

Response to Submissions Report State Significant Development Application (SSD 6533)



Barangaroo Central

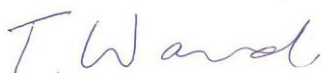
Remediation of Block 5 – Part of Remediation Site 21122

Submitted to Planning and Environment
On Behalf of Lend Lease

July 2015 ■ 14152

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A handwritten signature in blue ink, appearing to read 'T. Ward'.

Tim Ward

22/07/2015

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1.0 Introduction

This Response to Submissions (RTS) report is submitted to the Department of Planning and Environment (DP&E) in support of a State Significant Development Application (SSD DA) 6533 for a proposed remediation works at Block 5, incorporating part of EPA Remediation Site 21122, Barangaroo Central.

The RTS has been prepared by JBA on behalf of Lend Lease (Millers Point) Pty Ltd (Lend Lease).

It should be noted that the site has recently been subdivided. The Block 5 Remediation Area is now described as part of Lot 101 DP 1204946, and the site subject of works comprises Lot 101 DP 1204946 and Hickson Road.

1.1 Project Background

In May 2009 the Environmental Protection Agency (EPA) declared part of Millers Point to be a remediation site (Remediation Site No. 21122) under the Contaminated Land Management Act 1997 (the “EPA Declaration”). The site to which the declaration relates (the “EPA Declaration Area”) coincides with the known footprint of the former Millers Point gasworks and is located within part of the Barangaroo site and part of Hickson Road.

The EPA Declaration was made because the EPA considered that the EPA Declaration Area was contaminated in such a way as to present a significant risk of harm to human health and the environment. The EPA Declaration states that “The EPA believes that the site is contaminated with gasworks waste and particularly waste tar as a result of the previous use of the site as a gasworks plant.”

The Barangaroo Delivery Authority (BDA) entered into a Voluntary Management Proposal (VMP) with the NSW EPA (No. 20101719) to address the EPA Declaration.

In September 2014 Lend Lease submitted, on behalf of the BDA, SSD DA 6533 and Environmental Impact Statement (EIS) to seek approval for the remediation of contaminated land at Block 5, Barangaroo Central, which forms part of the EPA Declaration Area. The EIS provides an assessment of the environmental impacts of the project in accordance with the relevant Secretary environmental assessment requirements (SEARs) and sets out the undertakings made by Lend Lease to manage and minimise potential impacts arising from the development.

The remaining parts of the EPA Declaration Area (being Block 4 and Hickson Rd) will be the subject of separate Development Applications (DAs), and accordingly remediation works in these areas are not the subject of this SSD DA (being SSD 6533). It is noted that remediation of Block 4 has received development consent under SSD 5897-2013, which was approved in November 2014.

1.2 Public Exhibition

In accordance with Section 89F of the *Environmental Planning and Assessment Act 1979* (EP&A Act) the DP&E made the SSD DA publicly available for at least 30 days. In total the EIS was exhibited for 43 days, from 25 September 2014 to 7 November 2014. A total of nine submissions were received by the DP&E as follows:

- Environment Protection Authority (EPA).
- Transport for NSW (TfNSW).
- City of Sydney Council.

- Office of Environment and Heritage (OEH).
- Department of Primary Industries (DPI), including inputs from NSW Office of Water, Fisheries NSW, Agriculture NSW and Crown Lands.
- Sydney Water Corporation.
- Fire & Rescue NSW.
- NSW Health.
- Jemena, being the historical owner and operator of the former Millers Point Gasworks site.

1.3 Purpose of RTS

In accordance with Clause 85A of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), the DP&E has provided a copy of the submissions to Lend Lease and requested that Lend Lease provide a response to the issues raised in the submissions.

The purpose of this RTS Report is to respond to the issues raised in submissions to assist the DP&E in relation to its assessment of SSD DA 6533 and, where appropriate, to assist in the preparation of suitable conditions of approval.

1.4 Changes to the SSD

No significant changes to the nature, extent or design of the Block 5 remediation works have been made as a result of the issues raised in submissions, or for any other reason, since the public exhibition of the EIS. However, the overall timeframe for works, and how it is coordinated with nearby works, has been revised, and further assessment of cumulative impacts has been carried out to reflect these changes. The Block 5 remediation works are now proposed to take place between November 2015 and October 2017. Revised cumulative scenarios are described and assessed in **Section 3**.

Further assessment has also been carried out to address a number of issues raised in submissions, and clarification of some assessment outcomes has been provided.

The mitigation measures detailed in the EIS have been modified, and where necessary, additional mitigation measures have been identified, to respond to the requirements identified in the submissions received or the further environmental assessment undertaken and detailed in this report. Additional proposed mitigation measures are provided in **Section 4**.

Additionally, the contaminant mass volumes that were originally estimated in the VMP Remediation Extent report (being Appendix H of the EIS) have been subject of a revised calculation to include for two hotspots in Block 5 that were otherwise included as part of the remediation extent. The updated estimate is documented in the VMP Remediation Extent Addendum (AECOM, December 2014), which is provided at **Appendix I**. The VMP Remediation Extent Addendum concludes that the updated remediation volume does not have a significant impact on the mass calculations presented in the VMP Remediation Extent report (Appendix H of the EIS), and does not affect the conclusions of the VMP Remediation Extent report or the Remedial Action Plan (Appendix G of the EIS). The accredited Contaminated Sites Auditor has reviewed the VMP Remediation Extent Addendum (see **Appendix K**) and concludes that the volume changes and revised calculations do not affect the conclusions of the VMP Extent Report or the RAP, as per AECOM's conclusion. The amendments made therefore do not affect the findings of the Site Audit Report and accompanying Site Audit Statement GN447A dated 31 July 2013.

2.0 Summary of Issues and Responses

2.1 Key Issues

A detailed description of all of the issues raised in submissions, along with a response to each issue, is provided in **Appendix A**. A summary of the issues raised by agencies is provided in **Table 1**. Issues raised by an agency that are of a technically complicated nature and which require technical analysis in order to respond have been addressed in the following sections.

The issues raised by a number of agencies are not considered to be key issues as they relate to comments or and are not detailed in **Section 2** below. These issues are summarised below, and **Appendix A** provides a full and detailed response to each issue or comment.

Jemena is the only objector. Issues raised by Jemena are discussed further in **Section 2.8**, in addition to the detailed summary and response table in **Appendix A**.

Table 1 – Summary of Agency Issues

Agency	Summary of Issues	Lend Lease Response
EPA	Additional information and clarifications in relation to: - Off-site transport, treatment and disposal of contaminated soil. - Health impact assessment and air quality impacts, including validity of modelling assumptions and associated mitigation and management measures. - Noise and vibration, including more detailed assessment of the adequacy or noise mitigation measures. - Water quality and discharges from the wastewater treatment plant in the context of the Environment Protection Licence. - Waste management.	These issues are complex and technical. As such, they are addressed in more detail in Section 2. Lend Lease met with the EPA on 9 Dec 2014 to discuss their submission and potential responses, which helped form the basis of relevant responses in this RTS.
TfNSW	TfNSW requires further details in relation to: - Public transport. - Pedestrian and cyclist movements. - Consultation. - Limiting traffic movements during the PM peak period. - Cumulative impact with other Barangaroo and Wynyard Precinct projects.	The project does not impact on public transport or pedestrian / cyclist movements. Lend Lease will consult with the State Transit Authority during the preparation of the Traffic Site Control Plan and will investigate measures to minimise heavy vehicle movements during the PM peak period. Detailed responses to issues raised by TfNSW are provided in Appendix A, and further consideration of cumulative impacts is provided in Section 3.

Agency	Summary of Issues	Lend Lease Response
City of Sydney Council	Recommendations relating to: - Monitoring of air quality and noise - Control of noise emissions and a complaints handling system.	Lend Lease does not object to the proposed recommendations. No further consideration is necessary.
OEH	No issues raised.	No further consideration is necessary.
DPI (Office of Water) ¹	Clarification and proposed conditions of consent relating to: - Dewatering licence - Groundwater management plan - Groundwater monitoring plan	Lend Lease does not object to the proposed conditions for dewatering licence and groundwater monitoring plan. Lend Lease advises that the GMP referred to in Section 7.6.3 of the EIS was erroneously referred to as a Groundwater Management Plan. The correct term for the report to be produced (per the RAP) is Groundwater Monitoring Plan.
Sydney Water	Requests ongoing liaison relating to work methods and ensuring that the diversion work are carried out in accordance with Sydney Water's Asset Creation Process.	Lend Lease agrees with Sydney Water's requests. No further consideration is necessary.
Fire & Rescue NSW	Recommended conditions of consent relating to: - emergency procedures - emergency plan - provision of first aid and fire-fighting equipment - consultation with Fire & Rescue NSW	Lend Lease does not object to the proposed conditions. No further consideration is necessary.
NSW Health	Recommended conditions of consent relating to managing health risks including: - Department of health environment health risk assessment guidelines. - Control, capture and treatment of contaminated water migrating onto the site. - Provision of adequate venting of sump pits to protect the health of the public.	Lend Lease does not object to the proposed conditions. No further consideration is necessary.

Note 1: Fisheries NSW, Agriculture NSW and Crown Lands did not raise any issues to respond to.

2.2 Scope of SSDA

The EPA identifies that the nominated strategy is excavation of contaminated material in an excavation enclosure, followed directly by transport of the material off-site for treatment (where required) and/or off-site landfill disposal. The EPA raises the following queries in relation to the nominated remedial strategy:

- Provide confirmation of whether on-site treatment is proposed.
- Whether off-site transport is consistent with the *Remedial Action Plan: NSW EPA Declared Remediation Site 21122 and Block 5 (Stage 1B) Development Works, Barangaroo* prepared by AECOM and dated 24 July 2013 (the RAP), which was attached as Appendix G of the EIS.

- The EPA requested that the EIS should provide reasonable information about the final destination of the untreated gasworks waste and provide justification of the suitability of the chosen licenced treatment facility, or specifications of such facility that will meet the environmental requirements for treating gasworks waste.

2.2.1 Responses to Issues Raised by the EPA

Responses to the EPA's queries in relation to the scope of the SSDA:

- On-site treatment was not envisaged or sought under the SSDA, and accordingly has not been assessed.
- AECOM has prepared a supplementary assessment of the nominated ex-situ off-site remedial strategy, dated 4 March 2015 (attached at **Appendix B**), which confirms it is consistent with the remediation works anticipated by the RAP. In particular, Sections 13.3 and 14.1 of the RAP state that material excavated from the Site will be treated on-site or transferred to a licensed offsite facility for treatment in accordance with applicable regulations and NSW EPA requirements. The environmental controls specified by the RAP accommodate both options. AECOM identify that the following specific sections of the RAP are applicable to the offsite transportation of contaminated materials:
 - Section 14.7.2, Material Tracking: outlines the requirements for the tracking of all excavated material (treated or untreated) which will be detailed in a Material Tracking Procedure (to be prepared);
 - Section 14.7.3, Material Preparation: as required to ensure potentially saturated materials are appropriately drained of excess water and spadeable (within the excavation enclosure) prior to transport to stockpiles and offsite disposal; and
 - Section 14.7.6, Off-site Transportation of Materials: outlines requirements for trucks transporting materials off the Site.
- With respect to off-site treatment, AECOM's supplementary assessment (**Appendix B**) identifies the following minimum requirements that the selected off-site treatment facility will be required to meet:
 - The facility and its operations must be approved by the EPA and comply with the *Protection of the Environment Operations (Waste) Regulation (2014)*;
 - The facility must have (or obtain) an Environmental Protection License (EPL) which permits the treatment of Hazardous Waste and must comply with the requirements of the EPL for the duration of the Barangaroo treatment works;
 - The facility must obtain an Immobilisation Approval from the NSW EPA as required by the NSW EPA General Approval of the Immobilisation of Contaminants in Waste (Approval Number 2005/14) for the materials to be received and treated from Barangaroo;
 - Following treatment of Hazardous Waste materials (as required by the Immobilisation Approval) all treated materials must be disposed to NSW EPA licensed landfill facility appropriately licensed to receive the relevant waste type; and
 - All materials must be tracked through the treatment and landfill disposal process in accordance with Part 4 of the *Protection of the Environment Operations (Waste) Regulation (2014)*.
- AECOM's supplementary assessment (**Appendix B**) has been reviewed by the accredited Contaminated Sites Auditor. The Auditor's review (attached at **Appendix J**) concludes that:

- off-site treatment is consistent with EPA guidelines if managed appropriately; and
- the proposed strategy is consistent with the remediation approach described in the RAP

The following sections of this RTS report provide details of further assessment, where required, in relation to managements and control off-site transport and treatment activities.

With consideration of the above it is considered that:

- The RAP adequately provided for off-site transport and treatment of contaminated materials.
- SSDA 6533 is consistent with the RAP.

2.3 Air Quality

2.3.1 Issues Raised by the EPA

The EPA identifies that further environmental assessment, or clarification, is required prior to it being able to recommend conditions of approval for the development. The EPA's information request includes the following key issues:

- Clarifications around the air quality modelling assumptions, including:
 - Stack dimensions, ventilation systems, and operating parameters.
 - Potential variations in the design of the discharges, including whether the modelling scenarios represent a worst case in the context of a cumulative assessment with Block 4.
 - Consideration of all relevant receptors.
 - Emissions from stockpiles located outside of remediation/ excavation enclosures.
 - Detailed calculations for deriving emissions rates, including justification for not assessing PM_{2.5} and for using average soil concentration for contaminants.
- Confirmation of compliance with *Protection of the Environment (Clean Air) Regulation 2010*.
- Clarification of air quality control and monitoring measures during remediation works, including:
 - Capture of asbestos fibres through air filtration units.
 - Pro-active management of filter beds.
 - Reactive management procedures for volatile organic compounds (VOCs).
 - Details of ambient air quality monitoring and program.
 - Management control to be implemented during works outside of excavation enclosures (such as perimeter retention wall works).
- Adequacy of dust and odour control methods during off-site transport, including consideration of sealed containers instead of using odour suppressant foams.

The EPA also identifies errors and mis-descriptions in the AQIA and the EIS, which have been clarified in **Appendix A**.

2.3.2 Responses to Issues Raised by the EPA

In response to the issues raised by the EPA, AECOM has prepared an amended Air Quality Impact Assessment (AQIA), attached at **Appendix C**. AECOM's supplementary letter (**Appendix B**) also addresses responses to the air quality issues raised by the EPA in relation to the nominated ex-situ off-site remedial strategy, including the off-site transport and treatment of contaminated materials. In particular:

- The amended AQIA (**Appendix C**) clarifies the assumptions and outcomes of the air quality dispersion modelling, as follows:
 - Section 5.4 of the amended AQIA clarifies stack heights at 4m from ground level.
 - Section 6.3 and 6.4 of the amended AQIA respectively provide sensitivity analyses of lower pollution reduction efficiencies for the odour control equipment in the discharge stacks as well as the impacts of increasing the area under excavation at a single time. The sensitivity analyses indicate that a good margin of safety has been applied to the pollution reduction of the odour control equipment compared to what is considered normal operating parameters, and that even with a significant increase in excavation footprint, the odour emissions are not expected to rise to a degree where adverse impacts are expected to occur.
 - Section 5.7 of the amended AQIA confirms that pollutant concentrations associated with the concurrent Block 4 remediation, construction works for buildings C3/T1 and the operation of the water treatment plant were included in the dispersion model, to provide for a cumulative assessment.
 - Additional receptors have been added into the dispersion model, being the future occupants within Barangaroo South Stage 1A buildings, with no change to the results.
 - Confirmation that, except during the perimeter retention wall works, all contaminated material that is required to be stockpiled will be stockpiled within the excavation enclosures.
 - Detailed calculations for deriving emissions rates are provided in Appendix D of the amended AQIA.
 - Section 3.5 of the amended AQIA clarifies that PM_{2.5} has not been assessed since the relative contribution of the site would be low compared to existing PM_{2.5} sources in the area, specifically local traffic.
 - Section 5.6 of the amended AQIA explains that average soil contaminant concentrations were considered to be most appropriate for use for estimating concentrations from the contaminated area as a whole given the highly variable levels of contamination across the site.
- The amended AQIA (**Appendix C**) includes a commitment to design the discharge stacks to comply with the *Protection of the Environment (Clean Air) Regulation 2010*.
- The amended AQIA (**Appendix C**) provides clarification of air quality control and monitoring measures during remediation works, including:
 - Clarification that air emissions control systems would be designed to remove odorous emissions, not asbestos fibres. Management of asbestos encountered on the site would be in accordance with the site Asbestos Management Plan, which should include monitoring. It also noted that the final design and detailing of the air filtration systems will be subject to further design development, the details of which will be submitted to the EPA for review and comment. The air filtration systems will be designed to operate continuously (including outside of normal working hours) with a

minimum of two filters installed in series for each emission stack to prevent fugitive emissions during filter exchanges.

- Clarification that inter-bed monitoring would be undertaken for the carbon filters in accordance with a Breakthrough Management Plan.
- Details of a revised approach to reactive management for VOCs, based on daily hand-held measurements for monitoring of VOCs, and as agreed in consultation with the EPA.
- Clarification that ambient air quality monitoring will be undertaken throughout the remediation works.
- Reference to the *Block 5 Perimeter Retention Wall – Preliminary Odour Plan* – which was included in Appendix Y of the EIS, which sets out the odour control methodology during works where a working within an excavation enclosure is not practicable.
- AECOM's supplementary letter (**Appendix B**) sets out the environmental control measures that would be implemented during the off-site transport and treatment of contaminated soil, including the following:
 - Materials will be loaded into trucks within the excavation enclosure (except for perimeter retention wall works).
 - The exposed surface of untreated material will be sprayed with a suitable foam agent to minimise the release of emissions during transport.
 - The trucks will be covered and decontaminated in the wheel wash before exiting the excavation enclosure.
 - Procedures around the inspection and validation of the foam application and truck covering prior to the truck exiting the site.
 - Commitments around selection of transport routes to minimise impacts to off-site receptors, including the preparation of contingency measures manage potential risks associated with breakdowns, accidents or other emergency circumstances, and monitoring of trucks using Global Positioning Systems.

2.4 Health Impact Assessment

2.4.1 Issues Raised by the EPA

The EPA raises the following key issues in relation to the Health Impact Assessment:

- Details of risk assessment in relation to health impacts on local receptors.
- Recommendations about the design and effectiveness of the proposed monitoring program to ensure effective and ongoing implementation of control measures.
- A definition of and method to determine "highly contaminated liquid" is required to establish what water may be pumped by licensed liquid waste contractors (vacuum truck) and disposed of off-site.
- Details of control measures that will be used to manage scenarios such as large rainfall events, overflows, leaks and blockages, when there may be a potential for migration of contaminants directly into the harbour or clean stormwater.
- Consideration of the potential "mist derived" exposure pathways. In addition, details should be provided on the controls that will be used to manage any associated risks. Mists that may be laden with POPC/dust have the potential to be inhaled by exposed receptors. In addition, there is the potential for

contaminated surface water, soil and sediments to result and accumulate over a significant area from the use of mist sprays.

2.4.2 Responses to Issues Raised by the EPA

In response to the issues raised by the EPA, AECOM has prepared an updated Health Impact Assessment, attached at **Appendix D**. The amended Health Impact Assessment includes the following in relation to the key issues raised by the EPA:

- The completed Risk Analysis Matrix has been added to Appendix A of the amended Health Impact Assessment (**Appendix D**). Likelihoods and consequences were assigned on a qualitative basis; and assume that site control measures have been implemented.
- Confirmation that the monitoring program will be used to manage the intensity, location and duration of works, and will be incorporated into the Air Quality Management Plan (that forms part of the Construction Framework Environmental Management Plan), as provided for in the EIS.
- Clarification that highly contaminated liquid waste is defined as liquid with a strong odour or high level of visible contamination.
- Confirmation that the environmental control measures for stormwater management would be regularly checked to ensure their ongoing integrity and operability. Any spillages would be managed in accordance with an Emergency Response and Contingency Plan to be prepared by Lend Lease as required by Section 13.1.3 of the RAP.
- Clarification that misting sprays are not expected to result in an additional exposure pathway from the site. The misting sprays will reduce the existing potential off-site dust exposure pathway. The only risk associated with misting sprays relates to the accumulation of moisture or liquids from the sprays. This liquid would be monitored and controlled as part of the site surface water management plan).

2.5 Noise and Vibration

2.5.1 Issues Raised by the EPA

The EPA identifies that further environmental assessment, or clarification, is required prior to it being able to recommend conditions of approval for the development. The EPA's information request includes the following key issues:

- Suitability of assessing the works under the *Interim Construction Noise Guideline* rather than the *Industrial Noise Policy*.
- Clarifications around the noise modelling assumptions and outputs, including:
 - Clearly setting out mitigation measures included in the noise model, including whether a 2.4m hoarding was included in the model.
 - Whether construction traffic noise will exceed the relevant criteria outside of the AM/PM peak periods.
- Whether the correct vibration standard had been applied in the Construction Noise and Vibration Impact Assessment Report and whether vibration monitoring is necessary.
- Further assessment of recommended mitigation measures and confirmation of which measures will be applied.
- Provide more details of monitoring procedures.

2.5.2 Responses to Issues Raised by the EPA

An amended Construction Noise and Vibration Impact Assessment Report has been prepared by Wilkinson Murray, and is provided at **Appendix E**. Specific responses to the noise-related issues raised by the EPA are set out below:

- The proposed Block 5 remediation works are temporary in nature and compromise construction-related excavation works. At the meeting of 9 Dec 2014, EPA agreed with Lend Lease that the *Interim Construction Noise Guideline* is the appropriate guideline against which to assess temporary construction works.
- The amended Construction Noise and Vibration Impact Assessment Report (**Appendix E**) includes the following clarifications around the noise modelling assumptions and outputs:
 - That a 2.4m hoarding was assumed in the noise model (Section 6).
 - That the existing traffic noise already exceeds the relevant traffic noise criteria at all times during the remediation works (including outside of the AM/PM peak periods).
- The amended Construction Noise and Vibration Impact Assessment Report (**Appendix E**) includes updated references to the 2008 British Standard, and sets out in Section 7 that Trial Vibration Monitoring would be carried out to determine appropriate work distances and equipment types where equipment is identified as having the potential to exceed the human comfort criteria for vibration.
- The amended Construction Noise and Vibration Impact Assessment Report (**Appendix E**) includes a new Appendix E that sets out an analysis of reasonable and feasible noise reduction measures. The analysis identifies that all of the nominated noise reduction measures are reasonable and feasible. Section 8 of the amended Construction Noise and Vibration Impact Assessment Report (**Appendix E**) sets out how these mitigation measures will be implemented through the Construction Noise and Vibration Management Plan.
- Section 8 of the amended Construction Noise and Vibration Impact Assessment Report (**Appendix E**) provides more details of monitoring, including frequency, compliance standards, reporting, actions and responsibility, as well as complaints handling procedures.

2.6 Soil and Water

2.6.1 Issues Raised by the EPA

The EPA identifies that further details are required in relation to the following soil and water assessment issues:

- The effect of groundwater dewatering on flows towards the harbour.
- How heavy metals discharge limits from the wastewater treatment plant (WTP) would be complied with.
- Management of unexpected failures of the WTP, particularly in relation to bio-accumulative or acutely toxic pollutants.
- Methodology to evaluate the discharge limit for turbidity based on Total Suspended Solids (TSS).

The EPA also suggests that the commissioning phase should be extended to better understand treatment and chemical variability in the feed and discharge waters.

2.6.2 Response to Soil and Water Issues

An amended Soil and Water Impact Assessment Report has been prepared by Worley Parsons, and is provided at **Appendix F**. Specific responses to the soil and water related issues raised by the EPA are set out below:

- A new Section 5.6.6 has been inserted into the amended Soil and Water Impact Assessment Report (**Appendix F**) which states that the Block 5 remediation works will not result in any significant impacts on estuarine circulation or changes to hydrological regimes in the harbour, because:
 - The works do not include permanent retention walls that may obstruct the flow of groundwater through the Site; and
 - The remediation works are to be undertaken behind (and setback from the face of) the existing caisson wall.
- Clarification in Section 7.3 of the amended Soil and Water Impact Assessment Report (**Appendix F**) that the WTP would be designed to treat heavy metals and the relevant chemicals of potential concern.
- Clarification in Section 8.4 of the amended Soil and Water Impact Assessment Report (**Appendix F**) that diverters and storage basins should be used during unexpected failures of the WTP to prevent discharge of "untreated" or non-compliant waters into Darling Harbour.
- Additional details in Section 8.4 of the amended Soil and Water Impact Assessment Report (**Appendix F**) explaining the proposed approach to develop site specific TSS-turbidity relationships based on initial TSS and turbidity data and the level of organic contaminants present. The relationship will serve as an equivalent turbidity limit to allow instantaneous site compliance checks.
- Clarification that the commissioning period will be extended from two weeks to a month.

2.7 Waste

2.7.1 Issues Raised by the EPA

The EPA raises the following key issues in relation to the management of waste:

- Reference to the more recent versions of the Waste Regulation and Waste Classification Guidelines, and appropriate characterisation of trackable waste under the waste Regulation.
- Whether treated material may potentially be reused onsite at Barangaroo.

2.7.2 Responses to Waste Issues Raised by the EPA

An amended Waste Management Plan has been prepared by AECOM, and is provided at **Appendix G**. Specific responses to the waste management related issues raised are set out below:

- The amended Waste Management Plan (Appendix F) has been updated to reference the relevant new regulations and waste classification guidelines.
- The amended Waste Management Plan (Appendix F) has been updated to confirm that any treated (stabilised) materials will not be reused (including at Barangaroo) and will be appropriately disposed of to a NSW EPA licensed landfill facility.

2.8 Issues Raised by Jemena

2.8.1 Summary of Issues

Jemena has made submission on the SSDA that submits that the application should be refused for the following reasons (note: a full and comprehensive summary of Jemena's submission is provided in **Appendix A**):

- **Characterisation of Development:** Jemena submits that the works go substantially beyond what is "required" or "appropriate" to facilitate the removal of the EPA Declaration, and that the works have been designed for a separate purpose of facilitating the Barangaroo development.
- **Inconsistency between HHERA and Development Application:** Jemena submits that the HHERA states that the contamination in the EPA Declaration area presents unacceptable risks because an unprotected maintenance worker may dig 2 metres below the surface of the site and that the existing contamination may impact on groundwater dependent ecosystems (GDEs). Jemena submits that the HHERA concludes that these are unacceptable risks which drive the need to remediate the contamination. Jemena submits that the HHERA is flawed and inconsistent with the excavation approach in the Block 5 DA because of the following reasons:
 - The HHERA does not consider that workers accessing service trenches on the site could wear personal protective equipment as part of a management plan.
 - The HHERA is based on an assumption that GDEs are present and that these need to be protected. Jemena submits that their view is that there are no GDEs present so that the conclusion to be drawn is that the HHERA/RAP is flawed and cannot lawfully be used as a basis to approve the Block 5 DA.
 - There is no evidence that the contamination of the site poses a threat to Darling Harbour.
- **Failure to adequately consider alternatives:** Jemena submits that the applicant has not properly considered the available options for remediation of Block 5.
- **Inconsistency with Block 4 DA:** Jemena submits that the Block 5 DA is inconsistent with the development application for remediation of Block 4, and the development application for Block 4 is based on using Block 5 for a remediation enclosure for the treatment and storage of material excavated from Block 4.
- **Proposed excavation exceeds remediation extent:** Jemena submits that the development contemplated by the Block 5 DA involves excavation of a large area of land which is much larger than the remediation extent shown in the RAP. Jemena submits that the environmental impacts of the remediation could be substantially reduced by limiting the remediation to the contaminated areas identified in the applicant's documents.
- **Incomplete information:** Jemena submits that the EIS contemplates that Block 5 will be used for the Barangaroo project and that further applications will be made for the buildings on Block 5. Jemena submits that the EIS uses the consistency of the excavation with the Concept Plan and future development to justify the remediation approach. Jemena submits that the consent authority cannot properly evaluate the Block 5 DA and its relationship with the Barangaroo project in the absence of the development applications for Block 5 or the applicant disclosing what arrangements it has in place for the development of Block 5.

- Increased risks relative to current state: Jemena submits that the applicant has failed to explain whether undertaking the remediation works as proposed would result in a more significant risk of harm to human health or the environment than ongoing lawful use of the land in absence of the work. Jemena submits that the applicant should undertake a comparative risk and environmental analysis of managing the contamination in situ based on existing use and excavating the material and exposing it to the environment.
- Lack of Block 5 remediation detail in RAP: Jemena submits that the RAP approved by the EPA is missing necessary detail about the proposed excavation of Block 5 and is insufficient, from a planning perspective, to justify granting consent to the Block 5 DA.
- Ecologically sustainable development (ESD): Jemena submits that the analysis of the development in the context of ESD is flawed. Jemena submits that it does not properly consider and balance the environmental impacts and risks of the existing contamination within Block 5 (which is of less significance than contamination within Block 4) against the environmental impacts and risks of excavating the contamination and exposing it to persons and the environment.
- Underlying land use to remove EPA Declaration: Jemena submits that the EIS is silent on identifying the underlying land use which is required to remove the EPA Declaration.
- Remediation Extent Overstates Remediation Area: Jemena submits that the remediation area extends across parts of the EPA Declaration area where no evidence of exceedances of the contamination criteria has been reported and where no evidence of contamination exceeding the soil or groundwater SSTC has been found.

Jemena's submission included a technical appendix prepared by SKM that stated it focused on the following three issues:

- Whether the conceptual site model adopted by the AECOM HHERA provides a proper representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors;
- Whether the AECOM HHERA meets the relevant standards for the preparation of an environmental risk assessment; and
- Whether the AECOM HHERA meets the relevant standards for the preparation of a human health risk assessment.

2.8.2 Response to Jemena Issues

A full and comprehensive response to each of the issues raised in Jemena's submission is provided in **Appendix A**. We provide the following general comments in response in order to demonstrate that the scope of SSDA 6533 is appropriately established, and that the EIS is adequate for the purposes of seeking development consent.

- The EIS and RAP clearly limit the extent and scope of remediation at Block 5 to that which is required to remove the EPA Declaration. Any additional excavation or remediation associated with development works at Block 5 (in the future) would be the subject of a separate RAP and a separate development application.
- The EPA through the EPA Declaration has determined that the site is significantly contaminated land which is significant enough to warrant regulation. Under the Contaminated Land Management Act 1997 (CLM Act), a Voluntary Management Proposal (VMP) has been agreed with the EPA to

remediate the significant contamination referred to in the EPA Declaration. The VMP required various investigations to be undertaken and a remedial action plan to be developed which was approved by the EPA and an independent site auditor accredited under the CLM Act. The VMP required that, amongst other things, the preparation of a HHERA to identify the site specific acceptance criteria for the site and for the remediation works. The VMP HHERA (AECOM, 2012) for the VMP Remediation Works Area establishes appropriate acceptance criteria in the context of existing land uses allowable without a development approval. In addition the VMP/Block 4 RAP sets out remediation objectives that must be met.

- It is the purpose of the EIS to identify alternatives, and to explain why the development subject of the SSDA is the preferred alternative. Section 6.2.3 of the EIS satisfactory addresses this requirement. In support of this consideration, the RAP includes (at Chapter 10) a detailed comparative analysis of the remedial technology options – which considered sustainability, technical, financial, logistical, timing and community issues. This assessment of remediation options in the RAP was undertaken with specific consideration of NSW EPA policy on their preferred hierarchy of remediation management (NSW DEC 2006). The RAP was prepared consistent with the requirements of the NEPM (RAP, Section 2.2.4). Whilst the Block 5 remediation works are not related to the delivery of the Concept Plan, it is appropriate that the preferred option should not unreasonably constrain development of Block 5 consistent with the Concept Plan. In this way, the preferred remediation option for Block 5 is not inconsistent with the Concept Plan.
- The Block 4 DA (SSD 5897) is not solely based on a remediation enclosure located on Block 5. The Block 4 DA provides alternatives for either on-site treatment, or for treatment at an off-site facility. Accordingly, the Block 4 DA can be undertaken with no on-site treatment/remediation enclosure, allowing the Block 5 DA to be concurrently undertaken with excavation on Block 4. These two applications are therefore consistent with each other.
- The proposed remediation extent within Block 5 does not require further development of Block 5 to occur. It has been determined on the basis of continuation of the current land use (i.e. 'VMP Remediation Works'). The DA Site (as shown in Figure 2 (page 9), and described in Section 2.2 of the EIS) includes additional land for the purposes of further excavation (e.g. battering to access the material required for remediation) and remediation related logistics and storage. This additional land is not proposed to be remediated.
- As required by the SEARs the proposal has been assessed against the approved Barangaroo Concept Plan to ensure it is consistent with that Concept Plan. However, consistency with the Concept Plan has not been used to justify the remediation approach. The remediation approach has been selected based on the RAP, which provides for either a preferred in-situ chemical oxidation method (subject to pilot trial) or an alternate ex-situ remediation method. The in-situ remediation option under the RAP is not preferred in SSD 6533, as review of the initial pilot Trial (Proving Phase Trial) indicated that the in-situ chemical oxidation method is unlikely to be as suitable in the heterogeneous fill material of Block 5 compared to ex-situ remediation of material in this area. Consequently, the alternate ex-situ remediation method, per the RAP, has been selected for SSD 6533.
- It is necessary to demonstrate that the proposed development does not exceed mandated thresholds for human health and environmental impacts, including Government guidelines, and that on-balance, when a whole range of long term and short term benefits and impacts are weighed up there is a net public interest benefit to carrying out the development. The Block 5 EIS and this RTS demonstrate that the works can be carried out in a manner that

ensures significant adverse environmental effects do not occur and environmental impacts will remain within acceptable limits. Where appropriate, the EIS sets out necessary mitigation and management measures to ensure that the Block 5 remediation works can be carried out in a manner that would prevent significant adverse environmental effects from occurring. The proposed works meet the guidelines in terms of short term impacts and will result in a net public interest benefit in the long term. The proposed remedial works clearly achieve this as they will remove sources of gasworks contamination to meet the RAP objectives and the VMP HHERA remediation criteria.

- The extent of remediation is not simply based on the identification of CIM or SPGWT from previous intrusive investigations. Section 8.1 of the RAP, sets out the matters that were considered in determining the lateral extent of remediation required for protection of human health and the environment.

The submission made by Jemena should be considered in light of clause 12(1) of *State Environmental Planning Policy No. 55 - Remediation of Land* (SEPP 55) which provides that:

"(1) The consent authority must not refuse development consent for a category 1 remediation work unless the authority is satisfied that there would be a more significant risk of harm to human health or some other aspect of the environment from the carrying out of the work than there would be from the use of the land concerned (in the absence of the work) for any purpose for which it may lawfully be used".

The Block 5 remediation works EIS and this Response to Submissions demonstrate that undertaking the works the subject of SSD 6533 would not result in a more significant risk of harm than if the works were not carried out. In particular the proposed Block 5 remediation works:

- Comply with the relevant guidelines in terms of short term impacts associated with the emission of pollutants to air and water.
- Address the significant risk of harm to human health and the environment identified by the EPA Declaration through the removal of contaminant mass.
- Contribute to a long term improvement of ground water quality which is leaving the Site and provide for an improvement to the environmental conditions in the vicinity of the site.
- Result in a net public interest benefit in the long term through the removal of the historical legacy of contamination at the Site.

Accordingly, Clause 12 of SEPP 55 should inform the determination of SSD 6533.

In relation to the issues raised in the SKM attachment to the Jemena submission, AECOM has prepared a detailed technical response which is provided at **Appendix H**. The key components of this technical response are summarised below:

- The Conceptual Site Model (CSM) is considered to be adequate for *inter alia* the following reasons:
 - The CSM presented in the HHERA was developed in accordance with human health risk assessment guidance provided in Schedule B4 of the Assessment of Site Contamination (ASC) NEPM (NEPC, 1999) which was endorsed by EPA at the time the HHERA was prepared. It is noted that there is no substantial difference to the approach in developing a conceptual site model for the purposes of undertaking a human health risk assessment in the ASC NEPM (NEPC, 2013).

- The HHERA was considered appropriate by the NSW Site Auditor in his Site Audit Report and Site Audit Statements for the RAP.
 - The approach to not include asbestos was supported by the full data set available at the time the HHERA was developed.
 - Assessment of the two Sydney Water Pump Stations stated by SKM as other potential sources of contamination was adequate.
 - Assessment of GDEs and the point of compliance in the CSM were considered as directed by EPA and therefore in line with EPA policy.
 - The CSM presented in the HHERA is compliant with the requirements of EPA and appropriate for the assessment of appropriate remedial options.
 - The CSM was developed as part of the exposure assessment conducted within the HHERA and provides an overview of the potential contaminant releases, exposed populations, and potential exposure pathways for the current land use conditions at the Site. The CSM is considered appropriately detailed for the purposes of the HHERA and provides a conceptual understanding of the exposure modelling that was undertaken to assess the potential for unacceptable risks to identified receptors at the Site.
- The Ecological Risk Assessment (ERA) is considered adequate for *inter alia* the following reasons:
- The ERA was prepared in accordance with guidance set out in the ASC NEPM (1999), which was endorsed by NSW EPA at the time the document was prepared. It is noted that the ASC NEPM (NEPC, 1999) was amended in 2013, however the general principles of ecological risk assessment as presented in the ASC NEPM (NEPC, 1999) are still applicable and the use of amended guidance would not have significantly altered the outcomes of the HHERA.
 - The EPA directed AECOM to use the MWQG at the boundary of the Declaration Area to assess ecological risk, including the potential presence of GDEs.
 - The ERA was considered appropriate by the NSW Site Auditor in his Site Audit Statement (ENVIRON, 2013). Therefore further response to the SKM submission regarding the point of compliance being the boundary of Darling Harbour and groundwater well selection is not relevant.
 - The HHERA is not required to address ESD principles as per the CLM Act. The risk assessment determines the acceptable risk/SSTCs and informs the remedial action plan. The principles of ESD are then assessed in remedial planning/action documentation and/or the EIS.
 - It is also noted that a number of comments in the SKM submission were specifically related to elements included in the ERA as directed by the EPA, and therefore are considered to meet the requirements of relevant standards for the preparation of an ERA and policies of the EPA.
 - The ERA, as contained in the HHERA met the relevant standards for preparation of an ERA, which in turn allowed for the development of a remedial strategy that was able to address the requirements of Section 9 of the CLM Act (1997) and ultimately remove the EPA Declaration.
- The Human Health Risk Assessment (HHRA) is considered adequate for *inter alia* the following reasons:
- The HHERA was prepared in accordance with guidance set out in the ASC NEPM (NEPC, 1999) and, as such, is considered to meet the relevant standards of a HHRA. It is noted that the ASC NEPM (NEPC, 2013) was

amended in 2013, however the general principles of HHRA as presented in the ASC NEPM (NEPC, 1999) are still applicable and the use of amended guidance would not have altered the outcomes of the HHRA.

- The HHRA (AECOM, 2012), including the HHRA, was considered appropriate by the NSW Site Auditor in his Site Audit Statement (ENVIRON, 2013).
- The approach of assuming an intrusive maintenance worker is unprotected is in line with industry standard practice as per the Health Screening Levels established by the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (2011).
- The HHRA was conducted using all available site investigation data.
- The HHRA, as contained in the HHRA, met the relevant standards for preparation of a HHRA, which in turn allowed for the development of a remedial strategy that was able to address the requirements of Section 9 of the CLM Act (1997) and ultimately remove the EPA Declaration.

3.0 Revised Cumulative Assessment

3.1 Works Scheduling

The Block 5 remediation works are now proposed to take place between November 2015 and October 2017. **Table 2** provides a schedule of works currently underway at or around Barangaroo or programmed to occur in the relevant period in the future.

In particular, it is highlighted that the approved Block 4 remediation works and bulk earthworks are now scheduled to take place broadly concurrently with the Block 5 remediation works. Revised cumulative impact assessments have been carried out for traffic, noise and air quality, and are provided below.

Table 2 – Works Schedule

Project	Programmed Dates	Concurrent with Block 5 Remediation Works?
Block 5 Remediation Works	Nov 2015 – Oct 2017	NA
Block 4 Remediation Works	Aug 2015 – Nov 2017	✓
Headland Park Main Works	Apr 2013 – Jul 2015	✗
T2 Commercial Building	May 2013 – Oct 2015	✗
Concrete Batch Plant Operation	Sep 2013 – Sep 2015	✗
T3 Commercial Building	Oct 2013 – Apr 2016	✓
R8/R9 Residential Buildings Construction	Jan 2014 – Nov 2015	✗
T1 Commercial Building	Mar 2014 – Sep 2016	✓
Barangaroo Central – Waterfront Promenade	Mar 2014 – Jul 2015	✗
Stage 1A Public Domain works	Jul 2014 – Mar 2016	✓
City Walk Link Bridge	Oct 2014 – Jun 2015	✗
R1 Construction	Sept 2015 – June 2016	✓
Crown Remediation and Earthworks	Dec 2015 – Mar 2018	✓
Crown Hotel Construction	Jun 2016 – Nov 2019	✓
R7 Construction	Jul 2015 – April 2016	✓
C2/C6 Above GF Only (GF + 6 floors)	Jul 2015 – Sep 2016	✓
C8/H2 Above GF Only (GF + 6 floors)	Nov 2016 – Feb 2018	✓
Wynyard Walk Bridge	Apr 2013 – Sep 2015	✗
Barangaroo Ferry Wharf	Aug 2015 – Aug 2016	✓

3.2 Revised Traffic Assessment

3.2.1 Site Access Arrangements

In July 2015 two major improvements to the pedestrian network in the Barangaroo precinct were opened to the public, those being:

- The City Walk Bridge – providing a grade separated pedestrian connection from Napoleon Street, across Sussex Street into the Barangaroo site
- Signalisation of the Hickson Road / Napoleon Street intersection providing controlled pedestrian crossing movements across all four legs of the intersection.

In late 2015 site access for construction workers will be further improved through the completion of the Wynyard Walk development, which will provide safe and efficient pedestrian access across Hickson Road and Sussex Street.

Access for construction vehicles to the site will be located via Hickson Road at the existing gatehouse, approximately 350m north of the Sussex Street / Napoleon Street intersection. No truck queuing is to occur on Hickson Road, and all vehicles will enter the site in a forwards direction.

3.2.2 Traffic Impact Assessment

A revised Traffic Impact Assessment has been prepared by Arup, and is provided at **Appendix L**.

On average over the course of the construction period, 41 construction vehicles per day (related to the proposed works) will access the work site for the Block 5 remediation works. This would result in 82 traffic movements over the course of a typical day. This is lower than what was originally forecast in the EIS due to a more accurate understanding of the anticipated construction methodology.

Based on anticipated construction and development traffic movements associated with each project in the Barangaroo precinct (see **Appendix L**), as described in **Section 3.1**, peak traffic during the Block 5 construction works is anticipated to occur in August 2016 with 300 traffic movements forecast during the AM peak hour. Of these, only a small proportion (8 vehicles per hour or 2%) are attributable to the Block 5 remediation works.

This peak future traffic scenario was modelled to show the future peak flow at the relevant intersections with and without the Block 5 remediation works. The results of the modelling are presented in **Table 3**.

Table 3 – Intersection Analysis

Intersection	Future Peak without Project			Future Peak with Project		
	LOS	DOS	AVD(sec)	LOS	DOS	AVD(sec)
Sussex Street & Erskine Street	C	0.73	33	C	0.76	33
Sussex Street & Shelley Street	A	0.31	3	A	0.31	2
Napoleon Street & Hickson Road	C	0.89	37	C	0.89	37
Margaret Street & Kent Street	B	0.65	24	B	0.65	24
Hickson Road & Globe Street	A	0.36	2	A	0.35	2

LOS – Level of Service / DOS – Degree of Saturation / AVD – Average Delay per Vehicle.

The results of the LinSig intersection analysis forecast minimal changes in the operation of key intersections as a result of the Block 5 remediation works, when compared with the base case scenario. The additional construction vehicles

associated with the Block 5 remediation works has a negligible impact on forecast road network performance.

During the AM peak hour, when construction vehicles attributable to Block 5 remediation are expected to access the site, the road network generally operates satisfactorily. The addition of construction traffic movements associated with Block 5 remediation works does not impact the overall operation of the local road network, and requires no further works to accommodate the levels of construction traffic anticipated.

3.3 Revised Noise Assessment

A revised Noise and Vibration Assessment has been prepared by Wilkinson Murray, and is provided at **Appendix E**.

3.3.1 New Receivers

The revised Noise and Vibration Assessment incorporates a new receiver location, being the residential receivers in building R8, located within Barangaroo South, and which will be occupied during the Block 5 remediation works.

3.3.2 Noise Impact Assessment

Table 4 provides the noise levels for the Block 5 remediation works at all receivers (including the new R87 receivers; Note: that the noise modelling results for the other receivers remain the same as reported in the EIS), as well as noise levels for the revised cumulative scenario at all receivers. The revised cumulative scenario has resulted in only minor changes to the noise impacts that were reporting in the EIS (i.e. plus or minus 1 dBA).

Table 4 – Noise Impact at Residential Receivers

Scenario	Hickson Rd	High St	Merriman St	Balmain East	Darling Island	Sydney Wharf	R8 Residences
Criteria							
Day	63	57	56	59	57	57	63
Evening	58	49	49	50	49	49	58
Night	54	46	45	45	44	44	54
Saturday	55	50	51	51	55	55	55
Predicted Noise							
Stage 2							
Day	64	65	47	44	47	46	62
Night	18	23	7	6	6	4	18
Stage 3							
Day	67	66	47	44	47	45	62
Night	27	27	10	8	9	8	24
Stage 4							
Day	67	66	47	45	48	46	60
Night	20	23	7	6	6	4	18
Cumulative							
Day	74	66	51	50	54	56	71
Night	32	26	10	8	11	10	28

Note: Cells highlighted in red indicate exceedance of the relevant noise criteria

As shown in **Table 4** the cumulative impact of the Block 5 remediation works the most affected area is Hickson Road, High Street and R8 residents with potential cumulative noise exceedances of 19 dBA, 16 dBA and 16 dBA respectively on Saturdays. A minor 1 dBA exceedance is predicted at Sydney Wharf residents on

Saturdays. Noise control measures as set out in Section 9 of the EIS, and reiterated in the revised Noise and Vibration Assessment will be employed, which will reduce cumulative noise impacts on residential receptors.

In the case of commercial receivers a small exceedance of 4 dBA is predicted at The Bond. A marginal 1 dBA exceedance is now predicted at the external playground area of the KU Lance Preschool. For internal areas, an exceedance of up to 11 dBA is predicted during the cumulative noise scenario, although this is when windows are open. In addition to the implementation of noise mitigation measures set out in the EIS and reiterated in the revised Noise and Vibration Assessment, windows could potentially be closed during intensive periods of construction, if required.

Based on the cumulative assessment it can be concluded that noise from remediation of Block 5 will be the main contributor to cumulative noise levels at residences on High Street, however other works, particularly Block 4 remediation works and the Stage 1C remediation and earthworks will be the main contributors to noise levels at other receivers.

3.3.3 Construction Traffic Noise

Existing traffic noise along Hickson Road is approximately 67.1 dBA. Peak hour traffic along Hickson Road was predicted to be 68.9 dBA in December 2016 with background traffic growth, rising to 69 dBA when considering the impact of the Block 5 remediation works. When considered cumulatively with total operational and construction traffic the calculated traffic noise level would rise to 69.7 dBA.

When Block 5 remediation works and all Barangaroo South construction and operational traffic are included, an increase of approximately 1 dBA is predicted. Traffic noise levels are therefore not predicted to exceed the 2 dBA objective due to construction and operational traffic in December 2016.

3.4 Revised Air Quality Assessment

A revised Air Quality Impact Assessment has been prepared by AECOM, and is provided at **Appendix C**.

3.4.1 New Receivers

As with the noise assessment, the revised Air Quality Impact Assessment incorporates a new receiver location, being the residential receivers in building R8, located within Barangaroo South, and which will be occupied during the Block 5 remediation works.

3.4.2 Dispersion Modelling

Dispersion modelling was undertaken to predict the potential effects of the proposed remediation works. Two operational scenarios were modelled as part of the assessment, which comprised the expected highest activity levels during the remediation work at Block 5, combined with the Block 4 remediation works (Scenario 1) and a scenario comprising the Block 5 works, the Block 4 works and the Stage 1C remediation and earthworks (Scenario 2). In each case, the total combined project contribution was determined as well as the cumulative assessment which represents the project contribution plus background pollutant concentrations.

The Block 4 remediation and landforming works were modelled based on the off-site treatment of contaminated material (as opposed to the on-site treatment of contaminated materials associated with the Block 4 remediation works as presented in the EIS for the Block 4 remediation and land forming works).

Table 5 shows the modelling results of the AQIA.

Table 5 – AQIA Modelling Results

Pollutant	Averaging Period	Units	Scenario 1		Scenario 2		Criteria
			Maximum Predicted Contribution	Total Cumulative Concentration	Maximum Predicted Contribution	Total Cumulative Concentration	
NO ₂	Max 1 hour Average	µg/m ³	141.0	192.4	248.2	312.2	246
	Annual Average	µg/m ³	9.2	29.3	23.9	44.0	62
PM ₁₀	Max 24 Hour Average	µg/m ³	7	59	79	136	50
	Annual Average	µg/m ³	1	20	11	30	30
TSP	Annual Average	µg/m ³	3	49	33	79	90
Benzene	99.9 th 1 hour	µg/m ³	9.19	NA	9.19	NA	29
Ethylbenzene	99.9 th 1 hour	µg/m ³	10.2	NA	10.2	NA	8,000
Toluene	99.9 th 1 hour	µg/m ³	4.08	NA	4.08	NA	360
Xylenes	99.9 th 1 hour	µg/m ³	1.05	NA	1.05	NA	190
Naphthalene	99.9 th 1 hour	µg/m ³	63.37	NA	63.37	NA	440
Phenol	99.9 th 1 hour	µg/m ³	0.25	NA	0.25	NA	20
Odour	NRT	OU	0.05	NA	0.65	NA	2

* Annual NO₂ was calculated assuming all NO_x was NO₂

NRT – Nose Response Time 100th Percentile

Note: Cells highlighted in red indicate exceedance of the relevant air quality criteria

Scenario 1 modelling results (i.e. the Block 4 and Block 5 remediation activities only) show no predicted air quality exceedances at any receptor. Cumulative PM₁₀ concentrations show an exceedance of the criteria, although this is due to the background concentrations, which exceeded the 24 hour PM₁₀ criteria on 3 days in the 2013 time period. When the contemporaneous data are assessed in terms of cumulative 24 hour PM₁₀ exceedances, it was found that there were no additional exceedances of PM₁₀ concentrations beyond those identified in the background data i.e. all cumulative 24 hour PM₁₀ exceedances are due to background, not due to the Barangaroo activities.

When the Stage 1C remediation and earthworks activities are added (i.e. Scenario 2), exceedances of the EPA criteria were predicted to occur for cumulative 1 hour NO₂, and project contribution and cumulative 24 hour PM₁₀.

Results of the assessment indicate that the Block 4 and Block 5 operations are not expected to adversely impact on the surrounding sensitive receptors when operating simultaneously at full operational capacity.

No exceedances were predicted for air toxics, including metals, poly aromatic hydrocarbons and cyanide, as well as for odour.

Air quality mitigation measures set out in Section 9 of the EIS, have been amended in the response to issues raised in submissions. The amended air quality mitigation and management measures are described in the revised Air Quality Impact Assessment (**Appendix C**), and summarised in Section 4 below.

4.0 Mitigation Measures

The measures required to mitigate the impacts associated with the proposed works are detailed in Section 9 of the EIS. As a result of the submissions received and the further environmental assessment undertaken and detailed in this report, additional or modified mitigation measures are proposed as follows:

- As per Appendix Y of the EIS, confirmed the proposed implementation of the *Block 5 Perimeter Retention Wall – Preliminary Odour Plan*, which sets out the odour control methodology during works where a working within an excavation enclosure is not practicable (provided as Attachment 1 of the amended AQIA (see **Appendix C**).
- Vibration management to minimise the impact of high-vibratory activities, where equipment is identified as having the potential to exceed the human comfort criteria, consisting of:
 - Trial Vibration Monitoring to determine appropriate work distances and equipment types;
 - Notification of occupant's adjacent to the site of when these activities occur; and
 - Utilise the smallest practicable size of vibratory roller.
- Additional management measures associated with the off-site transportation of contaminated materials
 - Materials will be loaded into trucks within excavation enclosures.
 - Once the truck trailer has been loaded, the exposed surface of the untreated contaminated soil will be sprayed with a suitable foam agent, such as Rusmar AC-645 (or equivalent) to minimise the release of fugitive emissions during transportation. The intent of the foam agent is to form a barrier that provides adequate odour control for the duration of transport. The foam agent will be required to meet the following criteria:
 - must be non-hazardous and bio-degradable;
 - must be able to be quickly applied to truck loads shortly after the truck is loaded to rapidly mitigate the generation of fugitive emissions and odours;
 - must form a seal across the surface of the soil and effectively bind surface dust particles; and
 - upon drying, must form a cover which is flexible and capable of resisting degradation during transportation of the materials to the licensed offsite facility.
 - A suitable work area (for example a raised platform) will be constructed within the excavation enclosure to allow a thorough application of the foam agent (or equivalent) across the surface of each truck load containing untreated odorous soil;
 - Trucks carrying excavated materials will be covered and decontaminated in the wheel wash facility before exiting the excavation enclosure (as applicable) and exiting the Site;
 - Trucks carrying contaminated materials will be covered prior to exiting the Site and will remain covered until authorised to unload at the destination;
 - Trucks will be fitted with seals to ensure that the movement of potentially saturated materials is undertaken appropriately;
 - Trucks will not wait in the streets surrounding the Site or within the CBD;
 - Trucks will exit the Site through predetermined exit points on Hickson Road and will follow a predetermined transport route to the destination

(landfill or other) via Sussex Street, Anzac Bridge and the City West Link or across the Harbour Bridge;

- Truck trailers will also be covered with a waterproof tarpaulin to mitigate the potential ingress of rainwater during transportation and to assist in protecting the integrity of the foaming agent;
 - The truck will be inspected prior to leaving Site to ensure that the mitigation measures described above have been appropriately implemented;
 - Where possible, the selected transport route(s) will avoid travel through residential areas;
 - Contingency measures will be developed and implemented to manage potential risks associated with breakdowns, accidents or other emergency circumstances. This will include monitoring of trucks using Global Positioning System (GPS) and development of actions to respond to breakdowns and accidents and to ensure soil transport is accomplished in accordance with the mitigation measures described above; and
 - Photographs will be taken regularly to confirm that the above works have been conducted appropriately.
- The Air Quality Management Plan would also include:
 - the implementation of best available control technology and best environmental practice to ensure emissions are being reduced to the maximum extent achievable for all air pollutant generating activities;
 - an ambient air monitoring program and reactive management strategy, including real-time meteorological monitoring, continuous particulate and VOC monitoring for management purposes, fit for purpose odour monitoring, and the implementation of appropriate triggers to further develop the reactive management strategy for air pollution mitigation;
 - details of all proposed air quality emission control measures including:
 - timeframe for implementation of all identified emission controls;
 - key performance indicator(s) for emission controls;
 - monitoring method(s) including location, frequency and duration;
 - response mechanisms;
 - responsibilities for demonstrating and reporting achievement of key performance indicator(s);
 - record keeping and complaints response register; and
 - compliance reporting.

The above mitigation measures are supplementary to those listed in Section 9 of the EIS. No further additional mitigation measures are required or are proposed.

In addition to the above supplementary measures, the following mitigation measures are proposed to be amended:

- The reactive management plan described in the EIS will be limited to PM₁₀. VOCs and NO₂ are no longer proposed to be subject of a reactive management plan.
 - VOCs have been removed as a result of discussions with the EPA, where it has been agreed that hand-held photoionisation detection (PID) is more reliable. As such, the continuously monitored reactive management triggers for VOCs have been removed and daily PID has been added as part of the air quality monitoring program.
 - NO₂ was included in Table 11 (Section 9) of the EIS erroneously, and was not a recommendation of the AQIA.

5.0 Conclusion

The proposed remediation at Block 5, Barangaroo Central is State Significant Development which will remove the principal sources of contamination within Block 5 thereby enabling the future removal of the EPA Declaration over Block 5.

An EIS was prepared for the SSD DA, and has been publicly exhibited, in accordance with the relevant provisions of the EP&A Act. Submissions have been received from NSW Government authorities (EPA, Transport for NSW, OEH, DPI, Fire & Rescue NSW and NSW Health), City of Sydney Council, Sydney Water and Jemena.

This RTS Report responds to all of the issues made in the submissions. It provides further justification, explanation and clarification in order to address the issues raised in submissions. With respect to air quality, noise and water quality issues raised in submissions further assessment or clarification has been provided in updated assessment reports. The updated assessment reports have not resulted in any substantial changes to the outcomes of the assessments.

Issues raised by the EPA in relation to air quality impacts have resulted in the inclusion of additional mitigation measures predominantly relating to:

- Air quality and odour mitigation measures to be implemented for Remediation works that cannot be carried within an excavation enclosure, being the perimeter retention wall works.
- Air quality and odour mitigation measures during the off-site transportation of the contaminated materials.

It is highlighted that a number of submissions include requests for further consultation and approval of detailed designs, or recommended conditions of approval. Except where explicitly stated in this RTS Report (including **Appendix A**), Lend Lease do not object to the imposition of the recommended conditions of approval or any conditions which require further consultation and approval of details designs as requested by the agencies.

The assessment of the proposed Block 5 remediation works has demonstrated that the implementation of robust and comprehensive management measures during the carrying out of works will ensure significant adverse environmental impacts do not occur.