and bicycle conflict with vehicles along the foreshore, and
- A longer driveway would be required (150 metres in comparison to 125 metres for Towns Place).

Service vehicle access to the future use within the headland will be from the driveway from the Towns Place/Dalgety Road

A bicycle path is proposed along the foreshore that will connect into the City of Sydney's proposed cycleways on Towns Place and Dalgety Road.

7.6.3 Public Transport

The Halcrow report identifies the following public transport access arrangements for the project:

- a new ferry terminal is to be constructed in Barangaroo South,
- a new light rail line which is likely to include stations along Sussex Street, The Hungry Mile and Hickson Road.

Existing bus services terminate at either King Street Wharf or Argyle Street in The Rocks. With the potential introduction of Light Rail along The Hungry Mile and Hickson Road, Transport NSW will be reviewing the bus servicing strategy for Barangaroo. With light rail introduction and a single public transport ticketing system, it is unlikely that public buses will operate along Hickson Road and The Hungry Mile south of Towns Place.

A taxi rank would be located on the Hungry Mile with final location to be determined.

7.6.4 Parking

The 300 space public car park has been previously identified as part of the Barangaroo Concept Plan, with the Director General's Assessment Report (Concept Plan 06_0162 Barangaroo) identifying that Barangaroo was providing less than the City of Sydney Council LEP parking rates for the entire site (including the Headland Park). Justification for the car park is provided in the Halcrow report.

The proposed 300 space car park is intended to serve the visitors to the park areas and Barangaroo residential/commercial visitors. Residents and employees would be discouraged from using this car park by appropriate charging rates (high charges for all day parking).

The most likely users would be visitors to the area for leisure activities in the park, or to cycle or walk along the foreshore.

In relation to on-street parking it is envisaged that the current time limited parking for non-residents will continue.

7.6.5 Construction Traffic Management

Halcrow has prepared a Construction Traffic Management Plan for the proposed works (refer Appendix 20). It assesses the likely construction traffic to be generated and its impact on the road network as well as the cumulative impact of both the Stage 1 Bulk Excavation and Basement Car Parking project and the Headland Park Main Works.

Construction Traffic Generation

The peak number of truck movements per day varies between stages and will not occur on the same days. These are:

- Delivery of earthmoving and compacting vehicles – 10 rigid trucks and semi trailers movements on one day.
- Delivery of site compound buildings – 2 rigid trucks movements on one day.
- Delivery of fill materials from Barangaroo Stage 1 – 144 truck movements per day at peak.
- Transportation of sandstone for saw cutting – 17 truck movements per day.
- Other deliveries – 2 truck movements per day.
- Concrete deliveries – 172 truck movements per day.
- Sewer construction from Gate 5 on The Hungry Mile to Towns Place – 2 truck movements per day.

Truck movements for the delivery of fill materials from Barangaroo Stage 1 will be confined to the site. Fill from the Stage 1 excavation will be loaded into trucks which will then travel across the site to transfer the fill to the Headland Park. These truck movements therefore will not impact on local roads.

The combined impact of the various components of the Headland Park Main Works construction (including staff traffic) on each of the roads in the area is outlined in Table 10. The Halcrow report concludes that these increases in traffic volumes are not expected to have any significant impact on the traffic network.

Table 10: Combined impacts of Headland Park Main Works construction traffic

Road	Location	Additional Peak Direction Vehicles (per hour)
Dalgety Road	South of Towns Place	7
Towns Place	East of Dalgety Road	26
The Hungry Mile	South of Towns Place	26
	South of Gate 5B	43
Sussex Street	South of Napoleon Street	42
Napoleon Street	East of Sussex Street	7

The proposed truck movements will not have an impact on the operations of The Hungry Mile. The Hungry Mile currently has a peak flow of 452 vehicles per hour northbound and 391 vehicles southbound. As result of the increase in traffic volume by 9 trucks per hour, no significant impact is expected.

A cumulative impact assessment incorporating both the Stage 1 Bulk Excavation and Basement Car Parking and the Headland Park Main Works projects has also been prepared. The cumulative impact assessment considers both truck and car/utility/van trips.

In terms of car/utility/van trips, the Halcrow report notes that at peak there will be 90 peak hour trips to the site. These trips will generally occur outside the peak periods, with construction commencing at 7am and finishing at 6pm. As such, the report concludes that these trips will not have any significant impact on traffic flows in the area.

Truck volumes for the Headland Main Works and the Stage 1 Bulk Excavation and Car Park construction are shown in Table 11.

Table 11: Peak Truck Volume Analysis

Start	Finish	Site	Activity	Max Vol (trucks per hour)- AM Peak	
				Inbound	Outbound
Oct-10	Dec-11	Headland Park	Sandstone Extraction	2	2
Feb-11	Jan-12	Stage 1	Bulk Excavation (outside peak hour)	30	0
Feb-11	Jan-12	Stage 1	Bulk Excavation	2	2
Oct-11	Jan-12	Stage 1	Construction	10	10
Feb-11	Dec-11	Headland Park	Fill Receipt and Headland Formation	3	3
Jul-11	May-13	Northern Cove	Sandstone Placement and bulk concrete	9	9
Apr-12	Jun-13	Car Park	Concrete	4	4
Sept-12	Jun-13	Headland Park	Top Soil deliveries	1	1
Oct-12	Mar-13	Northern Cove	Material Removal	5	5

The flow is reversed for the PM peak period

With the exception of the arrival of the haulage trucks (which takes place prior to 7am), the peak number of trucks entering and leaving the site during the morning/evening peak is 42, with 12 trucks leaving during this period. This will occur in the period between December 2011 and February 2012. These trucks will all use either The Hungry Mile or Lime Street to access Sussex Street and Napoleon Street. The trucks have been assigned to roads, according to their purpose.

Table 12: Truck Distribution

Road(s)	Location	Max Vol (trucks per hour) – AM Peak	
		Inbound	Outbound
Towns Place	East of Dalgety Rd	2	2
The Hungry Mile	Between Gate 4B and 5B	9	9
	North of Napoleon Street	17	12
Shelly Street	West of Sussex Street	5	5
Napoleon Street	East of Sussex Street	5	5
Sussex Street	South of Lime Street	42	12

For the purposes of this report, it has been assumed that Sandstone excavation related activities will use Towns Place; fill receipt and concrete related deliveries will use Gate 4B and Stage 1 related movements will be split between Shelly Street and Gate 8. The majority of movements are related to the construction of the Headland Car Park, bulk concrete for the foreshore and Stage 1 car park. These movements will generally come from concrete plants in either Alexandria or Pyrmont. The above figures are lower than an indicative maximum used for analysis in the Stage 1 - Bulk Excavation and Car Park Construction Traffic Management Report (Arup 2010).

Based on the above assessment, the Halcrow report concludes that truck movements associated with both Stage 1 and the Headland Park Main Works will not have a significant impact on the road network.

The Halcrow report concludes that:

- The proposed development will not have a significant impact on the operations of the transport network and will increase access to the Walsh Bay area.
- Construction vehicle movements to and from the site can be satisfactorily accommodated by the surrounding road network.
- Traffic controllers would be used to assist pedestrians whist materials are being moved across the existing accesses on The Hungry Mile and Dalgety Road;

It is therefore considered that the proposed development and the associated construction activities will not result in an adverse traffic impact and indeed will increase pedestrian access to the area once completed. It is therefore considered acceptable in terms of traffic and access.

7.6.6 Mitigation Measures

An outline Construction Traffic Management Plan (CTMP) has been prepared and is included in the Halcrow report at Appendix 20. The CTMP outlines measures required to ensure that the proposed works do not result in unacceptable impacts on the surrounding road network.

Prior to works commencing on site and following appointment of the contractor a more detailed CTMP will be prepared that is consistent with the outline CTMP. Principles that will be applied in the CTMP include:

- Construction trucks would enter and exit the site by using the existing accesses from either The Hungry Mile (Gate 4) or Dalgety Road (Gate 3);
- All vehicles carrying materials to/from the site must have their loads covered with tarpaulins or similar;
- Tyres of trucks leaving the site will be appropriately cleaned;
- Traffic controllers would be used to assist pedestrians while materials are being moved across the existing accesses on The Hungry Mile and Dalgety Road;

In addition to the CTMP it is necessary to provide traffic control around, past or through work sites to ensure the safety of all persons at work sites. The RTA manual contains standard traffic control plans (TCP) for a range of common construction activities. TCPs will be prepared and implemented as required depending on the duration of the specific works. In addition RTA guidelines recommend installation of advanced warning signs when there are 20 or more truck movements per shift.

Plans showing how trucks enter and leave the site and indicative pedestrian and bicycle traffic management plans where the haul road crosses the foreshore path are attached at Appendix A of the Halcrow report.

7.7 Air Quality, Health and Odour

An assessment of the impact of the proposed Main Works on air quality and health (including odour) has been undertaken by JBS Environmental (August 2010), a copy of which is provided at Appendix 21.

The assessment considers the range of potential source air emissions that could occur as a result of the proposed works on site including:

- soil excavation works to facilitate the excavation of the proposed Northern Cove and the alterations to the Park shoreline;
- screening of sandstone to generate engineered fill materials for use in the Park construction; and
- receipt, handling and stockpiling of potentially environmentally impacted soils from the southern part of the Headland Park Site and excavated soils from the Headland Park Site.

The report recommends air emission controls (mitigation measures) and assesses the activities for air emissions in the light of these measures. Recommended controls relate specifically to the following works:

- Excavation of soils within the Headland Park shoreline adjustment and excavation of Northern Cove
- Handling of soils received as fill material on the Headland Park Site to control potential particulate emissions, and
- Handling of tar impacted soils received as fill material on the Headland Park Site to control potential odour emissions.

In summary the assessment concludes that with the successful implementation of the proposed mitigation measures, the proposed works will not pose an unacceptable level of air quality or health impact, and will meet the adopted air quality and human health risk criteria.

It found that levels of chemical emissions were generally well below DECCW published or endorsed criteria, apart from the maximum level of airborne benzene which was found to slightly exceed the DECCW endorsed criteria at the interim Port facility adjoining the site. However review of modelling data indicated that these exceedances would generally only occur during very early morning periods when this facility was likely to be unoccupied.

Further, maximum levels of odour were identified as potentially exceeding DECCW criteria at receptors in close proximity of the Headland Park. However the modelling was considered to have over-predicted the extent of potential odour impacts.

The Assessment also noted that a further health assessment, comprising a detailed assessment of all chemical constituents, was also undertaken to derive actual risk and hazard estimates for potentially impacted properties in proximity of the Headland Park. The health assessment found that levels of chemical constituents will not occur at levels which may pose a potential health risk to persons off-site.

7.7.1 Mitigation Measures

The recommended air control emissions (mitigation measures) comprise:

- Regular (at least hourly) application of water sprays / mists to disturbed areas;
- Reduced excavation / material handling activities during periods of nonfavourable meteorological conditions;
- Minimisation the quantities of exposed coal tar impacted materials on the Headland Park Site at all times by the rapid identification and management of malodorous soils when received at the Headland Park Site. Stockpile surfaces of these soils require to be minimised to the extent possible by covering. Readily available non malodorous soils, odour suppressant and/or 'hydro-mulch' should be used to cover the malodorous soils as soon as possible subsequent to receipt;

- Install an odour suppression system at the Headland Park Site works boundary. Operate as necessary throughout the duration of the works;
- Undertaking air monitoring throughout the duration of the earthworks including:
    a. Continual visual assessment of dust emissions during all facets of demolition and earthworks. No visible dust should be observed at any stage at site boundaries;
    b. Periodic particulate monitoring at site boundaries undertaken using realtime aerosol monitor;
    c. Continuous odour monitoring by use of photo-ionisation detector and field scientist observations supported by field olfactometer measurements;
    d. Respirable fibres monitoring at discrete locations during the works at any stage where potential asbestos containing materials are identified in materials being received on the Headland Park Site, or present in soils being excavated on the Headland Park Site; and
    e. Dust deposition gauges maintained at two discrete locations at the site boundaries for the duration of the proposed earthworks.

These measures have been included in the Preliminary Environmental and Construction Management Plan (refer Appendix 26).

Having regard to the conclusions of the Air Quality and Health Assessment, and the recommended mitigation measures, it is considered that the proposed Main Works can be undertaken without resulting in unacceptable air quality, odour or health impacts.

7.8 Heritage

The proposed works have the potential to impact on the heritage items listed in Table 13:

Table 13: Heritage Items in Vicinity

Item on the site	**Heritage Listings**
MWS & DB Substation (Sewage Pumping Station 0014)	Sydney LEP 2005 Sydney Water Section 170 Register Sydney Ports Section 170 Register
Sandstone seawall (at NW of site)	Sydney Ports Section 170 Register
Harbour Control Tower	Sydney Ports Section 170 Register
Dalgety Bond Stores	State Heritage Register 00526 Sydney LEP 2005 Sydney Ports Section 170 Register
Munn Street Terraces	State Heritage Register 00526 Sydney LEP 2005 NSW Housing Section 170 Register
Grafton Bond Store (Sandstone Wall)	State Heritage Register 01431 Sydney LEP 1992 Sydney Ports Section 170 Register
Moores Wharf Building (north of site)	Sydney Ports Section 170 Register
Items in the vicinity of the site	**Heritage Listing**
Millers Point Conservation Area Millers Point and Dawes Point Village Precinct	State Heritage Register NSW Housing Section 170 Register Sydney LEP 2005

A heritage impact statement (HIS) has been prepared by Conybeare Morrison (Appendix 5) to assess the impact of the proposed works on relevant heritage items. The HIS assesses the impact of the proposed works on each item with the impacts summarised in Table 14. It should be noted that in regard to SPS0014 approval is sought for the location and the use only with the actual works to the building to be subject to a future application.

Table 14: Potential impacts on heritage items

Item	Proposal	Impact/mitigation
Clyne Reserve	Access road beneath park	Minor change to cliff context
Moore's Wharf Building	Provision of access to the new Headland Park	Positive impact in the interpretation of the former wharf pattern
Merriman Street terraces	Headland space for a future use would block views to west. Existing cliff face remains exposed.	Minor impact. No mitigation required.
MWS&DB Pumping Station	Relocation	Some negative impacts but mitigated by retention in an appropriate vicinity with opportunity for interpretation and appropriate new use as public toilets.
Sandstone seawall	Part demolition and relocation to nearby sites	Considerable adverse impacts, but function remains and potential mitigation with interpretation
Harbour Control Tower	No proposed works	Minor impact on setting of the tower
Munn Street Reserve	Munn Street is used as entry to a future use	Positive impact in the reactivation of the former street pattern
Cliff around Clyne Reserve and Merriman Street	Exposure along Merriman Street and partial exposure along Clyne Reserve	No significant impact
Dalgetys Bond Stores	Retaining wall and fill added to vicinity of lowest floor	Works would have no physical impact, but minor blocking of some views to a small part of the building
Grafton Bond Stores and Sandstone Wall	No works	No impact
High Street Duplexes	No works	No impact

The report concludes that the proposed Headland Park and Northern Cove works would rehabilitate a prominent point in Sydney Harbour close to its original form, enhancing the natural heritage context of other headlands in the vicinity. The finished vegetated park would act as a foil to existing and proposed developed areas of central Sydney.

The works would enhance the context of Moore's Bond Stores by providing a more intimate port-side environment, quite different from the existing massive contrast in scale it experiences adjacent to the East Darling Harbour dock. Reconstructing the headland would enable the building to visually remain on a small peninsula on the site of the former Tyser's

Wharf. The reactivation of Munn Street would be a positive heritage impact reflecting the nineteenth century street pattern. The proposed interpretation works have the potential to enable the Barangaroo Headland Park project to have a positive heritage impact on most of the surrounding heritage items.

Given that the decommissioning of the Sewage Pumping Station 14 has been addressed in the Early Works program, the decision to relocate the superstructure to a nearby location at a similar level for use as public toilets is a positive impact. Interpretation and reconstructing missing original building elements could largely mitigate the adverse heritage impact resulting from relocation of the building. Reconstructing the 1836 shoreline would open possibilities for interpretation of the nineteenth century uses of the site.

The 1913 sandstone seawall would experience some adverse heritage impacts as part of these works. The arrangement of the seawall's sandstone blocks and their original location would be lost, however, their continued function as retaining elements a short distance from their original location provides opportunity for interpretation that would mitigate the impact of moving them. The existing condition of the sandstone seawall has been compromised due to the multiple stormwater pipe penetrations through the original sandstone fabric.

No other heritage items would be adversely affected by the proposed works.

7.8.1 Mitigation Measures

Detailed recommendations are included in the report in relation to interpretation (refer section 8.2 of Appendix 5). These items will be considered in the detailed design and incorporated where appropriate.

In addition the HIS includes recommended Conservation Policies as follows:

- Prepare a detailed interpretation strategy for heritage items proposed to be affected by the works as part of the overall site interpretation
- Proposed works should minimise damage and disturbance to significant original fabric of heritage items
- Prepare a Conservation Management Plan for heritage items proposed to be affected by the works to guide the future management and maintenance of the item. A Conservation Management Plan has been prepared for SPS0014 and is provided at Appendix 30
- Prepare construction works method statements for all heritage items in the vicinity of works that could be affected by construction works, including vibration. This would include restricting vehicular access to the Hungry Mile (Hickson Road) for all heavy vehicles, and
- A structural audit of all heritage items in proximity to the works should be completed before the commencement of construction works.

Relevant requirements have been included in commitments for the project (refer Chapter 8).

Having regard to the heritage impact statement and proposed statement of commitments it is concluded that the proposed works will not result in an unacceptable impact on any heritage item. Whilst some adverse impacts will result from works to the Sewage Pumping Station (subject to future application) and sandstone sea wall, these items will be relocated and reused on site and will provide opportunities for interpretation.

7.9 Archaeology

The approved Concept Plan for Barangaroo includes Commitment 60A which requires the preparation of a Research Design and Archaeological Excavation Methodology for each part of the proposed Barangaroo development. To satisfy this commitment and to assess the impact of the proposed Main Works on potential archaeological resources on site, a Research Design and Archaeological Excavation Methodology (Research Design) report has been prepared by Austral Archaeology (Refer Appendix 22). Austral Archaeology also previously prepared an Archaeological Assessment and Management Plan (AAMP) for the whole of the Barangaroo site and heritage impact statement (HIS) for the early works application. The Research Design and Archaeological Excavation Methodology report prepared for the Main Works is consistent with the AAMP and follows on from the early works HIS.

The Research Design report:

- identifies the location and identity of potential archaeological features and relics;
- defines the likely impacts of the proposed works on the archaeological resource;
- formulates a set of research questions relevant to the site and to Australian archaeology and history;
- provides a methodology for undertaking the archaeological program; and
- provides management guidelines and recommendations based on Heritage Branch guidelines and best practice.

The report notes that the proposed headland park is larger than the original headland, however land reclamation over time has pushed sea walls, wharves and jetties well beyond the original shore line. It indicates that the Barangaroo site is likely to contain a combination of archaeological site types that are representative of the uses of the place dating from the 1820s to the 1970s. This resource is likely to consist of elements of built landscape, archaeological and topographical features created by cutting through the bedrock, the manipulation of the wharf edge by the protrusion of finger wharves and jetties, a succession of sea walls dating from the 1830's to 1900 and the subsequent formalization of a new edge by reclamation and infill in the 1970's. It concludes that:

- There is low potential for archaeological evidence of Aboriginal occupation in the Northern Cove and Moore's Wharf inlet due to the impact of European activity.

- There is moderate potential for evidence of the pre-European environment in the form of remnant shoreline, marine sediments and escarpment that was buried during reclamation.
- There is moderate to high potential for archaeological evidence from all phases of European activity to survive in the location of the northern edge of the Northern Cove. The southern half of the cove was likely to have been subject to dredging for the construction of Wharf No 2 and the archaeological resource is unlikely to survive.
- There is moderate to high potential for the survival of an archaeological resource to survive in the Moore's Wharf inlet from all phases of European activity.
- There is low potential for evidence of maritime activity, occupation or modification of the western edge of the headland predating 1870. There is moderate to high potential for the survival of an archaeological resource associated with the last two phases behind the southern half of the current sandstone sea wall.

It further concludes that the history of the site is diverse, layered and authentic. The site is of significance for its numerous historical associations with prominent people and important historical events. The potential archaeological resource of the Barangaroo site is of local and State significance for its ability to reveal information about land uses and technologies from the Colonial period as well as the lives of the inhabitants that are not, or never were, documented. The site has a long maritime history and has the potential to provide valuable evidence about the development of the site over time and the importance of maritime industry to Sydney and Australia.

In terms of the impact of the proposed Main Works, the Research Design report concludes that the creation of a naturalised shape and form for the headland will require the penetration of the caisson wall at the north and west of the deck, as well as removal of the current sandstone sea wall. The main impact identified on the potential archaeological resources of the Northern Headland is from the bulk excavation to create the water insertions of the Northern Cove and the Moore's Wharf inlet.

Given that the site has medium to high level of archaeological potential and significance that is likely to be substantially impacted or destroyed by a proposed development of the Headland Park and Northern Cove, an archaeological excavation is recommended. The aim of the archaeological excavation is to carry out comprehensive recording of the archaeological resource prior to its removal and destruction by the proposed development. Recording of the site includes written description, drawings, photographs, measured plans, collection and analysis of artefacts and a response to the research questions.

The Research Design report outlines a program of archaeological works that would commence with a first stage of targeted test excavations of areas to be impacted by the development to ensure that any *in situ* archaeological material is assessed, recorded and analysed; to confirm the accuracy of the site's predicted archaeological potential and enable evaluation and management of any significant archaeological resource. If significant and intact structures and deposits are present, a second stage of open area excavation is recommended to be undertaken.

The report notes that testing will clarify the nature and depth of the potential archaeological resource particularly in the Northern Cove and the Moore's Wharf inlet. It will confirm or refute the survival of evidence from all European phases of activity and verify ground water levels. It is also useful in determining the depth and composition of the sub-deck deposits for future engineering and earth moving assessments. It will provide a basis for making decisions concerning the future management of the potential archaeological resource across the site such as the need for comprehensive open area excavation, monitoring or no further archaeological investigation.

7.9.1 Mitigation Measures

A commitment has been included in the Statement of Commitments for the Main Works that an archaeological excavation be undertaken in accordance with the methodology and recommendations (relating to testing methodology, site interpretation, research questions) contained in the Research Design Report. This will be undertaken following the early works but prior to excavation of the Northern Cove and Moore's Wharf inlet.

7.10 Wind

An assessment of wind conditions within the Headland Park and the potential impact of the development to the south on these wind effects is provided in the Wind Effects Statement prepared by Windtech Consultants (Appendix 23).

The subject site is currently impacted on by the various principal winds for Sydney, namely the north-easterly, southerly and westerly winds. The expected future wind conditions as a result of the proposed earthworks are as follows:

- Southerly winds are expected to be partially shielded by the proposed buildings on Barangaroo South.
- The site will remain exposed to the strong south-westerly winds. These winds are expected to affect the waterfront areas, which are intended as a pedestrian thoroughfare. The steep incline in the escarpment facing the south-westerly direction has the potential to generate a significant speed up effect at the top, where stationary activities are proposed.
- The westerly to north-westerly winds will have the greatest impact on the wind conditions within the subject site. The long run of steeply inclined landform in the north-south direction will result in potentially strong wind conditions over the entire "upper bluff" area under the effect of the westerly winds.

The report indicates that the changes to the site as a result of the proposed earthworks are likely to significantly exacerbate the effect of the prevailing winds without appropriate mitigation measures.

7.10.1 Mitigation Measures

To mitigate the anticipated wind effects, the report recommends that extensive planting be carried out and provides specifications regarding the layout, general type, size and height of

planting in critical areas. It also notes that the effective design of the winding staircases and paths near the foreshore will provide relatively calm wind conditions for pedestrians in those areas with the densely foliating vegetation used in close proximity.

The proposed landscape design is generally consistent with the recommended mitigation measures.

7.11 Views and Visual Impact

To assess the impact of the proposed parkland on existing views to and across the site, a visual impact and views analysis has been prepared by JPW and PWP Landscape Architecture (refer Appendix 24). The assessment which incudes 3D images of the proposed park, confirms that construction of the Headland Park will significantly improve views of the site from surrounding viewing points including from Millers Point, Blues Point, Balls Head, Ballast Point, Balmain East and Pyrmont. The images illustrate that the creation of the Headland Park is a significant aesthetic improvement over the current situation with a green parkland replacing the existing barren asphalt landscape.

In terms of the impact of the proposed park on existing views across the site to the Harbour to the west, the visual impact and views analysis indicates that the construction of the park will inevitably alter existing views. It notes as follows:

> *Completion of the Headland Park will dramatically alter views from local areas, primarily from the adjacent streets in Millers Point – Merriman Street and High Street but also from Dalgety Road and Bettington Street.*
>
> *<u>High St and Kent St</u>*
> *Views from High Street will be improved by the construction of the park. There will be mid-ground views of the Northern Cove and the densely planted bluffs of the park will soften the harsh edges created by the development of the current extensive paved area. Views of the headland will be retained.*
>
> *<u>Merriman St and Bettington St</u>*
> *The upper areas of the park will be approximately at the level of Merriman Street. The view from the street will now be out across broad expanses of green parkland which will be similar in character to the Domain. However instead of the distant panoramic views over the asphalt to the harbor beyond, the views will now be terminated by the broad extent of 'bushland park' along the western slopes of the headland. In effect the views presently obtained will be moved westward to the higher park paths and to the waterside promenade. These views are very similar to those that would have been obtained in the approved concept plan. Existing views from Clyne Reserve and the northern end of Merriman Street will remain more or less as it is at present. Although there will be more trees in the foreground and the view to the north west will be over parkland.*
>
> *The axial view down Bettington Street which currently terminates in a view of the sky will now be of tree in parkland.*

Towns Place

The view down Dalgety Road towards Towns Place will now have a view of the park entry and trees beyond. The view to Sydney Harbour will remain visible.

The visual impact and view analysis concludes that the impact of the proposed Headland Park will be positive in terms of views to and from the site. There will be some view impact to properties to the east of the site (Merriman Street etc) however in this regard existing views to the harbour (over the site looking west) will be replaced with views of the proposed park. This is consistent with the impact envisaged under the approved Concept Plan.

7.12 Safety and Security

Crime prevention and public safety is an important consideration for the Headland Park and Northern Cove. The Headland Park has been designed to take into account the principles of Crime Prevention Through Environmental Design (CPTED). These principles include:

1. Surveillance
2. Access Control
3. Territorial Enforcement
4. Space Management

Surveillance

It is known that the attractiveness of crime targets can be reduced by providing opportunities for effective surveillance, both natural and technical. Good surveillance means that people can see what others are doing. People feel safe in public areas when they can easily see and interact with others. Would be offenders are often deterred from committing crime in areas with high levels of surveillance. This has been incorporated in the design of the park by:

- extensive lighting of all main pathways and open space areas
- providing clear sightlines from neighbouring properties on Merriman, Bettington and High Streets and Hickson Road into the public domain
- providing clear views for vehicles on Hickson Road through the site to the Northern Cove
- providing a wide foreshore promenade and open public spaces with clear sightlines
- eliminating the use of tall shrub planting alongside paths and ensuring clear landscaping beneath large trees so that potential offenders have no place to hide or entrap victims
- use of CCTV cameras

Access control

The park has been designed so that access to the park can be readily controlled in special event mode, for example during marathons or open air concerts. Apart from the two major entries (at Towns Place and off the Hungry Mile), the only other points of access are via bridges from Clyne and Munns Street Reserves and from Merriman Street. All of these

configurations allow temporary access control to ensure that the park does not become overcrowded and that undesirables can be excluded.

Likewise during events which are likely to attract large numbers temporary fences can be erected along the top of the (planted) steep slopes and along the water side of the promenade to stop over exuberant patrons falling down the slope or into the harbour.

Whilst it is currently envisaged that the park will remain open 24 hours a day, it will, should it become necessary, be easy to close the park at any desired hour.

Territorial reinforcement
Since community ownership of public space sends positive signals, people tend to feel more comfortable in, and are more likely to visit, places which feel owned and cared for. Experience has shown that places with a high level of public use deter criminals because of the higher risk of detection or apprehension of criminals.

This has been accounted for in the design by:

- strong visual and physical links between the park and its adjacent residential development
- clear transitions and boundaries between the public domain and private space
- clear design cues how the space is intended to be used, eg delineation of pedestrian and cyclist paths, picnic space, informal play space.

Space management
Whilst this is not strictly a design issue and is more the responsibility of park management, it is clear that by ensuring that the park is well maintained and well used, the public will have a greater feeling of security. Space management strategies may include:

- site cleanliness and maintenance
- rapid repair of vandalism and graffiti
- rapid removal or refurbishment of damaged park furniture, signs etc
- events within the park possibly including summer outdoor cinemas, art displays, street performances and sports events.

7.13 Accessibility

Morris-Goding Accessibility Consulting has prepared an Access Review to provide advice and strategies to maximise reasonable provisions of access for people with disabilities. A copy of the report is provided at Appendix 25.

The Access Review Report is a key element in the design development of Barangaroo Headland Park, and an appropriate response to the AS1428 series, Building Code of Australia (BCA), and ultimately the Commonwealth Disability Discrimination Act (DDA).

The development has been reviewed to ensure that ingress and egress, paths of travel, circulation areas, toilets, lifts, and car parking comply with relevant statutory guidelines. The Access Review Report notes that in general, the development has accessible paths of travel that are continuous throughout. It states that the Project Application drawings indicate that compliance with statutory requirements, pertaining to site access, common area access, accessible parking and accessible sanitary facilities, can be readily achieved.

The report concludes that provided that the report's recommendations are implemented, the proposed development has demonstrated a reasonable degree of accessibility. The recommendations include:

- Footpaths - safety mechanisms to minimise conflicts between people with a disability in relation to cyclists; surface treatments to provide for people with a visual impairment a clear tactile delineation between the footpath and the shoreline.
- Stairways – provision of handrails, tactile step indicators, appropriate stairway design.
- Furniture and Facilities – appropriate provision of seating, toilet facilities and other park furniture
- Accessible Car Parking – provision and design of car parking in accordance with relevant accessibility standards
- Transport – appropriate location and design of future light rail stop, as well as kiss-and-ride and taxi facilities
- Signage – provision of directional and other signage in accordance with relevant accessibility standards.

As the provisions of the DDA Access Code 2010 are due to be inserted into the BCA from 1 May 2011, the provisions of the DDA Access Code will from that date onwards become mandatory for new building work. The recommendations in the Access Review Report have been made in accordance with the DDA Access Code.

7.14 Environmental Management

7.14.1 Construction Management

A Preliminary Environmental and Construction Management Plan (PECMP) has been prepared prior to the commencement of works to manage the impacts of the proposed construction activities. The PECMP provides details on:

- a detailed description of construction works;
- the environmental management approach including the management plan framework and controls;
- organisation and communications including reporting requirements and communications;
- community consultation (monitoring and notification & complaints handling);
- construction impacts and environmental controls

  - construction noise and vibration
  - air quality & odour
  - visual impacts
  - water quality (including groundwater quality)
  - waste and chemical management (including construction waste management and hazardous materials management)
  - stockpiling
  - traffic and transport management
  - heritage
  - sustainability
- monitoring and review;
- procedures for managing environmental incidents;
- risk management.

The PECMP is provided at Appendix 26. Once a construction contractor has been appointed and further details of the proposed works, construction methods and staging development are available, a more detailed Construction Environmental Management Plan (CEMP) will be prepared and implemented for the proposed works.

7.14.2 Erosion and Sediment Control

The stormwater soil erosion and sediment control measures will be designed in accordance with Managing Urban Stormwater – Soils & Construction, Volume 1 (Landcom, 2004). A more detailed description of erosion and sediment controls during works will be provided in the site ECMP which will be prepared by the construction contractor selected to undertake the Works. These measures will include:

- Construction of truck entry/exit points including cleaning facilities and wheel wash facilities, managed by a gate controller.
- Existing on-site stormwater drainage pits and grates to be cleaned, and then securely covered with suitable geotextile fabric.
- Ongoing dust suppression using recycled water from on-site.
- Construction of a sediment-laden water management system, through installation sedimentation ponds (with adjacent overflow tanks), based on:
  - a run-off coefficient of 1 and a 5 year design storm event;
  - a storage of 200m^3 per hectare of exposed fill area;
- Installation of swale drains/ pits around the site perimeter to collect and divert runoff into the sedimentation ponds.
- Setup and installation of sediment silt fences/ hay bale, sand bag bunds around the active works areas.

- Construction of bunding and isolation fencing in undisturbed areas of the site to divert clean water runoff through the site.
- Stabilisation of fill materials during placement and graded to direct runoff towards established swale drains.

The maintenance of all erosion and sediment controls will be continually monitored on a daily basis to ensure correct implementation and modification (if necessary).

7.14.3 Waste Management

A Waste Management Plan (WMP) for construction was has been prepared by JBS Environmental and is provided at Appendix 27. In accordance with the DG's EA Requirements the WMP are provides details of:

- The quantity and type of wastes generated, handled, processed or disposed of at the Headland Park Site
- The quantity, type and specifications for all output products proposed to be produced (if applicable)
- Intended (or potential) end uses for output products (if applicable)
- The layout, the treatment process and the environmental controls of the proposal
- Spoil disposal (if applicable)
- The management of hazardous and dangerous materials
- The type and quantity of chemical substances used or stored on the HeadlandPark Site.

The Headland Park Site lies within the Barangaroo Project Site (refer Figure 2 in WMP). As per the definition of waste provided in the Protection of the Environment Operations Act 1997, materials which are not unwanted or surplus to the Barangaroo Project Site requirements are not waste and are therefore not the subject of the provisions of the Waste Management Plan. The materials to be handled on site as part of the Main Works, and whether they are / are not considered wastes are listed in Table 15.

Table 15: Waste and Non-Waste Materials

Waste Materials	Non-Waste Materials
Deleterious materials removed from fill materials which are unsuitable to be retained on site (e.g., timber/tyres/steel)	Excavated fill materials and soils sourced from within the Barangaroo Project Site and re-used within the Headland Park Site in accordance with the Headland Park Remedial Action Plan and Human Health and Ecological Risk Assessment
Excess surface water and/or groundwater which is unable to be reused on site for dust suppression during construction works	Sandstone extracted from the Headland Park Site and re-used within the Headland Park Site
Remnant hazardous building materials removed as part of demolition works (e.g. asbestos cement sheeting)	Concrete/asphalt materials sourced from the Barangaroo Project Site and reused within the Headland Park Site
Waste water from site amenities	Surface water and/or groundwater sourced from the Headland Park Site and reused on the Headland Park Site for dust suppression
Office waste from site sheds	

Miscellaneous construction wastes (e.g. packaging)	

Fill materials/natural soils/rock excavated and relocated within the Barangaroo Project Site are not waste materials and are therefore not addressed in the WMP.

In relation to operational waste, the Barangaroo Zero Waste Action Plan is working towards zero operational waste by 2020.

7.15 Environmental Sustainability

An ESD Report for the Main Works has been prepared by WSP Lincolne Scott Pty Ltd (provided at Appendix 17). The report considers ESD (Ecologically Sustainable Development) initiatives to be implemented for the Main Works and operation of the park.

The site aims to deliver a precinct which values the well being of people and the planet by:

- Being water positive
- Generating zero waste
- Achieving carbon neutrality
- Promoting community wellbeing, and
- 100% renewable energy generation for the public domain.

A summary of the key ESD initiatives to be adopted for the Headland Park is provided below.

Energy and Carbon	▪ Energy consumption will be minimised where possible ▪ On site renewable energy generation of up to 56kWp will meet the Headland Park public domain demand. Photovoltaics will be located in the Headland Park and adjacent Northern Cove ▪ Off-Site renewable energy to off-set any remaining energy use of the Headland Park including the car park and future space
Transport Emissions	▪ Integration with local public transport networks through the use of locality maps, timetables, and real-time commuter updates. ▪ Pedestrian links with local public transport networks ▪ Infrastructure and support for cyclists and pedestrians ▪ Preferential small car parking and hybrid car parking stations and dedicated car club spaces. ▪ 20% of parking spaces will be electric vehicle parking stations ▪ Provision for future installation of electric vehicle charging stations. ▪ Levies for vehicles will be incorporated into the cost of car parking to encourage public transport use ▪ Public events held at the park with paid tickets to include the cost of public transport within the cost of the ticket.
Water	▪ The Main Works is targeting an 80% water reduction from construction practices. To reduce potable construction water a

	rainwater tank may be provided, as is proposed for the Early Works. ▪ Irrigation requirements will be minimised through the preferential selection of low irrigation plant species, use of efficient irrigation systems such as sub-soil drip irrigation, and use of efficient fixtures
Pollution and Waste	▪ An overall strategy to achieve zero waste for the site will be achieved through the following measures: - A greater than 90% diversion of construction waste (by mass) from landfill - This will be achieved through the implementation of a waste management plan and quarterly reporting during construction. - The Barangaroo Zero Waste Action Plan will work towards zero operational waste across Barangaroo by 2020 - Green waste from the greater Barangaroo precinct to be utilised as mulch and fertiliser throughout the operation of the precinct. - An on-site composting facility is to be included which can be re-used in landscaping in the parklands. - Recycling points to be located throughout the Public Domain site - Minimum 20m² waste recycling storage space is to be provided for the future use
Ecology and Landscaping	▪ 100% native and 90% endemic plant species (excluding lawn) to be used which have low irrigation requirements ▪ Treatment of water leaving the site to meet national best practice standards ▪ Light pollution to be minimised during the operation of the park
Construction Practices	Carbon - On site quarrying of the sandstone to reduce transport emissions. - 100% Biodiesel construction equipment where possible. Alternatively 20% bio-fuels should be used where possible. - The site is to commit to 100% Green Power - Local materials are to be used preferentially where sustainable sources are not compromised Pollution and Waste - Waste management plans to reduce waste from construction of the early works. - Environmental management plan to minimise local environmental disturbances - Treatment of stormwater during early works to prevent pollution into the harbour including gross pollutant traps and swales - Pollution control measures on construction equipment including diesel oxidation catalysts and diesel particulate matter filters Materials - Re-used materials to be used where possible - Re-used of FCS certified timber to be used where required Community Wellbeing - Ensure appropriate construction worker conditions.

7.16 Climate Change and Sea Level Rise

Sea level rise has the potential to have a significant medium to long term impact on developments built today in particular for coastal developments such as Barangaroo. The *Draft NSW Coastal Planning Guideline: Adapting to Sea Level Rise* (NSW Department of Planning, October 2009) indicates that sea level rise along the NSW coast relative to 1990 mean sea levels are projected to increase as follows:

- 40cm by 2050
- 90cm by 2100

As noted in the *NSW Sea Level Rise Policy Statement* (DECCW, October 2009) sea level rise may result in the following:

- increased or permanent tidal inundation of land by seawater
- recession of beach and dune systems and to a lesser extent cliffs and bluffs
- changes in the way that tides behave within estuaries
- saltwater extending further upstream in estuaries
- higher saline water tables in coastal areas
- increased coastal flood levels due to reduced ability to effectively drain low-lying coastal areas

In relation to the Headland Park increased sea level rise could result in:

- Reduced area for vegetation and parkland through tidal inundation. As sea levels rise sea walls, and features may become engulfed by the water, making them redundant. If the sea level was to rise above seawalls this would result in flooding of the parkland reducing the amount of usable area.
- Increased harbour pollution. Sea levels may rise above where there are currently water sensitive urban design initiatives such as bio-swales or gross pollutant traps. If these initiatives fall below the water line, they will become ineffective in managing stormwater entering the harbour.

The ESD Report prepared by WSP Lincolne Scott Pty Ltd (Appendix 17) states that a 90cm sea level rise should be allowed for within the base design of the Headland Park, inclusive of the ground level and the height of the sea wall. It recommends that the design should also accommodate daily tides, and storm surges above the reference level (RL) measured by Australian Height Datum (AHD). As per AS4997- 2005 the design of maritime structures needs to account for a storm surge of a 1:100 year storm. The height of this storm surge is 1.435m RL. Daily tides do not exceed this level and it is recommended in the ESD Report that the additional sea level rise of 0.9m be accommodated above this 1:100 year storm surge level.

The Headland Park site should be built at a RL greater than 2.335m (AHD). This is consistent with the proposed design which provides for the footpath at a level of RL 3.15.

7.17 Community and Social Issues

While preparation of a whole of site Community Plan is premature at this stage of the development process, a plan (Appendix 28) has been formulated in conjunction with the Technical Working Group which outlines the methodology and timeframes for the preparation, implementation and review of a site wide Community Plan. The Community Plan will address all matters required in Commitment 18 of the Concept Plan Terms of Approval.

The Community Plan will be driven by the goals of:

- Promoting social equity and inclusion;
- Enhancing liveability; and
- Increasing destinational vitality

It will:

- provide an overarching philosophy and framework for promoting wellbeing at Barangaroo
- analyse the current statutory and community context
- identify the needs of the emerging and existing communities of interest at Barangaroo
- recommend measures and indicators to determine the efficacy of various projects and the success of the plan in responding to the diverse needs of:
  - new and existing residents
  - the onsite working community
  - the many visitors to Barangaroo
- detail strategies that encompass a range of initiatives to be delivered by the Barangaroo Delivery Authority (The Authority) and Lend Lease for Barangaroo South.
- outline opportunities for cooperation with other agencies active within the area including, but not limited to, the City of Sydney, SHFA and NSW Housing
- identify implementation and governance arrangements for the various social initiatives and strategies
- outline processes for ongoing monitoring, review and reporting against the stated goals of each strategy.

The plan for the Community Plan at Appendix 28 contains a One Planet Action Plan for the Headland Park which identified strategies for the Headland Park to address the 10 “One Planet” principles as follows:

These principles will also underpin the development of the Headland Park and the Barangaroo Community Plan.

8. STATEMENT OF COMMITMENTS

The Approved Concept Plan includes a Statement of Commitments which details a range of measures to be undertaken by the Barangaroo Delivery Authority and other agencies to ensure the development of Barangaroo achieves the objectives set out in the report. The Statement of Commitments is in addition to the Minister's Terms of Approval for the development.

For the subject project application further commitments are proposed that relate specifically to the scope of the proposed Main Works and ongoing operation of the Headland Park. Unless otherwise specifically stated these are in addition to Commitments already made in the Concept Plan Statement of Commitments.

SUBJECT	COMMITMENTS	TIMING
Contamination	1. A Human Health and Ecological Risk Assessment (HHERA) will be prepared to establish the risk based criteria which form part of the Site Acceptance Criteria for the Headland Park Site;	Prior to commencement of remediation works on site
	2. A Remediation Environmental Management Plan (REMP) will be prepared to document the monitoring and management measures required to control the environmental impacts of the works and ensure the validation protocols are being addressed;	Prior to mobilisation onto the site for remediation works
	3. A Remediation Occupational Health and Safety Management Plan (ROHSMP) will be prepared to document the procedures to be followed to manage the risks posed to the health of the remediation workforce; and	Prior to mobilisation onto the site for remediation works
	4. A Remediation Work Plan (RWP) will be prepared to detail the precise remediation works to be undertaken following: - finalisation of the Headland Park and Northern Cove HHERA following review/acceptance by the appointed Site Auditor; - finalisation of the design of the Headland Park and the Cultural Facility/carpark; - review of the existing soil data for the Headland Park Site against the final in situ risk-based soil criteria and an assessment undertaken against nominated limits on decision errors in accordance with AS 4482.1- 2005, followed by additional investigations as required; - completion of any delineation investigations to more accurately estimate the extent of remediation required outside parts of the Headland Park Site which are not proposed to be excavated as part of the foreshore re-	Prior to mobilisation onto the site for remediation works

SUBJECT	COMMITMENTS	TIMING
	alignment excavations; and - completion of a survey by a registered surveyor showing the location of the in-situ soils, including elevation co-ordinates to m AHD.	
	5. The REMP and the ROHSMP will contain a plan addressing plausible contingencies and both Plans are required to be certified by an independent, expert person and submitted for acceptance by the BDA prior to mobilisation onto the Headland Park Site. The RWP will be prepared by the Remediation Consultant and reviewed/ accepted by the Site Auditor prior to the commencement of remedial works.	Prior to mobilisation onto the site for remediation works
	6. Upon completion of the works on the Headland Park Site, a validation report and an ongoing Long Term Environmental Management Plan (LTEMP) for impacted materials retained beneath Headland Park will be submitted by the Remediation Consultant to the Site Auditor for certification that the Headland Park Site is suitable for the proposed uses, subject to implementation of the LTEMP.	Prior to occupation of the site by future users
	7. A Part B Site Audit Statement will be provided to the Department of Planning	Prior to the commencement of remediation works
Acid Sulphate Soils	8. Any activities involving the disturbance of acid sulfate soils will be undertaken in accordance with the requirements of the *Acid Sulfate Soils Management Plan – Main Works Application* (JBS Environmental Pty Ltd, October 2010)	During excavation works
Hydrology and Water Management	9. The proposed development will be undertaken in accordance with the mitigation and monitoring requirements for surface and groundwater hydrology and quality, including water quality of the Harbour outlined in the Soil and Water report (WSP Environment and Energy, October 2010).	During construction works and during the operational phase
Navigation	10. Any new navigational aids will be determined in consultation with Sydney Ports Corporation, NSW Maritime and Sydney Ferries need to be confirmed through consultation with these parties	Prior to the installation of new navigational aids
Noise and Vibration	11. Noise and vibration on site will be managed in accordance with the *Main Works Preliminary Noise and Vibration Management Plan* prepared by Acoustic Logic Consultancy dated 19 October 2010	During proposed works
	12. The Preliminary Noise and Vibration Management Plan will be finalised in accordance with the recommendations of the Main Works Noise and Vibration Assessment once the Site Contractor is engaged	Following appointment of Site Contractor

Traffic, Parking and Access	13. Prior to the commencement of works on site a detailed CTMP will be prepared which is generally consistent with the *Traffic Impact Assessment and Construction Traffic Management Plan* prepared by Halcrow Pty Ltd (October 2010)	Prior to commencement of works on site
	1. Prior to the commencement of works on site a Traffic Control Plan (or series of plans) in accordance with RTA requirements, would be prepared for the proposed work round, past or through work sites.	Prior to commencement of works on site
	2. The detailed CTMP will address traffic issues relating to Moores Wharf, the CPT and the Harbour Control Tower in consultation with Sydney Ports Corporation.	Prior to commencement of works on site
Air Quality, Health and Odour	3. Air control emissions (mitigation measures) and Air Monitoring Program as recommended in the *Air Quality and Health Assessment- Main Works* prepared by JBS Environmental (October 2010) will be incorporated into the detailed Environmental Construction Management Plan for the proposed works and implemented during all works on site.	Prior to commencement and during works on site
Heritage	4. A detailed interpretation strategy is to be prepared for the Sewage Pumping Station and Sandstone Seawall as part of the overall site interpretation. In regard to the seawall this Plan should address the heritage values of the sandstone blocks to be relocated and demonstrate how, when and why these sandstone blocks were originally laid.	Within 6 months of completion of construction works
	5. The proposed retaining wall on the western side of the Moore's Wharf building should be designed to protect and enhance the significance of this building. Consideration should be given to designing the retaining wall as a gentle curve offset from the building.	Prior to construction of the retaining wall on the western side of the Moore's Wharf Building
	6. A structural audit of all heritage items in proximity to the works should be completed	Prior to the commencement of construction works
Archaeology	7. An archaeological excavation will be undertaken in accordance with the methodology and recommendations (relating to testing methodology, site interpretation, research questions) contained in the *Research Design and Archaeological Excavation Methodology* (Austral Archaeology, October 2010).	Prior to the excavation of the Northern Cove and Moore's Wharf inlet.
Accessibility	8. The proposed development will be undertaken in accordance with the recommendations of the Access Review Report prepared by Morris-Goding Accessibility Consulting (October 2010)	During construction.
Environmental	9. The proposed development will be undertaken in accordance with the Preliminary Environmental and Construction	During construction

Management	Management Plan prepared by the Barangaroo Delivery Authority (October 2010) or the subsequent more detailed plan to be prepared by the construction contractor once appointed.	
Waste Management	10. The proposed development will be undertaken in accordance with the Waste Management Plan prepared by JBS Environmental (October 2010).	During the construction and operational phases of the development
ESD	11. The proposed development will be undertaken in accordance with the recommendations of the ESD report prepared by prepared by WSP Lincolne Scott Pty Ltd (October 2010)	During the construction and operational phases of the development
Plan of Management	12. A plan of management will be prepared to guide the ongoing operations and management of the Headland Park	Prior to opening of the park to the public.

9. CONCLUSION

This Project Application seeks approval for the Main Works required to form and construct the Headland Park and Northern Cove following on from the Early Works Project Application. It also seeks approval for the use of the Headland Park and Northern Cove for recreation and associated uses.

The Headland Park will become another iconic part of Sydney Harbour and is the centrepiece of the transformation of Barangaroo. The park will restore north Barangaroo with a similar shoreline to that which existed in 1836, providing a new harbour side park opening in 2014, that families can enjoy for generations. It will complete the ring of prominent headlands and islands that characterise Sydney harbour and create a natural connection to the waterfront, linking Darling Harbour to Walsh Bay.

The proposal is consistent with the approved Concept Plan and Concept Plan Statement of Commitments. The assessment of the Project Application has demonstrated that the proposed development will have minimal adverse environmental effects and where impacts do occur appropriate measures can be adopted to mitigate the impacts.

Given the significant public benefits of the proposed Headland Park and Northern Cove to both the local and wider community of Sydney as well as visitors to the city, it is requested that the Minister approve the Project Application under Section 75J of the EP&A Act.