Barangaroo Delivery Authority

Harbour Control Tower Removal Works

Air Quality Management Plan

Barangaroo
Hickson Road, Sydney NSW

3 July 2014
43083-55789 Revision B
JBS& Australia Pty Ltd

www.jbsg.com.au

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List of Abbreviations

A list of the common abbreviations used throughout this report is provided below.

- ACM Asbestos Containing Material
- AQMP Air Quality Management Plan
- AMP Asbestos Management Plan
- BDA Barangaroo Delivery Authority
- BPL Baulderstone Pty Ltd
- CFEMP Construction Framework Environmental Management Plan
- DECCW NSW Department of Environment, Climate Change and Water
- DP&I NSW Department of Planning and Infrastructure
- DP Deposited Plan
- EPA New South Wales Environment Protection Authority
- JBS JBS Environmental Pty Ltd (now JBS&G Australia Pty Ltd)
- LOR Limit of Reporting
- MCoA Minister's Conditions of Approval
- PM10 Particulate Matter less than 10 microns in diameter
- SoC Statement of Commitments
- WMP Waste Management Plan

1 Introduction

JBS&G Australia Pty Ltd (JBS&G) was engaged by Barangaroo Delivery Authority (BDA) to prepare an Air Quality Management Plan (AQMP) for the works associated with the decommissioning and demolition of the Harbour Control Tower (the tower) that is present at the eastern portion of the Headland Park area of the Barangaroo development site located at Hickson Road, Sydney, NSW, 2000 (**Figure 1**). The AQMP is required to monitor and control potential air emissions that may migrate from the decommissioning / demolition program proposed for the tower and its surrounding area. This AQMP is also outlines mitigation strategies required to be implemented during the various stages of removal works to minimise particulate emissions to the maximum extent practicable.

1.1 Purpose

Barangaroo (formerly East Darling Harbour) is a 22-hectare area of Sydney's harbour foreshore immediately adjoining the western edge of the Sydney CBD which has been identified for urban renewal by the NSW State Government. The site has been divided into three redevelopment areas - the Headland Park, Barangaroo Central and Barangaroo South.

The Barangaroo Headland Park involves the creation of a new parkland area and northern cove adjacent to Hickson Road. Baulderstone Pty Ltd (BPL) is contracted to the Barangaroo Delivery Authority (BDA) to undertake the Headland Park works, which is referred to hereafter as the site. Included in the site is the now unoccupied Harbour Control Tower.

The Barangaroo Project Site details are summarised in **Table 1.1** and described in more detail in the following sections.

Table 1.1: Summary Details for the Barangaroo Project Site

Lot/DP	Lots 1, 3, 5 and 6 of Deposited Plan 876514, including adjacent parts of Sussex Street, Hickson Road and Towns Place
Address	Hickson Road, Millers Point NSW
Local Government Authority	City of Sydney
Site Zoning	Zone B4 Mixed Use and RE1 Public Recreation
Current Use	Vacant / Roadway
Geographical Co-ordinates, Elevation	Easting – 333643m E, Northing – 6251851m S, 2-3m AHD
Site Area	Approximately 22 ha

As a part of the site development works, it is required that the tower be decommissioned and removed. The area of the tower is shown relative to the Headland Park Site on **Figure 1**.

This Air Quality Management Plan (AQMP) forms part of the construction environmental management documentation for the Port tower project. The AQMP provides specific management measures to ensure that the decommissioning and demolitions works associated with the removal of the Harbour Control Tower have minimal Air Quality impact and risks, and where possible, enhanced environmental outcomes.

This AQMP is designed to sit within the context of the Construction Environmental Management Plan for the purposes for the removal of the Harbour Control Tower site located adjacent the main area of the Barangaroo Headland Park development site. The plan is required to:

- Include management measures, procedures, monitoring, auditing and reporting requirements and allocates responsibility in relation to construction phases of the project to minimise particulate emissions during the works to the extent practicable; and

- Provide measures that will be used to manage environmental risk and opportunities including provision for reactive management of potential air quality issues.

1.2 Project description

The location of the Harbour Control Tower is shown on **Figure 1**. The project is simply to decommission the services to the Tower, and then facilitate the demolition of the Tower. Subsequent to the demolition, the footprint of the Tower will be incorporated within the Headland Park construction to the west of the Tower.

1.3 Scope of AQMP

This plan addresses Air Quality issues and risks associated with the decommissioning and demolition of the tower and any impacts which are influenced by the removal methodologies and staging. The AQMP will provide mitigations strategies required minimise particulate emissions to the maximum extent practicable. It covers all areas where physical works will occur, or off-site areas that may be impacted by works. Potential air quality impacts of fibre and particulate impacts have been identified during a qualitative assessment of the project.

This AQMP is designed to sit within the context of the Construction Environmental Management Plan as prepared for the decommissioning and demolition works as supplemental to the overall Headland Park construction.

1.4 Objectives

The objectives of this AQMP are:

- To minimise adverse air quality impacts to the maximum extent practicable – including particulates and potential asbestos fibre emissions from the tower removal works;
- Meet the environmental performance objectives of the Barangaroo Delivery Authority;
- Ensure compliance with relevant environmental legislation; and
- Ensure environmental risks associated with the tower removal activities are properly managed.

This plan is not a static document and will be reviewed and updated by the key project personnel throughout the construction programme.

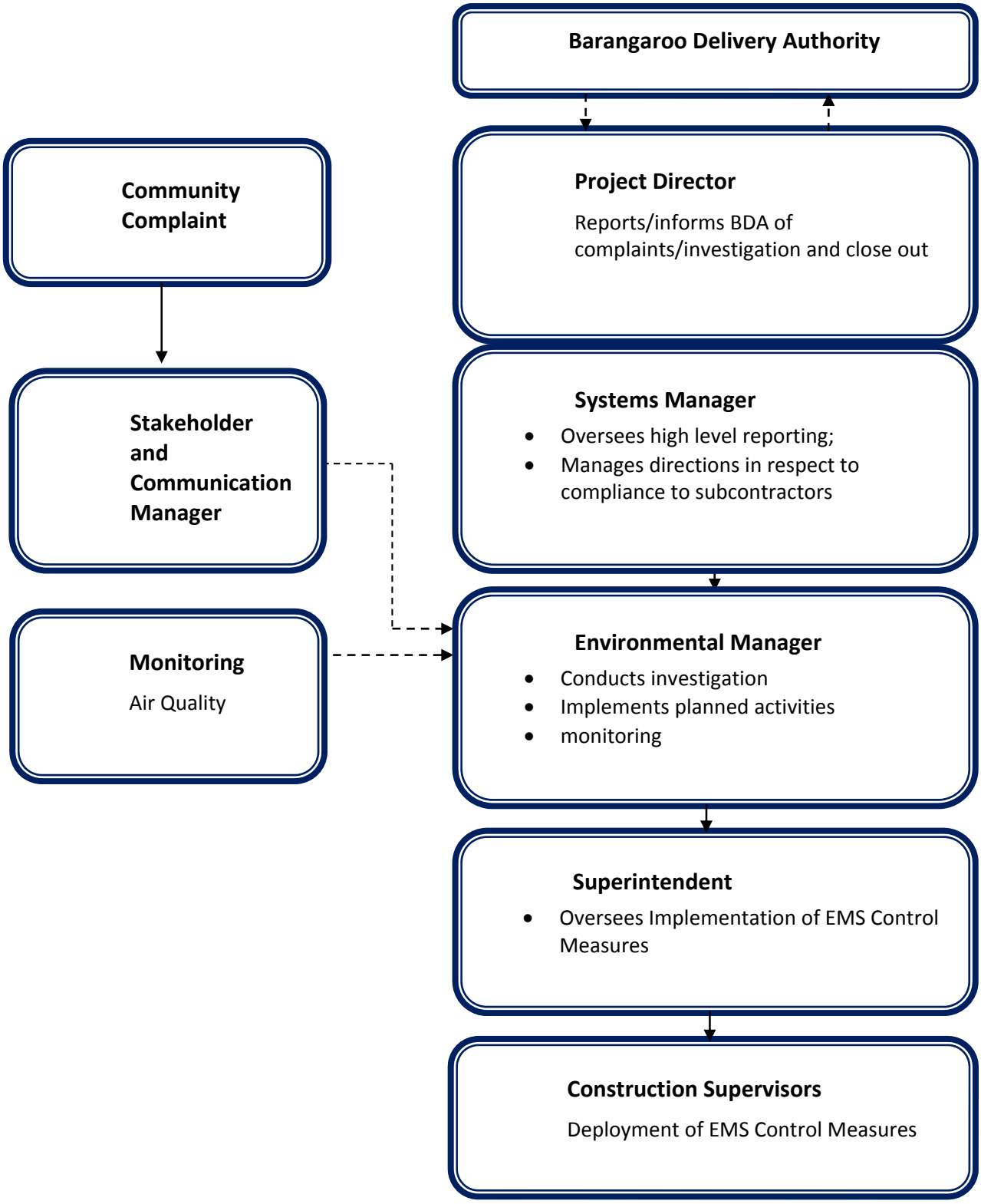
1.5 Key Issues

The existing air quality around the project area is influenced by emissions from commercial and residential land uses, and transportation sources.

Emissions of particulates are considered possible as a result of the anticipated activities associated with the tower removal works. A range of management/mitigation measures are required to be implemented to minimise these emissions to the extent practicable. Monitoring of key air quality parameters is additionally required to provide information to site personnel to assist in the day to day management of air quality impacts and also be provided to the public as part of transparent and open community involvement.

2 Roles and Responsibilities

The following flow chart outlines the roles and responsibilities of the project for implementing this plan.



3 AQMP Compliance

3.1 Statutory Requirements

Statutory Requirements are detailed in the below list;

Protection of the Environment Operations Act 1997 (NSW) states:

- "Must not cause air pollution from construction plant (sis 124 and 125), dealing with materials – including movement of soil and construction materials (s 126) or cause emission of air pollutants (s 128) as a result of activities – including dust generation from earthworks, clearing or grubbing activities"; and
- "Must not allow soil or dust to be deposited or blown onto a public place (s 145)".

Protection of the Environment Operations (Clean Air) Regulation 2002 (NSW) states:

- Vehicles must not emit visible air impurities for a continuous period of 10 seconds or more (clauses 8 and 9).

NSW EPA - Approved Methods for the Sampling and Analysis of Air Pollutants in NSW identifies:

- Relevant Air Quality Sampling Requirements.

NSW EPA - Approved Methods for the Modelling and Assessment of Air Pollutants in NSW

- Relevant Air Quality Modelling Requirements.

3.2 Environmental Licence Conditions

The AQMP has been prepared to satisfy the relevant conditions of Environment Protection Licence (EPL) 13336 as issued to the Barangaroo Delivery Authority. **Table 3.1** following summarises each of the relevant requirements of the EPL and the compliance of the site works.

Table 3.1: AQMP Requirements as Required by Environmental Protection Licence

Condition Number	Issues to be addressed in development of EPL (EPL 13336)	Where addressed in this AQMP
O3	Prevention of visible dust emission beyond site boundaries	Section 8.2
M1	Monitoring records to be retained	Section 8.5
E1	Site wide air emissions reports to be issued 30 days after commencement of works and monthly thereafter	Section 8.5
E3.1	AQMP to be developed with air emission controls	Section 7
E3.2	Monitoring plan to be developed. Including: • Real time particulate monitoring sites; • Establishment of a suitable number of PM10 monitoring sites; • Ambient monitoring sites to monitor chemicals known to be present in contaminated soil; • Real time meteorological station	Sections 8.1, 8.2, 8.3 and 8.4
E3.2	Reactive management strategy to be developed including: • Hourly review of real-time monitoring data; • Monitoring trigger levels and appropriate trigger actions to prevent exceedance of air quality criteria; • Review of monitoring activities, trigger levels and mitigation actions	Sections 4 and 9
E3.4	On-site meteorological weather station. Requirement for site inspections to occur: • Where wind speed exceeds 8 m/s during working hours; and • Where wind speed exceeds 8m/s as averaged over a 1 hour period in an easterly direction during non work hours.	Section 9
E3.6	Notification to EPA of exceedances, management and rectification within 2 days	Section 8.5

4 Environmental Criteria

A qualitative assessment has been undertaken of the potential for air emissions from the demolition of the Harbour Control Tower. Potential air emissions have been identified as:

- Particulates as associated with the demolition of building materials (i.e. concrete); and
- Potential respirable fibres where asbestos containing materials potentially present in the Tower are improperly handled and / or demolished.

The criteria to be used in the assessment of particulate and potential respirable fibre impacts, as discussed through further sections of this report, are summarised following in **Table 4.1**.

Table 4.1: Air Quality Criteria for Monitoring at Headland Park Main Works (inc. the tower site)

Pollutant	Criteria		Averaging Period
PM10	**Ppm**	**µg/m^3**	
	N/A	50	24-hour
	N/A	30	Annual
Dust Deposition	**g/m^2/month**	**g/m^2/month**	
	2 (increment)[1]	4 (total)[1]	Monthly (as with units)
Respirable fibres	Fibre / ml		
	0.1		4 hours

Note: 1. The 4g/m2/month is the maximum total allowable dust deposition due to all sources when there are no bench mark criteria available. The 2g/m2/month is the maximum dust deposition allowable from project sources.

5 Communication Strategy

The real-time monitoring of particulates and respirable fibres will enable the immediate dissemination of data to the community and relevant stakeholders. Of paramount importance, the collected and collated data will be used by site personnel in the pro-active day to day management of impacts, as specifically described in the Reactive Management Strategy provided as **Section 9**.

Secondly, and in line with the sustainability (community) goals for the Project, data will be available to the public. Data will be provided on a dedicated website, or hosted on the BDA website in a format that is usable and digestible by the public.

6 Environmental Management

Refer to the main body of the CFEMP and for details regarding:

- Consultation and approval requirements;
- Organisational structure;
- Roles and Responsibilities;
- Sub-contractor and suppliers; and
- Authorities and stakeholders.

Specific responsibilities as attached to each mitigation action and monitoring and reporting requirement are detailed throughout **Sections 7**, **8** and **9**.

7 Environmental Issues and Controls

7.1 Environmental Risk Assessment

Core activities associated with the removal of the tower which facilitate risks associated with Air Quality are:

- Decommissioning / demolition works, structure and infrastructure removal and removal of tower foundations;
- Stockpiling and handling activities related to materials sourced on-site; and
- Potential minor on-site excavations, this includes sandstone and soil excavations.

Primary risks associated with the above mentioned activities are;

- Dust pollution; and
- Other particulate generation, particularly asbestos fibres, as consequent of potential impacted materials present in the construction of the tower and its associated infrastructure.

7.2 Mitigation Measures

Mitigation measures have been designed for each of the potential sources of environmental emissions as identified in **Section 7.1** and outlined in **Table 7.1** following**.** These measures will ensure that dust and / or asbestos fibre emissions will be minimised to the maximum extent practicable during various processes associated with the stages of the removal works.

Table 7.1: Mitigation Measures to Prevent / Minimise Air Emissions from Works

Activity	Mitigation Measures	Timing			Accountability
		Pre-Works	During Works	Post-Works	
Masonry demolition including (but not limited to): • Site foundations • Site structural supports • Sandstone cutting (as required)	Directional water sprays and mist units to minimise particulate generation during works which are noted to be producing dust.	■	■		Project Engineers Foreman
	Minimisation of working areas where possible to control potential dust generation and limit worker traffic through these areas where possible.		■		Project Engineers Foreman
	Undertake demolition works with high potential for particulates during periods where wind direction is onto the Headland Park construction site (i.e. easterly).	■	■		Project Engineer
	Use of demolition methods appropriate to the specific task to minimise particulate generation where possible.	■	■		Project Engineer
Asbestos containing materials including (but not limited to): • Internal sheeting • Insulated service corridors	Use of accredited contractors to remove asbestos containing materials. These contractors will also provide best practice guidance and / or supervision for the removal of asbestos containing materials.	■	■		Project Engineer
	Removal and off-site disposal of asbestos containing materials prior to other demolition works. This should be done in conjunction with NSW WorkCover protocols for the removal and disposal of asbestos containing material.	■	■		Project Engineers Foreman

Activity	Mitigation Measures	Timing			Accountability
		Pre-Works	During Works	Post-Works	
	Wrapping of asbestos containing materials consistent with relevant safety and disposal requirements.		■		Foreman
Soil excavation including (but not limited to): • Removal of soil around services / foundations	Directional water sprays and mist units to minimise particulate generation particularly if excavated materials are noted to be dry during removal works.	■	■		Project Engineers Foreman
Unexpected Finds remediation / management including (but not limited to): • Buried ACM products • Damaged service conduits	Sampling and analysis to characterise environmental characteristics of material and identification of any unique air quality risk in accordance with the relevant sampling guidance.		■		Environmental Manager
	On-site delineation of location and potential extent of material associated with unexpected find.		■	■	Environmental Manager
	Provide equipment for spillage clean up.	■	■		Environmental Manager
Stockpiling and soil / demolition material handling including (but not limited to): • Stockpiled material awaiting classification / removal	Directional water sprays and mist units to minimise particulate generation.	■	■		Project Engineers Foreman
	Stockpile left in place overnight / > 24 hours to be covered using weighted tarpaulins / plastic covers or equivalent		■	■	Project Engineers Foreman
	Minimise stockpile working face.		■		Project Engineers Foreman
	Stabilise any exposed site surfaces to minimise potential for fugitive dust		■	■	Superintendent Foreman
Removal of materials from site including (but not limited to): • Demolished building materials • Site soils • Remediated materials	Construction and ongoing maintenance of a trackout control device ('cattle grid') to ensure that inappropriate material is not inadvertently moved offsite	■	■		Superintendent Foreman
	Do not overfill vehicles such as to create a potential that dust and / or ACM can be blown off loads.		■		Foreman
	Cover all loads with tarpaulin prior to movement.		■		Foreman
	Availability of roadway sweeper vehicles to remove any sediment / particulates as accumulated form wheel tracks on public roads.		■	■	Superintendent Foreman
Heavy equipment operation including (but not limited to): • Excavators • Bulldozers • Dump Trucks • Material removal trucks	Inspection of exhaust emissions to identify excessive visible exhaust emissions. Where visible / excessive emissions identified, decommissioning of equipment and undertaking maintenance.	■	■		Foreman
	Ensure FEL and excavator exhausts away from ground.	■	■		Foreman
	Regularly inspect the site for spillages		■	■	Foreman
	Provide equipment for spillage clean up.		■	■	Superintendent Environmental Manager

8 Air Quality Monitoring

8.1 Air Quality Monitoring Programme

As per the qualitative assessment of potential air emissions for the Harbour Control Tower site and the air quality controls as identified in **Section 7**, air quality monitoring will be required for:

- Particulate emissions, occurring as airborne and deposited particulates as summarised in **Tables 8.1**;
- Respirable fibres including asbestos fibres as summarised in **Table 8.2**; and
- Meteorological data as summarised in **Section 8.3**.

Reference should also be made to relevant monitoring plans for the Barangaroo Headland Park which shows relevant locations of fixed monitoring equipment already present as a part of the site AQMP prepared and currently implemented for these works.

The Environmental Manager is responsible for all aspects of environmental monitoring. However environmental monitoring activities may be undertaken by a range of environmental consultants / trained technicians at the discretion of the Environmental Manager.

8.2 Dust Pollution

Real time particulate monitoring has been identified in the air quality impact assessment as being an integral component of the management of air emissions from the proposed removal works. The following particulate monitoring is proposed for the works.

8.2.1 Tapered Element Oscillating Microbalance (TEOM)

Two (2) static Tapered Element Oscillating Microbalance (TEOM) are currently located and operated at two (2) different locations across the Barangaroo Headland Park site:

- Moores Wharf; and
- Hickson Road near to the Cruise Passenger Terminal.

Tapered Element Oscillating Microbalance (TEOM) units measure PM10 concentrations in realtime, are an approved NSW OEH reference method (AM 22) and Australian Standard method (AS 3580.9.8-2008). TEOM units log and report data on a continuous basis throughout the course of the works and will be the main certified particulate monitoring tool.

The TEOM Units will require to continue to be operated during the Harbour Control Tower demolition works. Potential impacts of the Tower demolition works will require to be assessed by consideration of existing levels of impact associated with the Headland Park construction works and by consideration of wind directions from the Harbour Control Tower as relative to the location of the TEOM units.

8.2.2 Portable DustTrak Units

In addition to the static TEOM units, portable DustTrak units are currently being used to undertake continuous dust monitoring at the Headland Park site boundaries. This includes areas in proximity of where the tower removal works are being undertaken.

It shall be ensured that this dust monitoring is continued during the Harbour Control Tower demolition works. Additional DustTrak monitoring locations shall be undertaken in proximity of the Harbour Control Tower site during demolition works here. The actual locations of dust monitoring will be determined depending on areas of potential particulate emissions (i.e. location of stockpiles, demolition works etc). As a minimum, each round of DustTrak monitoring shall comprise:

- One sample location taken at a representative upwind / background location to the Headland Park / Harbour Control Tower demolition works; and
- At least one distinct 'downwind' location on the site boundary near the works area. As well as the location of site activities, the selection of DustTrak 'downwind' locations shall be cognisant of the location of site receptors and prevailing meteorological conditions.

DustTrak monitoring shall be undertaken at these locations on an hourly basis throughout all operational periods of the site works. The 'upwind' sample location is required to establish the background contribution to levels of particulates. All 'downwind' measurements shall be reported as subtracted from the 'upwind' sample location. Generally the wind at the site occurs in an easterly direction.

DustTrak measurements shall be taken over a minimum period of ten minutes. The 10 minute averaged concentration shall be assessed. Where this exceeds 50 µg/m3 as attributable to site activities (assessed as the difference of the measured reading and the 'upwind' sample location), then the Environmental Manager shall be immediately notified and air quality controls implemented. The recommendation of air quality controls must be cognisant of the whether the Harbour Control Tower works or the Headland Park works are the source of the dust / particulate emissions.

Presumably subsequent to the implementation of air quality controls, the measurement shall be repeated within 30 minutes.

Data from the DustTrak units, as available in real-time, will facilitate reactive management of potential exceedances of project particulate criteria. This allows site personnel to identify if activities onsite are causing elevated particulate concentrations and whether these concentrations represent compliance risks or a threat of nuisance to the local community. If activities are identified as potentially giving rise to offsite impacts, works will be managed as per the available controls, or potentially ceased until more favourable meteorological conditions are available.

The DustTrak unit shall be 'check calibrated' to a TEOM unit at least on a weekly basis to ensure that representative PM10 data is obtained by the DustTrak.

Table 8.1: Summary of Requirements for Real Time Particulate Monitoring to Facilitate Reactive Management

Parameter	PM10
Location	At least one location upwind at site boundary. At least one locations downwind, considering location of material handling / potential dust generating activities at site boundary.
Frequency	Each round of measurements (two measurements in total) to be undertaken hourly through duration of dust generating works. Measurements subsequent to exceedance identification and 'reactive management' of activity to be undertaken within 30 minutes of implementation of air quality control.
Technique	Operation of instrument in accordance with manufacturer instruction. Instrument to be located on tripod at height of 1.6m above ground level. Instrument to be operated for period not exceeding 10 minutes and average concentration to be obtained.
Criteria	50 µg/m^3
Reporting	Record on daily field observations sheet. Exceedances of criteria to be reported to Environmental Management / Site Foreman immediately.
Responsibility	Environmental Manager
Duration	All Construction Works.

8.2.3 Dust Deposition Monitoring

Dust deposition monitoring is currently being undertaken at up to a total of three locations distributed along the boundary of the Headland Park works site (including at the two TEOM locations).

It is recommended that an additional dust deposition monitoring location is located near to the Harbour Control Tower works for the duration of the demolition works only.

Table 8.2: Summary of Requirements for Dust Deposition Monitoring

Parameter	Deposited Dust
Location	Existing Headland Park Locations and one additional location in close proximity of the Harbour Control Tower
Frequency	Continuous operation during all demolition works with the potential to release particulates
Technique	Preparation of sample collection device by NATA accredited laboratory. Analysis of sample collection device by NATA accredited laboratory on monthly basis.
Criteria	2 g/m2/month as attributable to Headland Park works. Levels to be considered with airborne levels as reported by continuous particulate monitoring.
Reporting	Monthly measurements to be reported.
Responsibility	Environmental Manager
Duration	All Construction Works.

8.3 Asbestos

Asbestos containing materials will potentially occur in material being removed during the tower decommissioning and demolition works. Particulate monitoring, and maintenance of PM10 levels to the nominated site action criteria, is considered to be effective in managing any risk as may be posed by respirable fibres. Where asbestos containing materials are identified during the proposed works, whether in fill material or building products, exposures and handling of these products will require to be managed in accordance with the Asbestos Management Plan (AMP) which has been provided as **Appendix A**.

A substantial respirable fibre monitoring program is currently being undertaken with the Headland Park construction works. It is recommended that this program is extended to the proximity of the Harbour Control Tower for all works which potentially include the handling of asbestos containing materials.

Respirable fibre monitoring is proposed to be undertaken in proximity of the Port Control works during asbestos handling activities consistent with the following:

- At least one additional daily static location shall be established for air sampling for respirable fibres in proximity of the Harbour Control Tower and undertaken in accordance with a method consistent with NIOSH method 7400;
- Analysis of respirable fibres shall be undertaken by a NATA accredited laboratory by a PCM method to report a concentration of respirable fibres; and
- Any detection of respirable fibres shall be assessed by a scanning electron microscope method by a NATA accredited laboratory to confirm the presence of asbestos fibres; and
- The concentration of asbestos fibres shall be compared to the action criteria. Where an action criterion is exceeded, all works shall be ceased and asbestos contaminated materials removed from site as per strict controls.

Table 8.3: Summary of Requirements for Respirable Fibre Monitoring

Parameter	Respirable Fibres
Location	Existing Headland Park respirable fibre monitoring locations. At least one additional location in close proximity of the Harbour Control Tower demolition works
Frequency	Daily during site operations involving the handling of asbestos containing materials
Technique	Sampling in accordance with NIOSH Method 7400. Sampling undertaken for a minimum period of four hours. Analysis for fibres by PCM by NATA accredited laboratory. Re-analysis of fibres in exceedance of action criteria by scanning electron microscope (SEM) by NATA accredited laboratory to confirm asbestos fibres.
Criteria	0.1 fibres/ml as asbestos fibres and attributable to site works.
Reporting	Daily report on receipt of laboratory results to Environmental Manager
Responsibility	Environmental Manager
Duration	All Construction Works.

8.4 Meteorological Data

A weather station has been established for the duration of the entire project works at the south west corner of the Headland Park work site. The weather station comprises as a minimum:

- A 10m high anemometer to measure wind speed and direction;
- Measuring instruments appropriate to assess temperature, humidity, air pressure and rainfall;
- Data logging capabilities to allow collection of at least hourly readings; and
- Telemetric modem with programming capability to allow alarm conditions to be notified to nominated Project Computer.

Meteorological data shall continue to be monitored throughout the Harbour Control Tower demolition works and shall be considered in the assessment of monitoring results from the

works. Further, the meteorological station shall be used to indicate when meteorological conditions are favourable for potential air emissions from the Harbour Control tower works to be directed into the adjoining Headland Park site.

8.5 Reporting

Air monitoring reports will be prepared by the demolition contractor and will meet the same reporting requirements as required for Headland Park. This includes daily reports of all air monitoring undertaken and monthly reports summarising all air quality monitoring for the purposes of NSW EPA review / comment.

Each monthly report requires a 2 page summary of major findings / measurements as appropriate for public issue. All reports are certified by the appointed environmental monitoring consultant as being appropriately accurate and representative of all measurements undertaken.

Monthly reports include:

- All 'raw data';
- Identification of any air quality exceedances and description of 'reactive management' strategy implemented; and
- Identification of any correlations between meteorological conditions and potential exceedances of air quality criteria.

Data requires to be presented in accordance with the requirements of **Section 4**.

As consistent with the Headland Park works, implementation of reactive management actions, and/or exceedances of air quality criteria, as related to the Harbour Control Tower works require to be reported to the NSW EPA within two days.

8.6 Responsibility

All monitoring shall be undertaken by specialised and appropriately qualified environmental consultants / technicians as engaged by the Demolition Contractor and controlled by the Environmental Manager.

8.7 Duration

Air quality monitoring shall be undertaken for the duration of the tower removal works and any associated earthworks that may also be carried out in the area.

9 Reactive Management Strategy

A monitoring program has been developed in **Section 8** which will be sufficient to identify potential conditions where air quality exceedances may occur. **Table 9.1** following identified each of the conditions which may trigger a reactive management action, and the proposed management actions to be considered.

The Site Superintendent, Environmental Manager, Project Engineers and/or Site Foreman will be responsible for the assessment of the potential air quality exceedance and selection of the appropriate management action(s). As outlined in the monitoring requirements, where a particulate measurement has triggered a reactive action, the management approach must be assessed within 30 minutes of implementation by an additional measurement.

Table 9.1: Summary of Reactive Management Strategy

Parameter / Emission	Trigger Condition	Measurement Method	Management / Mitigation Actions
Particulates	50 µg/m^3 PM10 averaged over 10s and attributable to site	DustTrak	Management in accordance with soil excavation / stockpiling mitigation measures. Increase in frequency of water application. Decrease in extent of working area and covering of remaining exposed areas. Construction of temporary wind breaks / covered batters. Cessation of works until favourable meteorological conditions.
Wind speed	Wind speed >8m/s during site operation	Meteorological Station	Site inspection with DustTrak measurements downwind of active works area.
Wind speed and direction	Average wind speed (1 hour) > 8m/s and wind direction to east	Meteorological Station	Site inspection with DustTrak measurements downwind of exposed areas on site.

10 Training and Resources

Potential air quality issues will require to be included in the site induction for the site workforce engaged in the tower removal works. The site is politically sensitive and the induction must be cognisant of the public perception of air emissions from the site.

A summary of training and resource requirements to implement the AQMP is provided in **Table 10.1** following.

Table 10.1: Summary of Training and Resource Requirements

Training
Induction to address: • Personnel obligations. • Air quality goals and air emission mitigation procedures. • Relevant matters in the mitigation measures section. Environmental Manager to provide specific briefing/instruction to: • Designers and Project Engineers – monitoring program and selection of mitigation measures. Toolbox talks to be conducted on: • Ongoing housekeeping requirements and effectiveness / requirement for mitigation measures. • Previous days air quality results (including respirable fibres).
Resources
• Air Quality Monitoring Consultant / Technicians • Air quality and meteorological monitoring equipment • Asbestos identification (hazardous materials building survey) • Water supply for dust control • Water sprays / misting systems • Plastic covers / tarpaulins for stockpile covering • Tippers / dump trucks with bin covers

11 Consultation and contacts

Table 11.1: Summary of Regulatory Authorities / Stakeholders

Consultation	
Agencies / Stakeholders	**Details / Outcomes**
Environmental Protection Authority	Comments to be considered in revision of sub-plan.
Barangaroo Delivery Authority	Comments on draft incorporated into Revision 2 of this management plan.
Department of Planning	Final approval required. Review and approval of JBS (2012) required.

Table 11.2: Summary of Contact Details

Contact details			
Position / Role	**Organisation**	**Name**	**Phone**
Environmental Manager	BPL	TBC	TBC
Environmental Monitoring Consultant	TBC	TBC	TBC

12 Complaints handling and incident response

Strategies for dealing with community issues, including complaints, are addressed in the Communication Management Plan (CMP). This plan details the process for receipt, management, address and actioning the various forms of communication from stakeholders to the project.

As described in the CMP for the Barangaroo Headland Park work, all community enquiries will be registered in the BPL database. Any actions that cannot be managed immediately are assigned to the appropriate construction personnel, and will become an outstanding action in the database. The action remains outstanding until it is closed off by a team member.

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

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

Potential air quality 'incidents' and proposed responses are summarised in **Table 12.1** following.

Table 12.1: Summary of Incidents and Proposed Responses

Incident type	Response	Responsibility
Environmental incidents including: • Improper handling of asbestos containing material • Inadequate application of air quality controls and visible air emissions from site. • Potential breach of licence, permit or approval requirement. • Potential breach of legislative requirements.	Implement the Emergency and Response Plan which should provide references to: • Criteria for classifying of environmental incidents. • Processes for systematically responding to and managing emergency situations. • Processes for notification of an environmental incident internally within the project team, to the BDA and in accordance with s.147 of the POEO Act. • The requirements of Part 5.7A of the POEO Act. All environmental incidents will be followed up and investigated to ensure that all agreed actions are appropriately completed and closed out.	Construction Manager Superintendent Environmental Manager
Unexpected find of potentially contaminated fill	The material is to remain in-situ and the Environmental Manager contacted immediately. The unexpected finds procedures are to be implemented. Depending on the time between testing and the provision of results, this may require segregation of the material by the installation of a temporary bund and the placement of a cover to ensuring the potential for chemical / malodorous emissions is minimised. The material will be tested and classified in accordance with Waste Classification Guidelines. Subject to the outcome of testing and classification, targeted air quality controls will be designed for the storage / handling of the material as required. In the event widespread contamination (such as the occurrence of ACM in fill material) is encountered during the site works, protocols outlined in the Asbestos Management Plan (AMP) provided as **Appendix A** will require to be implemented to ensure that potential exposures to ACM products are managed appropriately.	Construction Manager Superintendent Environmental Manager

Figure

Source: Base Image - www.nearmap.com

0 25 50 100 m

Scale: 1:2,250

Datum: MGA94 Zone 56 - AHD

Rev	Description	Drn.	Date
A4			
A	Issue - R01	RF	10-10-2013

Legend:

- Permanent Air Quality Monitoring Location - Proposed

Permanent Air Quality Monitoring Locations - Current

- Continuous Particulate Monitoring (2)
- Dust Deposition Gauge (3)
- Meteorological Monitoring (1)
- Control Tower Area

JBS&G

Figure 1: Current & Proposed Air Quality Monitoring Locations for Control Tower Removal

Client: Barangaroo Delivery Authority

Project: Barangaroo Headland Park - AQMP

Job No: 43083 File Name: 43083_01

Appendix A – Asbestos Management Plan

Barangaroo Delivery Authority

Harbour Control Tower Removal Works

Asbestos Management Plan

Barangaroo Headland Park
Hickson Road, Sydney NSW

3 July 2014
43083-58154 Revision A
JBS&G Australia Pty Ltd

www.jbsg.com.au

Barangaroo Delivery Authority

Asbestos Management Plan

Harbour Control Tower Removal Works
Barangaroo Headland Park
Hickson Road, Sydney, NSW

3 July 2014
43083-58154 (Rev A)
JBS&G Australia Pty Ltd

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Figures

List of Abbreviations

A list of the common abbreviations used throughout this report is provided below.

ACM	Asbestos Containing Material (e.g. fibre cement sheet)
AMP	Asbestos Management Plan
bgs	below ground surface
CSM	Conceptual site model
DQOs	Data Quality Objectives
EMP	Environmental Management Plan
EPA	NSW Environment Protection Authority
HIL	Health based investigation level
JBS&G	JBS&G Australia Pty Ltd
OAMP	Operational Asbestos Management Plan

1 Introduction

1.1 Background

JBS&G (NSW & WA) Pty Ltd (JBS&G) was engaged by Barangaroo Delivery Authority (BDA) to prepare an Asbestos Management Plan (AMP) for works associated with the decommissioning and demolition of the Harbour Control Tower (the tower) that is present at the eastern portion of the Headland Park area of the Barangaroo development site located at Hickson Road, Sydney, NSW, 2000. The area of the tower is shown relative to the Headland Park Site on **Figure 1**.

The project is simply to decommission the services to the Tower, and then facilitate the demolition of the Tower. Subsequent to the demolition, the footprint of the Tower will be incorporated within the Headland Park construction to the west of the Tower. This AMP has been provided as an Appendix to *Harbour Control tower Removal Works – Air Quality Management Plan, Barangaroo Headland Park,* JBS&G Australia Pty Ltd July 2014 (JBS&G 2014).

This AMP is required to ensure that when ACM or asbestos impacted soils are being handled at the site, they are appropriately managed to ensure protection of the health of site workers and the neighbouring community. This AMP also outlines the requirements for disposal of any asbestos impacted fill materials encountered during the demolition works undertaken by the client. This AMP does not outline the requirements to remediate the site.

1.2 Objectives

The purpose of this AMP is to outline the required procedures for handling of ACM and asbestos impacted soils during the proposed demolition works to be undertaken by the client at the site; to outline the measures required to protect the health and safety of site workers who may encounter ACM or asbestos impacted soils whilst completing the planned works; and to prevent any adverse health effects on the neighbouring community in accordance with relevant National Codes of Practice and Work Health and Safety Legislation.

Specifically, the objectives are to:

- Outline, monitor and enforce safe working condition for all site workers;
- Outline, monitor and enforce safe environmental conditions for all persons outside of the site;
- Outline, monitor and enforce procedures to manage works within asbestos contaminated soils identified onsite during works;
- Outline measures for the safe onsite storage and, if required, off-site disposal of asbestos impacted materials in accordance with all relevant legal and statutory requirements; and
- Outline ongoing management requirements of the site to ensure that the risk posed by any potential asbestos impact at the site is properly managed.

2 Application of AMP and Responsibilities

2.1 Application of AMP

This AMP will apply from the commencement of the proposed demolition works if asbestos impacted materials are encountered at the site and until completion of the clients associated work at the impacted area of the site.

The responsibilities for site management with regards to any asbestos impacted soils present at the site outlined in **Section 2.2** apply only to the demolition works that encounter asbestos impacted materials.

2.2 AMP Responsibilities during Proposed Asbestos Related Works

2.2.1 Appointment of Principal Contractor

In accordance with the provisions of the *Work Health and Safety Regulation 2011,* a principal contractor shall be appointed for the proposed works.

It is understood that Baulderstone Pty Ltd (BPL) shall act as Principal Contractor for the site.

2.2.2 Responsibilities of the Principal Contractor

Responsibilities of the Principal Contractor include, but are not limited to the following. The Principal Contractor must:

- Be responsible for the proposed project work at all times until the work is completed;
- Ensure that all persons involved with proposed project work have undertaken occupational health and safety training;
- Keep records of induction training for site workers and any site specific training;
- Ensure that any subcontractors provide safe work method statements for the activities for which they are engaged;
- Monitor any subcontractors to ensure that they are complying with the safe work method statements; and
- Maintain a hazardous substances register for all hazardous substances used or present on site.

The Principal Contractor is responsible for co-ordinating health and safety activities for the project. Other responsibilities of the Principal Contractor include:

- Compliance with occupational health and safety and environmental legislation, regulations, standards, codes and the site-specific rules relating to safety contained in this AMP;
- Ensuring that sufficient funds are available to procure the necessary health and safety equipment such as personal protective equipment (PPE);
- Managing accident and emergency procedures;
- Managing workplace injury management and rehabilitation.
- The Principal Contractor has the authority to provide for the auditing of compliance with the provisions of this AMP, suspension or modification of work

practices, and administration of disciplinary actions for individuals whose conduct does not meet the requirements set forth herein.

2.2.3 Asbestos Consultant or Competent Person

An Asbestos Consultant or Competent Person as defined in the WorkCover NSW Code of Practice – *How to Safely Remove Asbestos* (2011), shall be engaged to assess any suspected asbestos containing materials when required. The asbestos consultant or competent person shall also complete airborne asbestos monitoring for the duration of significant intrusive works. Where necessary, the Asbestos Consultant or Competent Person will undertake a visual clearance inspection following the removal of asbestos impacted materials and provide a clearance certificate.

The Asbestos Consultant shall:

- Complete static asbestos air monitoring during all intrusive and ground disturbance works associated with asbestos impacted materials including excavation, transport and placement until such time that the final clearance inspection has been completed. All daily results of air monitoring activities are to be displayed or be readily available for the information of site workers;
- Provide on-site advice, if required, in relation to suspected ACM and the management of asbestos issues associated with the works;
- Be available, if required, for consultation with regards to the conditions and requirements of this AMP; and
- Complete a final clearance inspection following the removal/placement of asbestos impacted materials.

Should asbestos be encountered during the planned demolition works, clearance inspections and clearance asbestos air monitoring may be required to confirm the appropriate management of asbestos prior to re-occupation.

2.2.4 Licensed Asbestos Removal Contractor

A Class A (friable or non-friable) or Class B (non-friable only) licensed asbestos removal contractor shall be engaged to complete the works associated with any asbestos impacted material at the site encountered during the proposed works. The licensed asbestos removal contractor will be the primary person responsible and in charge for works on site involving ACM and/or asbestos contaminated soils. Their responsibilities include:

- Prepare a site specific Asbestos Removal Control Plan (ARCP) prior to any asbestos works being completed;
- Ensuring compliance with relevant legislation and the conditions of this AMP;
- Handling and management of ACM and/or asbestos contaminated soils at the site in accordance with relevant legislation;
- Ensure appropriate environmental and safety controls outlined in this AMP are maintained for the duration of the works;
- Assisting all site sub-contractors, where required, in complying with relevant legislation and the procedures outlined in this AMP;
- Completion of a final site walkover and removal of all visible ACM from the ground surface across the site.

3 Summary of Contaminant Type

Friable asbestos is defined by Safe Work Australia in the *Code of Practice – How to Safely Remove Asbestos* (2011) as being "…*material that is in a powder form or that can be crumbled, pulverised or reduced to a powder by hand pressure when dry, and contains asbestos".* This includes asbestos fibre impacted soils and asbestos fines as identified by laboratory analysis.

Non-friable asbestos material is defined by Safe Work Australia (2011) as being *"…material containing asbestos that is not friable asbestos, including material containing asbestos fibres reinforced with a bonding compound."*

Mechanical disturbance of fragments of ACM may result in the release of fibres and therefore, such activities should be managed to prevent any fibres becoming airborne. The health effects of asbestos are detailed in enHealth (2005)[1] *Management of Asbestos in the Non-Occupational Environment*.

The primary issue associated with the asbestos contamination is inhalation of respirable asbestos fibres if the materials were to be disturbed and abraded.

A secondary issue with asbestos contamination is disposal of excess spoil that may be impacted with asbestos.

[1] *Management of Asbestos in the non-occupational environment.* enHealth, 2005 (enHealth 2005)

4 Health and Safety Management

4.1 Safe Work Method Statements

Safe work method statements that must be prepared by the Principal Contractor or by sub-contractors completing significant intrusive works and also covering other aspects of the proposed project works not related to significant intrusive works, are to be prepared and approved by the Principal Contractor prior to those activities commencing.

Safe Work Method Statements must:

- Describe how work is to be carried out;
- Identify the safety risks;
- Describe the control measures that must be applied to the work;
- Describe the equipment used in the work;
- Describe any standards or codes applicable to the work; and
- Training and qualifications required of persons undertaking the work.

Safe work method statements for all workers must be reviewed and approved by the Principal Contractor.

4.2 Site Access Control

The Principal Contractor shall ensure that the area in which works are taking place is designated a construction area and that the construction area is securely fenced and that access is controlled. Entrance to the site will be via a dedicated entry point which will contain the following features in addition to site security measures as required for a construction site as per relevant health and safety provisions:

- Readily identifiable and delineated site access / egress point. Where possible this location shall be visibly identifiable by site fencing / barricading;
- Decontamination unit for all site personnel to remove PPE and dispose of contaminated articles and will also include a hand wash and boot wash facility. The decontamination unit will be located in close proximity of the designated site access / egress point;
- Signage including “No Entry Without Required PPE” and a contact number for members of the public to direct any queries / complaints; and
- Emergency contact details.

The overall construction site boundary will be secured by fencing. It is anticipated that localised active construction site access points may be delineated within the overall site boundaries. Access to the construction site will be controlled and permitted by the person in charge of the site only after persons entering the site have been advised of the potential contamination hazards. This shall include notification of the potential presence of asbestos containing materials and asbestos contaminated soils.

Any authorised person accessing the site should do so in accordance with health and safety requirements as indicated in this AMP. The implementation of the health, safety and environmental requirements should be administered by the Principal Contractor.

Site access will not be allowed until the site personnel have been inducted, have signed in, and have donned the required PPE (**Section 4.5**). Upon exiting the site, personnel must remove and dispose of/clean the PPE in the provided decontamination area.

Asbestos removal boundaries (if required) shall be determined by the Principal Contractor in consultation with the asbestos consultant and will vary according to the location and size of the required daily activities. Any asbestos removal boundaries will be designed to allow other site works not involving significant intrusive works to continue without being required to adhere to this AMP.

It may be found that the asbestos removal boundaries require to be assigned to the site boundaries, in which case all site workers must adhere to the requirements of this AMP.

4.3 Training and Certification

The Principal Contractor must not allow any person to carry out project works unless he/she is satisfied that the person has undergone OHS induction training.

The OHS induction training required by the Regulation is as follows:

- General occupational health and safety training for construction work;
- Work activity based health and safety training (job specific training); and
- Site-specific health and safety induction training.

For each person carrying out project works, for a period of three years, the Principal Contractor must keep a record of the following:

- A copy of relevant statements of OHS induction training, or a statement indicating that the Principal Contractor is satisfied that the relevant OHS induction training has been undertaken; and
- A brief description of the site-specific training undertaken by the person.

4.4 Site Safety Induction

It is the responsibility of the Principal Contractor to ensure that all persons carrying out construction work on site are given site-specific occupational health and safety training. The induction shall be undertaken by the Principal Contractor. The induction shall be undertaken as per a standard presentation which will address the following topics as per the requirements of this AMP:

- Identification of any site specific hazards and risk control measures in relation to potential asbestos impacts at the site;
- Regulatory requirements or codes of practice relevant to identified site specific hazards as restricted to asbestos impact;
- Directions on what to do if suspected asbestos containing materials or asbestos contaminated soils are encountered;
- Site orientation at least including location of asbestos decontamination areas at site access / egress points; and
- Site specific safety rules in relation to asbestos.

The Principal Contractor is responsible for establishing site specific safety rules. The rules must be displayed in an easily observable location (nominally in the site office) so as to ensure that all site workers, including any sub-contractors, have ready access.

At the completion of the Induction Presentation, each 'inducted person' shall be required to acknowledge that they have understood the requirements for the site works and health, safety and environmental obligations by completion of a Site Induction Form.

4.5 Personal Protective Equipment

Prior to any ACM or asbestos contaminated soils being disturbed, no additional PPE is required above the standard construction site PPE outlined by the Principal Contractor for the site. During any excavation, transport or placement of asbestos impacted materials, the following additional items of PPE are required in addition to the standard construction site PPE outlined by the Principal Contractor for the site, and applies for any ground workers within the asbestos work area, as defined by the Licensed Asbestos Removal Contractor:

- Disposable 'tyvek' coverall suits must be worn;
- Disposable gloves – non disposable gloves must be cleaned within the decontamination unit in accordance with Safe Work Australia (2011);
- P2 class respirator or higher – non disposable respirators must be cleaned in the decontamination unit in accordance with Safe Work Australia (2011); and
- Laceless steel capped rubber soled work shoes or gumboots.

Plant operators must close cabin doors and windows and set air conditioning to re-circulate when operating within the asbestos work area.

4.6 Management of Subcontractors

Contractors and subcontractors working on-site will be required to adopt the provisions of this AMP and will be advised of potential safety and environmental issues on site during site-specific induction training. This induction will include the occupational health and safety responsibilities, requirements and controls for all subcontractors working on site. All subcontractor activities will be monitored by the Principal Contractor, the licensed asbestos removal contractor and the Asbestos Consultant to ensure compliance with the requirements of this AMP.

Contractors and subcontractors whose work will be performed on-site, or who otherwise could be exposed to health and safety hazards, will be advised of known hazards through distribution of site information contained in this AMP.

The Principal Contractor shall be solely responsible for the health and safety of their employees and shall comply with all applicable laws and regulations. All contractors and subcontractors are responsible for:

1. Providing their own personal protective equipment as required by the Principal Contractor and the conditions set out in this AMP;
2. Training their employees in accordance with applicable laws;
3. Providing medical surveillance and obtaining medical approvals for their employees, as appropriate;
4. Ensuring their employees are advised of and meet the minimum requirements of this AMP and any other additional measures required by their site activities; and
5. Designating their own site safety officer.

Subcontractors must sign an acceptance form prior to commencing work on site. Subcontractors may only modify, and then only to improve, the conditions specified in this AMP with approval from the Principal Contractor, or his nominee.

5 Environmental Management

5.1 Asbestos Impacted Materials Works

The following management measures for the asbestos impacted materials identified during the site works will apply:

- Prior to any intrusive work commencing:
  - Review of the information available for the site.
  - Approval for the works must be sought from the Principal Contractor who will assess whether the works are necessary or if there is an alternative that will not result in exposure of ACM impacted soils. The Principal Contractor must review the job specific risk assessment (JSRA) and safe work method statements (SWMS) of any subcontractors and ensure that site personnel and/or contractors who will undertake the works are inducted into the AMP.
  - Static airborne asbestos monitoring must be completed by the Asbestos Consultant for the duration of the asbestos impacted materials excavation/movement works until such time that the Asbestos Consultant deems it appropriate to cease.
  - The asbestos works area must be isolated from casual entry using temporary barriers and only personnel inducted in the requirements of the AMP will be permitted to enter the works area.
  - Sufficient room must be provided within the works area to allow stockpiling of spoil from excavations, in accordance with **Section 5.4**.
  - A water supply must be provided to the works area for the purpose of maintaining exposed asbestos impacted fill or soil in the excavations and stockpiles in a moist state.
- Personnel entering the works area must wear appropriate PPE in accordance with **Section 4.5**.
- Stockpiles of excavated spoil must be managed in accordance with **Section 5.4**.
- Air monitoring requirements must be met as outlined in **Section 5.5** and **Section 6**.

5.2 Specific Requirements for Working with Non-Friable Asbestos Impacted Materials

If asbestos is identified to be present in non-friable form the following procedures shall be implemented for the proposed non-friable asbestos relocation works to ensure workers safety and to mitigate any potential off site migration of contamination.

Prior to Excavation

- Workers and visitors to the asbestos work area will be made aware of the present asbestos contamination and only authorised people shall enter the asbestos work area, which must contain a perimeter barrier separate to the site boundaries to restrict entry. Where the asbestos work area boundary is also the site perimeter boundary, an exclusion zone of at least 5 m shall be erected beyond the site perimeter boundary (if practical/possible) to restrict access to the asbestos work area.

- Asbestos removal caution signs shall be placed on the perimeter barrier (or exclusion zone barrier, whichever is furthest from the asbestos removal work area), as per AS1319.
- A WorkCover NSW permit is not required to be submitted prior to the works commencing given there are no ACM or asbestos impacted materials proposed to be removed and disposed off site, however, in the event that ACM or asbestos impacted materials are required to be disposed off site, a WorkCover NSW notification for the removal of non-friable asbestos shall be required to be submitted at least 7 days prior to the anticipated removal date.
- Any wastes generated from the site must be classified, managed and disposed in accordance with the *Waste Classification Guidelines: Part 1 Classifying Waste* (DECCW 2009). As noted above, the disposal of asbestos impacted material offsite will result in the requirement for notification to WorkCover NSW.

During Excavation/Transport

- Personnel within the excavation work area shall wear a Tyvek suit, respirator (e.g. half faced P2 respirator), disposable gloves and laceless steel capped rubber soled work shoes or gumboots at all times and until clearance certification is provided by the Asbestos Consultant.
- The excavation shall be kept damp by water spraying at all times during excavation to reduce the possibility of dust generation.
- Personal protective equipment used during the works, such as disposable coverall suits and half faced respirators, shall be disposed of as asbestos waste.
- Airborne asbestos monitoring shall be conducted for the duration of the excavation works in accordance with **Section 6.1**.
- Any stockpiled excavated material shall be kept moist and covered if left for more than 24 hours, in accordance with **Section 5.4**.
- In the event that friable asbestos is unexpectedly encountered during excavation, validation samples shall be collected from the excavation walls and base and analysed at a NATA Accredited testing laboratory for the presence of asbestos. Clearance airborne asbestos monitoring shall also be conducted following the completion of the excavation and reinstatement works to be included in clearance certification. Clearance monitoring is not required if only non-friable asbestos is encountered.
- Upon receipt of both visual and laboratory data (where required) confirming the absence of asbestos, the walls and floors of any excavation shall be deemed suitable for re-occupation and shall be noted in the final clearance letter for the site.

Post Excavation – Working in Excavations

At the completion of the excavation, the excavation floor and walls shall be inspected by the Asbestos Consultant who is trained and experienced in the identification of asbestos. Any visible ACM shall be removed by the licensed asbestos removal contractor.

Two options are available for works within excavations.

Option 1 – Placement of Barrier Layer

- Prior to the commencement of post excavation works (installation / removal of pipes etc.), the remaining in-situ soils may be covered with a barrier layer (e.g. geofabric) which will provide a physical barrier between the workers and the exposed asbestos impacted materials. Once the barrier layer is installed and approved by the Asbestos Consultant, any additional works, excluding significant intrusive works beneath the barrier layer, in the area may be completed under non-asbestos PPE conditions.

Option 2 – Works on Exposed Soils

- Should commencement of post excavation works (installation / removal of pipes etc.) occur directly on exposed asbestos impacted soils (i.e. no barrier layer installed), works shall continue under the asbestos PPE conditions outlined for during excavation/transport (i.e Tyvex suit, P2 or above masks).

Post Excavation - Placement of Asbestos Impacted Materials

- Following completion of works in excavations, the asbestos impacted materials may be placed back into an excavated area as backfill material.
- Personnel within the placement work area shall wear a Tyvek suit, respirator (e.g. half faced P2 respirator), disposable gloves and laceless steel capped rubber soled work shoes or gumboots at all times when within the asbestos work area and until clearance certification is provided by the Asbestos Consultant.
- During the unloading of asbestos impacted materials from the transport vehicles, the materials shall be wetted down to reduce dust generation.
- The placed asbestos impacted materials shall be kept damp by water spraying at all times during excavation and placement to reduce the possibility of dust generation.
- Personal protective equipment used during the works, such as disposable coverall suits and half faced respirators, shall be disposed of as asbestos waste.
- Airborne asbestos monitoring shall be conducted for the duration of the excavation and placement works in accordance with **Section 6.1**.
- Any stockpiled excavated material shall be kept moist and covered if left for more than 24 hours, in accordance with **Section 5.4**.
- Following the completion of all placed asbestos impacted materials, a layer shall be installed covering the asbestos impacted materials of no less than 150 mm of clean imported material classified as VENM as per *Waste Classification Guidelines: Part 1 Classifying Waste* (DECCW 2009). The asbestos consultant must inspect the installation of clean imported VENM layer.
- Once all asbestos impacted materials have been loaded into the placement area and capped as outlined in the previous point, the location and volume shall be surveyed by a suitably qualified surveyor to confirm the exact location and dimensions of the asbestos impacted materials capped area. The presence, location and volume of the asbestos impacted materials at the site must be recorded and provided to the site owner (**Section 7**).

- Alternatively, if asbestos impacted material are not to backfilled into excavations, disposal of the material shall be undertaken as outlined in **Section 5.6**.

5.3 Disposal and Storage of Asbestos Containing Materials

Where asbestos fragments or other forms of asbestos are identified either during demolition works or on / within the ground surface, these materials should be removed under the supervision of the licensed asbestos removal contractor and in accordance with Safe Work Australia (2011).

The asbestos materials should be placed into heavy-duty 200µm (minimum thickness) polythene bags that are no more than 1200 mm long and 900 mm wide. The bags should not be filled more than 1/3 full and should be labelled as asbestos waste, sealed and placed in a designated waste area for off-site disposal.

5.4 Stockpile Management

Any stockpiles of excavated materials, including topsoil and grass cover, will be periodically sprayed with water to control dusts.

In the event that covers are required, they shall extend beyond the perimeter of the stockpiles and shall be secured to prevent being blown away by wind.

Stockpiles must be placed in a secure location onsite and covered if to remain for more than 24 hours.

5.5 Dust Management

Dust levels shall be managed by ensuring:

- All stockpiles will remain covered if to remain for more than 24 hours;
- Water sprays will be used on the excavation areas, stockpiles and haulage pathways;
- Any haulage vehicles shall remain on the designated access routes;
- All access roads are sufficiently maintained to ensure no visible dust at the site boundary; and
- Dust suppressors will be fitted to equipment as required.

If dust is visible at the site boundary, then additional dust control measures shall be employed, which may include:

- Temporarily suspending activities until winds speeds reduce; and/or
- Additional use of water sprays.

5.6 Waste Management

There shall be no wastes brought onto the site for storage, treatment, processing, reprocessing or disposal unless permitted by a licence issued under the POEO Act.

All wastes will be classified, managed and disposed in accordance with the *Waste Classification Guidelines: Part 1 Classifying Waste* (DECCW 2009).

All wastes disposed off-site will be controlled as per the EPA's requirements for waste tracking and acceptance. These are as follows:

- Obtain a written consignment authorisation number from an EPA-licensed waste disposal or treatment facility before moving waste to the facility.

- Accurately complete a waste data form signed by the consignor before the waste is dispatched.
- The waste consignor, the waste transporter and the waste facility must each keep a copy of the waste data form for up to four years for auditing purposes.
- The waste consignor must give a completed copy of the waste data form to the transporter, who must check that it is completed and then sign it. The driver must carry the waste data form in the vehicle.
- The transporter must give a completed copy of the waste data form to the waste facility on arrival at the destination. The waste facility operator must check the load details on the form. The waste data form must be signed by a representative of the waste facility on receipt of the waste at the destination.

The waste consignor must receive from the waste facility written confirmation of receipt of the waste within 21 days of dispatch. This must be kept for up to four years for auditing purposes.

6 Monitoring Program

To ensure that the control measures being implemented at the site are effective, the following monitoring procedures will be implemented during the proposed relocation of asbestos impacted materials at the site:

- Daily static airborne asbestos fibre monitoring at asbestos work area boundaries and transport lines with consideration given to proposed daily works and climatic conditions;
- Clearance Monitoring (if friable asbestos is encountered only); and
- Site Inspections.

6.1 Daily Static Airborne Asbestos Fibre Monitoring

During all excavation, demolition, transport and placement works on site, airborne asbestos fibre monitoring will be undertaken by the Asbestos Consultant using calibrated portable air sampling pumps. Monitoring locations shall be determined by the Asbestos Consultant but shall include at least 4 locations surrounding the impacted area on the site boundary; along the proposed transport route between the demolition and stockpile area (if in separate area) and outside the 'clean' end of the decontamination unit. At the end of each monitoring period the pump will be collected and attached filter will be analysed at a NATA-accredited laboratory.

Monitoring works shall be conducted in accordance with *NOHSC Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition* (NOHSC:3003 [2005]).

The results of air monitoring will be available on a 24-hour turnaround time basis. Daily air monitoring reports shall be displayed in a common area outside of the asbestos work area (e.g. site office or lunch shed) or be able to be produced upon request.

The following action levels will be applied upon receipt of daily results, as outlined in the Safe Work Australia (2011):

- Reading of less than 0.01 fibres/mL – control measures in place are working effectively, site works to continue;
- Reading between 0.01 and 0.02 fibres/mL – a review of control measures shall be completed in the work area and modifications made, as necessary; and
- Reading greater than 0.02 fibres/mL – works shall cease until the cause of contamination is identified and rectified.

It is noted that these action levels adopted are more conservative than the exposure standard for airborne asbestos (0.1 fibres/mL (TWA)) as outlined in the *Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment* [NOHSC: 1003(1995)] for an 8 hour shift.

6.2 Clearance Airborne Asbestos Fibre Monitoring

Where friable asbestos is encountered during the demolition works, clearance airborne asbestos monitoring shall be required. Following the completion of all earthworks, clearance air monitoring will take place in the vicinity of the work area to ensure that there is no residual airborne contamination remaining at the site.

Ambient air conditions clearance will be gained by recording airborne asbestos concentration levels in all sampling locations below 0.01 fibres/mL. It is noted that, in

accordance with WorkCover NSW requirements friable asbestos air monitoring and clearances must be undertaken by a licensed asbestos assessor (LAA).

6.3 Site Inspections

The Asbestos Consultant shall complete site inspections to assess the progress of the proposed works at key milestones in the project for the following purposes:

- Following the completion of any required demolition and/or excavation works to confirm that there is no visible ACM on the ground surface. Where friable asbestos has been encountered, this shall also include validation sampling (**Section 5.2**).
- Following the removal of the stockpiled asbestos impacted material including an inspection of stockpile footprints to ensure that all asbestos impacted stockpiles have been removed adequately.
- Prior to the installation of barrier layers over the placed asbestos impacted materials (if required) to confirm their correct installation.

Following the completion of the project, a final site walkover will be completed by the asbestos consultant to inspect the site ground surface for the presence of ACM. Any ACM observed will be removed and placed in asbestos waste bags as outlined in **Section 6.3** and in accordance with Safe Work Australia (2011). Once a successful site inspection has been completed and both the licensed asbestos removal contractor and the Asbestos Consultant are satisfied there is no visible residual asbestos contamination on the ground surface, the site shall be deemed suitable for re-occupation and a clearance report issued by the Asbestos Consultant.

7 Ongoing Asbestos Management

Following completion of the proposed demolition works at the site and receipt of the final clearance report, all documentation must be provided to the Site Owner. It is the responsibility of the Site Owner to ensure remediation of the asbestos impacted material occurs and the site is suitable for ongoing use as recreational open space in the short and long term.

The information provided to the Site Owners shall include details on:

- The known asbestos contamination issue at the site, this will take the form of an Asbestos Register as outlined as a requirement in Safe Work Australia's (2011) Code of Practice – *How to Manage and Control Asbestos in the Workplace*;
- The surveyed location and volume of the placed asbestos impacted materials (if required) encountered at the site during the works;
- The approximate depth of the potentially contaminated materials;
- The presence and purpose of the barrier layer.

8 Limitations

This advice is provided for use by the client who commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties. The advice has been prepared specifically for the client for the purposes of the commission. No warranties, express or implied, are offered to any third parties and no liability will be accepted for use or interpretation of this advice by any third party.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G.

Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, that were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the advice provided herein, through natural processes or through the intentional or accidental addition of contaminants. The advice is based on the information obtained or available at the time the advice is provided.

This advice is not a complete assessment of the status of the site, and it is limited to the scope of works commissioned. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the advice in the context of the additional information.

Figures

Source: Base Image - www.nearmap.com

0 25 50 100 m

Scale: 1:2,250

Datum: MGA94 Zone 56 - AHD

Rev	Description	Drn.	Date
A4			
A	Issue - R02	RF	10-10-2013

Legend:

Control Tower Area

JBS&G

Figure 1: Control Tower Area Demolition

Client: Barangaroo Delivery Authority

Project: Barangaroo Headland Park - AMP

Job No: 43083 File Name: 43083_01

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Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Oliver McCauley	Matt Parkinson	Draft for Client Review		03/07/2014

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