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PROPERTY NSW

**HUNTERS HILL  
REMEDIAION PROJECT**

AIR QUALITY  
MANAGEMENT PLAN

wsp

AUGUST 2021

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## Hunters Hill Remediation Project Air Quality Management Plan

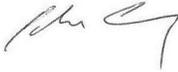
Property NSW

WSP

Level 27, 680 George Street  
Sydney NSW 2000  
GPO Box 5394  
Sydney NSW 2001

Tel: +61 2 9272 5100  
Fax: +61 2 9272 5101  
wsp.com

REV	DATE	DETAILS
Final	11 August 2021	Hunters Hill Remediation Air Quality Management Plan

	NAME	DATE	SIGNATURE
Prepared by:	John Conway	11/09/2021	
Reviewed by:	Johan Goosen	11/09/2021	
Approved by:	Morgan Cardiff	11/09/2021	

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# LIST OF EMERGENCY CONTACTS

POSITION	NAME	CONTACT
EPA Pollution Hotline	N/A	131 555
WAMC Project Manager		
WAMC Site Supervisor		
WAMC Construction Manager		
WAMC Environmental Co-ordinator		
Fire and Rescue NSW	N/A	000 (for pollution incidents that present an immediate threat to human health and property) 1300 729 579 (for pollution incidents that do not present an immediate threat to human health or property)
Hunters Hill Council	N/A	02 9879 9400
Property NSW	Scott Burrows	0439 440 368
SafeWork NSW	N/A	131 050

# ABBREVIATIONS

ACM	Asbestos containing material
ANSTO	Australian Nuclear Science and Technology Organisation
AQMP	Air quality management plan
AS/NZS	Australian Standard/New Zealand Standard
ASS	Acid sulphate soils
BTEX	Benzene, toluene, ethylbenzene and xylenes
CO	Carbon monoxide
DPIE	Department of Industry, Planning and the Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPD	Electronic personal dosimeter
GSW	General solid waste
HDPE	High density polyethylene
ISO	International Standards Organisation
NO <sub>x</sub>	Oxides of nitrogen comprising primarily of nitrogen monoxide (NO) and nitrogen dioxide (NO <sub>2</sub> )
OCPs	Organochlorine pesticides
NSW	New South Wales
PAHs	Polycyclic aromatic hydrocarbons
PID	Photoionisation detector
PM	Particulate matter
PPM	Parts per million
PM <sub>10</sub>	Particulate matter with an aerodynamic diameter of less than 10 micrometres
PM <sub>2.5</sub>	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres
PPR	Preferred Project Report
PCBs	Polychlorinated biphenyls
RAP	Remedial action plan
REMP	Remediation Environmental Management Plan
RSW	Restricted solid waste
SSD	State Significant Development

SO <sub>2</sub>	Sulphur dioxide
TPH	Total petroleum hydrocarbons
TSP	Total suspended particulates
TWA	Time-weighted average
US	United States
VENM	Virgin excavated natural material
WAMC	Waste Assets Management Corporation
WSP	WSP Australia Pty Ltd
WTP	Water treatment plant

# 1 INTRODUCTION

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## 1.1 PROJECT BACKGROUND

Property NSW proposes to conduct remediation work on a former Radium Hill Company site at Nelson Parade, Hunters Hill in New South Wales (NSW) (the Project). The Project seeks to make the project site suitable (from an environmental and health perspective) for ongoing low-density residential; and to address the contamination referred to in Declaration 21083. The Project also involves works on Private Properties (Private Property Works), being the targeted removal of materials under the direction of the Australian Nuclear Science and Technology Organisation (ANSTO). This Air Quality Management Plan (AQMP) has been prepared for Property NSW for the Project to:

- ensure air quality impacts on the receiving environment and on-site workers are minimised
  - meet the commitments of the Conditions of Consent (SSD 08\_0008), the Preferred Project Report (PPR) and the Environmental Impact Statement (EIS).
- 

## 1.2 AIM OF AIR QUALITY MANAGEMENT PLAN

The overall aim of the AQMP for the life of the Project is to protect the health and safety of nearby sensitive receptors and on-site workers to air emissions generated on-site, to have zero complaints relating to these emissions and, to ensure compliance with the Conditions of Consent (SSD 08\_0008).

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## 1.3 SCOPE OF WORKS

This AQMP has been prepared to satisfy the Conditions of Consent, SSD 08\_0008, NSW Government, Department of Planning Industry and Environment, 2021 relating to air quality.

To fulfil the aim of this Plan the following are required to be achieved:

- Prevent and minimise air quality impacts, within and beyond the site boundary and at all sensitive receptor locations, from on-site works, through management and monitoring as required.
- Prevent visible emissions of dust from the site and nuisance occurrences at the nearby sensitive receptors.
- Prevent odour emissions from the site affecting nearby sensitive receptors
- Achieve compliance with all relevant air quality standards.
- Establish and implement an ambient air quality monitoring plan to ensure compliance with statutory air quality assessment criteria is achieved.
- Promote awareness of all on-site personnel (including sub-contractors) of their contribution to minimising activities with the potential to generate elevated levels of pollutants e.g. particulate matter, odour, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs)
- Develop a communication strategy with clear roles and responsibilities for:
  - Implementation of this air quality management plan
  - Collection, review and reporting of monitoring data
  - Implementation of management measures
  - Reporting of complaints to the relevant authority.

# 2 PROJECT DESCRIPTION

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## 2.1 PROJECT OVERVIEW

The Project involves the remediation of the former Radium Hill Company site at Nelson Parade, Hunters Hill in New South Wales (NSW) (the Project). It comprises the following proposed works:

- remediation works at the Project Site (Remediation Works):
  - to make the Remediation Site suitable (from an environmental and health perspective) for ongoing low-density residential use;
  - to address the contamination referred to in Declaration 21083; and
  - works on Private Properties (Private Property Works), being the targeted removal of materials under the direction of the Australian Nuclear Science and Technology Organisation (ANSTO), the leading body in Australia on radiation.

The remediation involves the removal of all Restricted Solid Waste (RSW) and General Solid Waste (GSW) from the Project Site. RSW will be disposed of at a waste facility in the US state of Idaho which is licenced to receive RSW, this was decided on to accommodate community concerns raised during community consultations since 2012. Interim storage of packed, sealed and secured waste materials will occur at the Veolia Port Botany Waste Transfer Facility in Matraville NSW.

---

## 2.2 SITE LOCATION

The Project Site comprises:

- The Remediation Site, namely:
  - the properties at No. 7, 9 and 11 Nelson Parade; and
  - the foreshore properties adjacent to the properties at No. 5, 7, 9, 11 and 13 Nelson Parade; and
- The Private Properties, namely:
  - the private property at No. 5 Nelson Parade; and
  - the private properties at No. 13 and 15 Nelson Parade.

The Project Site is located in a residential area on Nelson Parade, Hunters Hill with established residences on both the eastern and western sides of the roadway. The Parramatta River, which flows into Sydney Harbour, is on the southern boundary of the Project Site, and the Nelson Parade roadway is on the northern boundary. Residential properties are located on the opposite side of Nelson Parade.

The Remediation Site is tiered from Nelson Parade down to the harbour over a 25 metre (m) drop. The Remediation Site is divided into two distinct areas: the upper terraces and the foreshore area, with a sandstone cliff of approximately 10 metres separating the two. A man-made seawall separates the Remediation Site from the harbour.

The location of the project site and the project site plan is shown on Figure 2-1 and Figure 2-2.

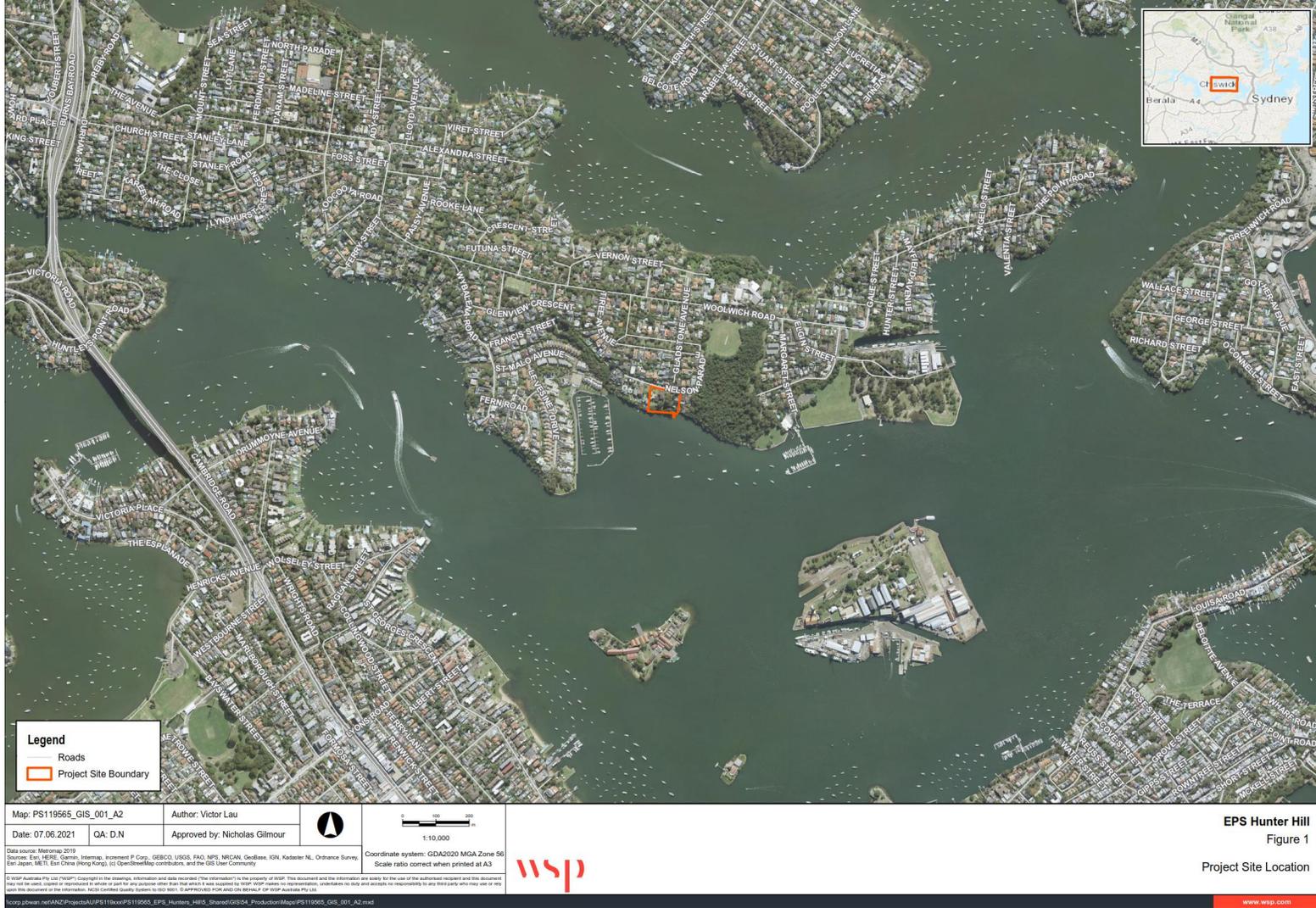


Figure 2-1 Project site location



Figure 2-2 Project site plan

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## 2.3 REMEDIATION SCOPE OF WORKS

The Project would be divided into five primary remediation phases. These are summarised below as relevant to air quality and discussed in more detail in the Remediation Environment Management Plan (REMP) [WSP 2021a].

### 2.3.1 *SITE ESTABLISHMENT AND SET-UP*

The contractor will set up a project site office in the existing dwelling (No. 11 Nelson Parade). Control zones will be established on the site and ensure site safety as well as preventing cross contamination. The following site establishment activities will be conducted as part of the site establishment prior to works commencing, including:

- installation of an on-site weather station
- removal or relocation of on-site services
- reconfigure No. 11 Nelson Parade to create ‘clean zones’ (office and amenities) and dirty zone (decontamination facilities)
- installation of a security fence with printed screen shade cloth (or similar) along No’s 7, 9 and 11 Nelson Parade, including two gates to be established within the proposed fence
- installation of environmental controls along the foreshore area and the sea wall including silt fences and hay bales covered with geofabric
- installation of a temporary safety barrier fence adjacent to the upper terrace cliff to create a safe working area, including fixed edge protection to be installed with installation of hard stand area and crane base
- installation of a dust suppression system along the front fence of Nelson Parade and side fences of the site incorporating a temporary water line along the side of No. 11 Nelson Parade with outlet connections at each level for dust suppression and decontamination usage.

### 2.3.2 *PHASE 1A – SITE SURVEY AND FURTHER SITE ESTABLISHMENT*

The key activities of this phase include erection of security fencing, establishment of environmental controls and safety barriers, improving stair access to the rear of properties, demolition of the front of No. 11 Nelson Parade house and associated gardens to create a new entrance to the premises.

Prior to the commencement of excavation works, ANSTO would resurvey the gamma levels of ground surfaces to ensure consistency with previous site investigations.

### 2.3.3 *PHASE 1 – CONSTRUCTION OF CLEAN SITE ACCESS*

Establishment of clean ‘remediated’ hardstand is essential to create a clean entry/exit at the site which would eliminate any risk associated with cross contamination. An engineered slab on the remediated upper terrace would remain a clean zone throughout works (subject to ongoing ANSTO assessment). A second crane landing zone would be established where loads can be assessed and cleaned if required before being moved into the clean zone. This area is proposed to be located at the Nelson Parade entrances to No’s 7, 9 and 11.

The Phase 1 works would comprise the following:

- saw cut removal areas as required within garage and driveway area of number 11 Nelson Parade
- remove concrete and demolition waste and place into bins for cleaning (waste subject to ANSTO assessment and classification)
- implement dust controls

- remove impacted soil/fill materials using both hand and mechanical excavation from the upper terrace to gain ANSTO validation. Additional chemical testing of the waste will also take place to confirm the waste classification, as recommended in ANSTO 2020.
- ANSTO assessment for transport off site and disposal in accordance with the ANSTO waste classification to a lawful waste facility
- validation of the excavated areas
- following validation of the upper terrace area by, the remediation contractor would supply, spread and compact approved imported base overlain by an engineered concrete slab
- vehicle and edge protection installed along southern edge of slab.

#### 2.3.4 *PHASE 2 – COMMISSION CRANE, PREPARATION OF BAG STORAGE AND TREE REMOVAL*

Following the construction of the remediated hardstand access area and establishment of the remediation site entrance / exit gates in Phase 1, the contractor would commence full establishment and commissioning of the tower crane proposed for the remedial works. Phase 2 works will comprise the following:

- establish crane base on street level terrace as per foundation specification
- implement dust controls across entire site
- commence removal of trees for on-site mulching and disposal to landfill
- lift a 8Tt excavator to terrace level with mobile crane;
- excavation of soil/fill (to bedrock) within the crane foundation footprint and placement into sealed bags for temporary on-site storage pending off-site disposal
- validation of the excavated areas
- placement of high-density polyethylene (HDPE) or geofabric across the excavation to prevent cross contamination in consultation with ANSTO
- re-align seawall at southwest side of boat ramp
- construction of a structure on the northern eastern boat ramp to accommodate the proposed water treatment plant
- partial demolition of the top floor of the house (No. 11 Nelson Parade).

#### 2.3.5 *PHASE 3 – STORMWATER WORKS AND INSTALLATION OF SITE INFRASTRUCTURE*

Phase 3 works would involve installation of the WTP, clearing most site vegetation, relining the sewer main and establishing site-wide storm water management controls.

The Phase 3 works comprise the following:

- installation of the WTP
- location and protection of sewer line, Sydney Water to be present during works to adequately supervise and direct works as required
- installation of an interim safety barrier fence along the foreshore cliff area
- root balls would be removed with the assistance of an excavator. Due to the soil adhering to the roots these would be assumed to be contaminated

- where the root balls can be decontaminated through brushing or washing off the impacted soil they may be disposed of to landfill, pre-classified as GSW (subject to radiological screening showing acceptable readings)
- where effective decontamination of the roots is impractical, they would be cut up and disposed of along with the contaminated soil
- installation of a stormwater collection trench and sump along the northern edge of foreshore terrace
- removal of the solid coal tar pitch from the foreshore area (if present and segregation can occur) and placement into bulk bags for transfer to the clean zone for loading into shipping containers prior to transport to a licenced transfer facility
- validation of the excavated areas within the foreshore area
- excavation, loading and off-site disposal of contaminated material that has accumulated within the storm water collection trench and basin
- installation of a trench or bunding to capture stormwater and protect Parramatta River. Captured stormwater would be directed to the sump and holding tanks (as required) for treatment through the WTP and prior to discharge to the harbour
- cleaning and validation of bedrock in the location of the storm water collection trench
- placement of HDPE across the collection trench and basin to prevent any cross contamination
- importation of approved clay virgin excavated natural material (VENM) and placement along the base and sides of the collection trench and sump; and
- placement of heavy duty geofabric across the areas of the collection trench and basin.

### 2.3.6 PHASE 4A, 4B AND 4C – DEMOLITION AND REMEDIATION WORKS

Phase 4A comprise the following:

- Excavation and remediation of the mid-Terrace area of No's 7, 9 and 11 Nelson Parade (excluding the building footprint of number 11), commencing the upper portion of the Site and progressing towards the lower level to minimise the likelihood of cross-contamination as excavations continue (Stage 4A)
- Bagged material would be transported for storage on upper terraces and loaded onto shipping containers. Filled containers would be loaded onto semi-trailers for transport to a licenced transfer facility near Port Botany for storage prior to overseas disposal (Stage 4A)
- Excavation around the lined sewer main (Stage 4A)

Phase 4B works comprise the following:

- removal of any identified asbestos containing building materials by licenced contractor
- erect dust screens at perimeter of pool demolition area and implement dust controls
- mobilise small excavator and remove remaining concrete and associated materials from pool area
- demolition of rear patio and associated infrastructure
- excavate impacted materials to bedrock within the pool area
- validation of excavated areas and subsequent reinstatement (as per design)
- excavation of soil/fill (to bedrock) beneath patio area; and
- validation of excavated area and placement of the excavated material into bags.

Phase 4C comprise the following:

- excavation of the foreshore outside of the tidal influence zone;
- solid coal tar pitch areas would be excavated discretely (if practicable)
- spoil to be placed into bulk bags for transfer to the loading area and subsequent transport to appropriately licensed storage / treatment and/or disposal facility
- demolition and removal of the stone wall returns of the south-western boat ramp. Sandstone would be validated and reused to continue the east west alignment of the sea wall
- excavation and subsequent validation of remaining spoil in approximately 3 m slots behind the sea wall.
- excavation of faces covered with 200 µm plastic to prevent cross contamination
- completion of the remediation works and achievement of validation
- backfill the foreshore terrace with approved underlay and the installation of turf.

### **2.3.7 PHASE 5 – REMEDIATION WORKS – COMPLETION OF EXCAVATION AND DEMOBILISATION**

Phase 5 remediation works have been identified as the closing phase of the Project. The works will comprise the following:

- disconnection of services
- establishment of new temporary site sheds
- removal of all identified asbestos containing building materials by a licensed asbestos removalist
- demolition and remediation of the No. 11 Nelson Parade building
- excavation of contaminated soil/fill remaining within the foreshore
- treatment of residual water within the basin through the WTP
- removal and off-site disposal of any residual sediment within the WTP
- validation of entire site
- demobilisation of equipment and services, and site hand over.

# 3 STATUTORY REQUIREMENTS

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## 3.1 LEGISLATION

The following legislative and project requirements apply to the air quality aspects of the Project:

- Environment Planning and Assessment Act 1979 (EP&A Act)
  - Protection of the Environment Operations Act, 1997 (POEO Act)
  - Contaminated Lands Management Act 1997 (CLM Act)
  - Protection of the Environment Operations (Clean Air) Regulation 2010.
- 

## 3.2 GUIDELINES AND REFERENCE DOCUMENTS

The main guidelines, measures and policy documents relevant to this AQMP include:

- National Environment Protection (Ambient Air Quality) Measure, 2016
- National Environment Protection (Air Toxics) Measure, 2011
- AS/NZS 3580.1.1:2007 Methods for the Sampling and analysis of ambient air – Guide to siting air monitoring equipment
- Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (2016) [Approved Methods, NSW EPA 2016]
- NSW Government 2021, Department of Planning, Industry and Environment, Conditions of Consent (SSD 08\_0008)
- WSP 2019, Appendix K, Air Quality Impact Assessment, Former Radium Hill Site, Hunters Hill
- WSP 2020a, Remediation Action Plan, Numbers 5, 7, 9, 11, 13 and 15 and Adjoining Foreshore, Nelson Parade, Hunters Hill, NSW, Property NSW
- WSP 2020b, Preferred Project Report, Hunters Hill Remediation, Property NSW
- WSP 2020c, Appendix E, Air Quality Assessment of Updated Remediation Action Plan for the Radium Hill Company site
- WSP 2021a, Hunters Hill Remediation, Remediation Environment Management Plan 2021
- WSP 2021b, Hunters Hill Remediation Project, Unexpected Finds Protocol, 2021
- WSP 2021c, Unexpected Finds Protocol for the Proposed Remediation Works at 7, 9 and 11, and Foreshore Areas Fronting Numbers 5, 7, 9, 11 and 13 Nelson Parade, Hunters Hill, NSW 2021
- Parsons Brinkerhoff 2012, Remediation of former Radium Hill Company site, Nelson Parade Hunters Hill Environmental Assessment, Volume 1, State Property Authority
- CH2M Hill Australia Pty Ltd 2012, Modelling of Potential Fugitive Dust Emissions
- ANSTO 2021a, In-site Waste Characterisation of Fill Materials on the Upper Terrace at a legacy radium extraction plant, Hunters Hill NSW 2021
- ANSTO 2021b, Radiation Management Plan for Remediation Works at Nelson Parade, Hunter Hill 2021.

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## 3.3 CONDITIONS OF CONSENT

The following Conditions of Approval are applicable to air quality:

### 3.3.1 METEOROLOGICAL MONITORING STATION

#### Condition B15

*'The proponent must maintain the meteorological station to the satisfaction of the EPA for the duration of the remediation works'.*

### 3.3.2 DUST MINIMISATION

#### Conditions B16

*'The Proponent must take all reasonable steps to minimise dust generated during all works authorised by this approval, including but not limited to:*

- (a) Use of meteorological data to guide daily works on site and during adverse weather conditions;*
- (b) Use of a tower crane to transport the excavator to each section of the site to minimise vehicle generated dust;*
- (c) Conducting excavation work in phases, minimising the area of exposed surface at any one time;*
- (d) Using sealed industrial packaging bags for the waste material;*
- (e) Watering exposed soil during excavation using hand held hoses*
- (f) Covering unsealed area with geofabric when not in use and overnight*
- (g) Using misting sprays on the perimeter, over the bag handling area and over excavations including private property works*
- (h) Erecting dust screens around the pool demolition area at 11 Nelson Parade and using water sprays during demolition works*
- (i) Ensuring all trucks entering or leaving the site with loads, have their loads covered; and*
- (j) Carrying out land stabilisation works progressively on site to minimise exposed surfaces'.*

### 3.3.3 ODOUR

#### Condition B20

*'The Proponent must ensure the project does not cause or permit the emissions of any offensive odour (as defined in the POEO Act)'.*

### 3.3.4 AIR QUALITY MANAGEMENT PLAN

#### Condition C2(b)

*'prior to the commencement site establishment works, the Proponent must prepare a Remediation Environmental Management Plan (REMP) for the project in accordance with the requirements of Condition C1 and to the satisfaction of the Planning Secretary. The REMP must include the following sub-plans:*

.....

*(b) an air quality management plan detailing the location and duration of dust controls to be implemented throughout the project, details of real-time boundary dust monitoring and personal dust monitoring for on-site work and triggers for implementation of additional dust control measures if required'.*

### 3.3.5 CONTINGENCY PLAN FOR UNEXPECTED ISSUES

#### Condition C2(f)

*'a contingency plan detailing measures to deal with unexpected issues arising during the project, such as excessive noise, dust, traffic and water quality impacts and unfavourable weather condition. The plan must include measures for minimising impacts if the remediation works fail to achieve the remediation criteria and goals'.*

# 4 RECEIVING ENVIRONMENT

## 4.1 SENSITIVE RECEPTORS

The Approved Methods (NSW EPA 2016) describes a sensitive receptor location as:

*‘A location where people are likely to work or reside, this may include a dwelling, school, hospital, office or public recreational area’.*

There are sensitive land uses and receptor locations near the site. These include:

- 7 and 9 Nelson Parade – vacant parcels of land with remnant footings of previously demolished dwelling. Both are within the site boundary and remediation zone.
- Residence at 11 Nelson Parade (uninhabited) within the site boundary and remediation zone
- Residences surrounding the site to the east, west and north (Nelson Parade)
- Fern Bay and Parramatta River directly adjacent to the southern site boundary.

Table 4-1 and Figure 4-1 present the nearest sensitive receptor to the Project site.

Table 4-1 Sensitive receptor locations

Receptor ID	Description	Address	Distance to site boundary (m)	Direction to site
SR1	Residence	17 Nelson Parade	0	West
SR2	Residence	19 Nelson Parade	20	West
SR3	Residence	14 Nelson Parade	30	North-west
SR4	Residence	12 Nelson Parade	10	North-west
SR5	Residence	10 Nelson Parade	10	North
SR6	Residence	2 Nelson Parade	10	North
SR7	Residence	2A Gladstone Avenue	30	North
SR8	Residence	5 Nelson Parade	0	East
SR9	Residence	8 Nelson Parade	10	North
SR10	River	Fern Bay and Parramatta River	0	South



Figure 4-1 Location of sensitive receptors

# 5 AIR EMISSION SOURCES AND TYPES

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## 5.1 TYPES OF AIR EMISSIONS

The following types of air emissions (ANSTO 2021a) may be generated during demolition and remediation works:

- particulate matter (dust<sup>1</sup>) of varying size fractions including:
  - Total suspended particulates (TSP)
  - Particulate matter with an aerodynamic diameter of less than 10 micrometres (PM<sub>10</sub>)
  - Particulate matter with an aerodynamic diameter of less than 2.5 micrometres (PM<sub>2.5</sub>)
- Deposited dust<sup>2</sup>
- metals (copper, lead, zinc, cadmium, chromium, nickel, arsenic and mercury)
- Combustion gases (carbon monoxide [CO], the oxides of nitrogen [NO<sub>x</sub>] (comprising of nitrogen monoxide [NO] and nitrogen dioxide [NO<sub>2</sub>]) and sulphur dioxide [SO<sub>2</sub>])
- VOCs including:
  - total recoverable hydrocarbons (TRH)
  - benzene, toluene, ethyl benzene and xylenes (BTEX)
- SVOCs including:
  - polycyclic aromatic hydrocarbons (PAHs)
  - organochlorine pesticides (OCPs)
  - polychlorinated biphenyls (PCBs)
  - phenols
- total cyanide
- Odour
- Asbestos containing material (ACM)
- Radiological contaminated material

It is understood there is a low to very low probability of acid sulphate soil (ASS) occurrence at the site (WSP 2021).

---

## 5.2 AIR EMISSION SOURCES

Table 5-1 presents the on-site activities that are likely to generate air emission during remediation and construction works.

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<sup>1</sup> Particulate matter and dust are often used interchangeably. For the purposes of this AQMP the term 'dust' has been used to include particles that give rise to soiling and to human health effects.

<sup>2</sup> Dust that is no longer suspended in the air and has settled onto a surface

Table 5-1 Source and types of air emissions for each Project phase

Phase	Potential emission sources and activities	Potential type of air emission
Phase 1A – Site establishment and set-up	General construction works	Dust
	Complete demolition of the front of No. 11 Nelson Parade and associated gardens to create a new entrance to the site.	ACM, dust
Phase 1 – construction of clean site access	Saw cut removal areas within garage and driveway area of No. 11 Nelson Parade	Dust
	Concrete and demolition waste removal and placement into bins for cleaning	ACM, dust
	Removal of impacted soil / fill material using both hand and mechanical excavator from the upper terrace area of No. 11 Nelson Parade	ACM, dust, radiological material
	Handling and transport of soil off-site	ACM, dust, radiological material
	Following validation of upper terrace area of No. 11 Nelson Parade, spread and compact approved imported base (virgin excavated natural material [VENM])	Dust
Phase 2 – remediation works	Tree removal and mulching	Dust
	Excavation of soil/fill to bedrock and placement into sealed bags	ACM, dust, radiological material
	Construction of a structure on the boat ramp to accommodate the WTP	Dust
	Partial demolition of the top floor of No. 11 Nelson Parade	Dust, ACM
Phase 3 – Stormwater works and site infrastructure installation	Installation of WTP and interim safety barrier	Dust
	Removal of tree root balls	ACM, dust, radiological material
	Installation of stormwater trench and sump along northern edge of foreshore terrace	Dust
	Excavate, load and dispose off-site contaminated material that has accumulated within the stormwater collection trench and basin.	ACM, dust, radiological material
	Removal of solid coal tar pitch from the foreshore area and placement into bags for transfer to clean prior to loading into ship containers.	Dust, VOCs, SVOCs, odour, radiological material
	Cleaning and validation of bedrock at the storm water collection trench location	Dust
	Importation of approved clay (VENM) and placement along the base and sides of the collection trench and sump	Dust
	Excavation of soil/fill to bedrock within the mid-terrace area of No's 7, 9 and 11 Nelson Parade and placement into sealed bags.	Dust, radiological material

Phase	Potential emission sources and activities	Potential type of air emission
Phase 4A – Remediation of mid-terrace	Bedrock cleaning progressively as excavation works continue.	Dust
	Bagged material to be transported to upper terraces for storage.	Dust, radiological material
	Excavation around lined sewer main	Dust, radiological material
	Removal and decommissioning concrete slab of No. 5 slab as per ANSTO direction and replace slab.	Dust
	Remove lower retaining wall and construct support wall	Dust
	Support No. 11 Nelson Parade retaining wall and conduct remediation, validation and backfilling works.	Dust
Phase 4B Remediation works – removal of pool and outdoor patio area	Removal of any asbestos containing building materials by a licensed contractor	ACM
	Removal of remaining concrete and associated materials from the pool area using an excavator	Dust, ACM
	Demolition of rear patio and associated infrastructure	Dust, ACM
	Excavation of impacted materials to bedrock within the pool area.	Dust, radiological material
	Excavation of soil/fill to bedrock beneath patio area and placement into sealed bags	Dust, radiological material
Phase 4C Remediation works – Foreshore excavation, sea wall support, validation and foreshore backfilling	Excavation of foreshore outside of tidal influence zone and placement into sealed bags	Dust, radiological material
	Demolition and removal of stone wall returns of south western boat ramp	Dust
	Excavation of remaining spoil in approximately 3 m slots behind sea wall.	Dust, radiological material
	Clean and validate exposed sea wall.	Dust
	Backfilling of foreshore terrace with approved underlay and installation of turf.	Dust
Phase 5 remediation works – completion of excavation and demobilisation	Demolish No. 11 Nelson Parade building	Dust, ACM
	Removal of underlying soil below No. 11 Nelson Parade	Dust, radiological material
	Excavation of contaminated soil/fill remaining within the foreshore.	Dust, radiological material
	Removal and off-site disposal of any residual sediment within WTP	Odour
	Removal of all construction equipment	Dust

# 6 MANAGEMENT AND MONITORING STRATEGY

## 6.1 MANAGEMENT MEASURES

The following management measures will be implemented to minimise emission during construction works: The management measures proposed in Table 6-1 are consistent with those outlined in the following documents:

- Remediation Action Plan, Numbers 5, 7, 9, 11, 13 and 15 and Adjoining Foreshore, Nelson Parade, Hunters Hill, NSW (WSP 2020a)
- Preferred Project Report, Hunters Hill Remediation, Property NSW (WSP 2020b)
- Air Quality Impact Assessment, Former Radium Hill Site, Hunters Hill Remediation, (WSP 2019)
- Environmental Assessment: Remediation of former Radium Hill Company site, Nelson Parade Hunters Hill, Volume 1 Main Report (Parsons Brinkerhoff, 2012).

Table 6-1 Management measures

Activity	Management measures
General - dust	<ul style="list-style-type: none"> <li>— Dust generating activities will be scheduled to avoid periods of high winds</li> <li>— Materials that have the potential to generate dust will be removed from site as soon as possible unless being re-used on-site. If being re-used, they are to be covered as soon as practicable.</li> <li>— Dust screens would be erected in demolition areas.</li> <li>— Cranes and bags would be used to move materials to trucks</li> <li>— An adequate water supply will be made available on the site for effective dust suppression, using non-potable water where possible</li> <li>— Appropriate equipment to be readily available on-site to clean up any spillages</li> <li>— All spillages to be cleaned up as soon as is reasonably practicable after the event using appropriate cleaning methods. WAMC will install fully equipped spill kits within work areas</li> <li>— Misting sprays will be installed at the site the site establishment phase and operate along the site boundaries</li> <li>— Misting sprays will be installed over the top of the bin handling area for the duration of the Project</li> <li>— During Private Property Works, appropriate dust management measures will be extended to cover the Private Properties.</li> <li>— Residents will be informed and consulted regarding the timing and duration of works</li> </ul>
Bulk bags containing contaminated material	<ul style="list-style-type: none"> <li>— Soil would be placed within bulk bags following excavation to remove the need to stockpile soil</li> <li>— All excavated contaminated material will be sufficiently wetted prior to transferring to the bulk bags</li> <li>— All bulk bags will be sealed prior to movement and handling to prevent spillage</li> </ul>

<b>Activity</b>	<b>Management measures</b>
Exposed surfaces	<ul style="list-style-type: none"> <li>— Material will be applied if required, following remediation works to stabilise exposed surfaces</li> <li>— Remediation works will be staged to limit exposed surfaces</li> <li>— Geotextile material will be used to cover partially excavated contaminated stockpiles at the end of each working day</li> <li>— High-density polyethylene (HDPE) or geofabric will be placed across excavation areas to prevent cross contamination in consultation with ANSTO</li> <li>— During dry and windy conditions, exposed surfaces will be wetted</li> <li>— The wind speed and direction monitored at the site will be checked on a regular basis</li> </ul>
Excavation/loading of contaminated soil/fill - dust	<ul style="list-style-type: none"> <li>— The number of excavated areas will be minimised at any one time</li> <li>— All unsealed areas will be covered with heavy duty geofabric including across the areas of the collection trench and basin</li> <li>— All excavation areas will be pre-soaked prior to excavation using hand held hoses</li> <li>— Direct water sprays will be used on all excavation areas</li> <li>— Geofabric material will be used to cover partially excavated contaminated areas at the end of each working day</li> <li>— All contaminated soil or other materials with a waste classification higher than general solid waste will be placed in bulk bags and loaded directly into sealed shipping containers.</li> </ul>
Operation of vehicles	<ul style="list-style-type: none"> <li>— Emissions from trucks to be regulated in accordance with requirements prescribed in the National Environment Protection (Diesel Vehicle Emissions 2001)</li> <li>— All diesel trucks to be fitted with particulate filters and catalytic convertors</li> <li>— No visible smoke plumes to be generated</li> <li>— Engine idling will be minimised when vehicle is not in use</li> </ul>
Operation of plant and equipment	<ul style="list-style-type: none"> <li>— All on-site plant and equipment will be maintained and operated in a proper and efficient manner including regular maintenance</li> <li>— No visible smoke plume to be emitted</li> <li>— Odour from plant and machinery should be not be detected at the site boundary. If this occurs, the plant/machinery will be replaced.</li> <li>— Where practicable engine idling will be minimised when equipment is not in use</li> <li>— All mobile plant machinery will be restricted to designated areas</li> <li>— All plant and equipment will be cleaned on a daily basis</li> <li>— Only cutting, grinding, sawing equipment fitted with or in conjunction with dust suppression techniques such as water sprays or local extraction will be used on-site</li> </ul>
Asbestos Containing Material	<ul style="list-style-type: none"> <li>— All monitoring and reporting of ACM, and corrective actions if necessary, will be carried out in accordance with requirements outlined in the Asbestos Management Plan.</li> <li>— Spoil will be analysed for asbestos. If present, it will be appropriately managed by certified asbestos personnel.</li> </ul>
Radiological controls	<ul style="list-style-type: none"> <li>— All vehicles/plant entering the controlled zones will pass through ANSTO Radiological Clearance</li> </ul>

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## 6.2 MONITORING

Monitoring of air emissions will take place for the duration of construction works. An air quality monitoring program will be prepared for the site and include the following pollutants:

- Dust i.e. PM<sub>10</sub> and PM<sub>2.5</sub> including radiological and occupational dust monitoring
- Meteorological monitoring
- Asbestos monitoring, if identified.

### 6.2.1 ENVIRONMENTAL DUST MONITORING

Visual monitoring for dust will be conducted on a daily basis on-site and along the site boundary to identify areas of dust generation during the day. Details will be logged on the daily log sheet.

An appropriately qualified and experienced air quality consultant will conduct ambient dust monitoring for the duration of the Project.

Continuous real-time dust (PM<sub>10</sub> and PM<sub>2.5</sub>) monitors (e.g. DustTrak, Airmet, ADR) will be installed at the following four locations:

- Eastern perimeter fence at 5 Nelson Parade
- Northern perimeter fence at 9 Nelson Parade
- Southern foreshore area of 11 Nelson Parade; and
- Western perimeter fence at 11 Nelson Parade.

The monitoring locations will be sited with consideration to the Australian Standard *AS/NZS 3580.1.1:2016 Methods for the sampling and analysis of ambient air. Part 1.2 Guide to the siting of air monitoring equipment*.

The results of the dust monitoring will be provided in regular progress reports to Property NSW or in the event of an exceedance of an Action Level.

ANSTO will also install a real-time continuous monitor at one location downwind of the on-site works. Continuous readings will be undertaken during the works and compared to various trigger levels based on airborne radioactivity. Further details on the monitoring program to be conducted by ANSTO is provided in the Radiation Management Plan (ANSTO 2021b).

### 6.2.2 METEOROLOGICAL MONITORING

A meteorological monitoring station will be installed on-site during the site establishment and set-up phase and prior to excavation and demolition works occurring to monitor on-site meteorological conditions at the Project site for the duration of works until the remediation sign-off by the Site Auditor. The meteorological monitoring will be conducted in consideration of the AS/NZS 3580.14 *'Methods for Sampling and Analysis of Ambient Air – Meteorological Monitoring for Ambient Air Quality Monitoring Applications'*.

The following meteorological parameters will be monitored continuously:

- Wind speed and direction
- Temperature
- Humidity; and
- Precipitation

Data will be logged on a real-time basis and available to Property NSW.

### 6.2.3 RADIOLOGICAL DUST MONITORING

Radiological dust monitoring will be undertaken for the duration of the remediation works. the following monitoring will be conducted:

- On-site workers using personal air samplers
- Site boundary monitoring at four locations (dust only) for the duration of the remediation works
- Radiological monitoring at the site boundary

Further details on the radiological monitoring is provided in ANSTO's Radiation Management Plan (ANSTO 2021b).

### 6.2.4 ASBESTOS MONITORING

The 2020 ANSTO report (ANSTO 2020) confirmed that no asbestos was identified during previous investigations and historical reviews and that no visible ACM was identified on the site during the waste classification. However, to ensure that any risk arising from the presence of asbestos in the buildings which remain on-site and the presence of other residual asbestos on-site (if any) is addressed, an Asbestos Management Plan will be prepared for the site. The plan will detail the proposed asbestos monitoring program.

### 6.2.5 UNEXPECTED FINDS MONITORING

In the event that unexpected finds are encountered during remediation works, additional monitoring will be conducted for those pollutants listed in section 6.2.

If odour, VOC or SVOCs are found, monitoring will be undertaken for the duration of their detection, as follows:

- Odour monitoring (olfactory observations) at boundary and off-site locations
- VOC, SVOC monitoring using a photoionisation detector (PID) at the area of excavation and along the site boundary

The monitoring results will be recorded on the daily log sheet.

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## 6.3 CONTINGENCY MANAGEMENT

The site contractor (WAMC) will prepare a Contingency Management Plan for the Project. In terms of air quality, Table 6-2 lists the potential problems that may arise on-site and proposed corrective actions that the site contractor will be required to implement.

Table 6-2 Contingency management

Issue	Proposed corrective action
Generation of excessive dust	Increase intensity of soaking excavation areas and any exposed surfaces. Monitor weather conditions and on-site meteorological data such as wind speed and direction Reduce or cease works completely and cover all exposed areas with geofabric until dust levels reduce to acceptable levels.
Generation of excessive odour	Monitor VOCs using a PID Monitor weather conditions such as wind speed and direction Reduce or cease works completely and cover all exposed areas with geofabric until odour at the site boundary is no longer detected.
Air monitoring equipment malfunction	Arrange with the equipment supplier that in the event of equipment breakdown, a replacement will be provided to site within 24 hours.

# 7 ROLES AND RESPONSIBILITIES

WAMC will have overall responsibility for implementing and managing this AQMP. All on-site personnel (employees and sub-contractors) must adhere to the requirements of this Plan.

Key personnel and associated responsibilities for this Project are presented in Table 7-1.

Table 7-1 Roles and responsibilities

Personnel	Roles and responsibilities
Site Manager (WAMC PM)	<ul style="list-style-type: none"> <li>— Overall responsibility for environmental management</li> <li>— Implementation of WAMC’s Environmental Policy for the Project</li> <li>— Responsibility for implementation, management and compliance</li> </ul>
WAMC Environmental Representative	<ul style="list-style-type: none"> <li>— Responsible for air quality management for the Project</li> <li>— Ensure this Plan is implemented, complied with and updated as necessary</li> <li>— Communicating the requirements of this Plan with all employees and sub-contractors</li> <li>— Review effectiveness of this Plan</li> <li>— Undertake environmental auditing as required</li> </ul>
All Personnel (WAMC and sub-contractors)	<ul style="list-style-type: none"> <li>— Comply with the requirements of this Plan</li> <li>— Responsible for conducting all operations and activities in accordance with this Plan</li> <li>— Report all environmental hazards, near misses and incidents relating to air quality</li> <li>— Attend inductions and all relevant air quality training</li> </ul>

# 8 COMMUNICATION STRATEGY

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## 8.1 SITE INDUCTIONS AND TOOL BOX TALKS

### 8.1.1 INDUCTIONS

WAMC appointed qualified site representative will induct all employees and contractors prior to the commencement of fieldwork. All site personnel must also be aware of the contents of this AQMP. ANSTO inductions will also be carried out for all personnel entering the site (excluding the site office at No. 11 Nelson Parade).

### 8.1.2 PRE-START MEETINGS

The pre-start meeting is a tool used to inform the workforce of the day's activities, safe work practices, environmental protection practices, work area restrictions, activities that may affect the works, coordination issues with other trades and teams, hazards and other information that may be relevant to the day's work. The meetings may also include a briefing on potential high PM generating activities and the control measures in place to control off-site impacts. The importance of the on-site meteorological station in guiding the daily on-site works will also be discussed.

The site supervisor will conduct a daily pre-start meeting with the site workforce before the commencement of work each shift or where changes occur during a shift.

The environmental component of pre-starts will be determined by relevant foreman and environmental personnel and will include any environmental issues that are potentially relevant to the day's activities. All attendees will be required to sign on to the pre-start and acknowledge their understanding of the issues explained.

Pre-start topics, dates delivered, and a register of attendees will be recorded.

The contractor (WAMC) will make allowance for a daily toolbox meeting to be held at the start of each day's fieldwork to communicate the following information to all staff and its subcontractors.

- key learnings from recent safety alerts, incidents, near misses or identified hazards.
- changes in conditions to the site.
- expected interactions with client and asset owner processes.
- expected tasks to be performed during the day.
- environmental issues and mitigation measures.
- extreme weather forecasts.
- any other information that WAMC feels is relevant to ensure the safety of its employees and its subcontractors during the day.

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## 8.2 AIR QUALITY REPORTING

All internal reports will be presented to the WAMC. Observational monitoring for dust will be reported on a daily basis to WAMC.

Dust and radiological dust monitoring, and meteorological monitoring will be reported on a monthly basis.

## 8.3 COMPLAINTS REPORTING

Air quality complaints will be taken seriously and dealt with promptly. Each complaint will be investigated and appropriate management measures put in place to prevent future occurrences.

Complaints will generally be managed in accordance with the *Better Practice Guide to Complaint Handling* (Australian Government, Commonwealth Ombudsman, 2009) and Australian Standard 10002-2006 *Customer Satisfaction—guidelines for complaints handling in organisations* (AS ISO 10002, 2006) with air quality complaints being lodged via a website and a phone hotline. The Community Involvement Plan (CIP) and CEMP (WSP 2020d) contain details of the complaints handling process including a list of emergency contacts.

Table 8-1 Key contacts

Role	Name and position	Telephone	Roles and responsibilities
Construction contractor (WAMC)	Project manager		WAMC maintains ultimate responsibility for implementation, compliance and review of the CEMP.
	Safety Manager		
Environmental (compliance monitoring) consultant (to be advised)	ANSTO (Radiation) Coomber Consultants (Heritage) WAMC (Water / Air Quality)		
DPIE	Scott Burrows	0439 440 368	

For effective complaint resolution, the following information is required as a minimum:

- Complainant contact details
- Date, time and location of the complaint
- Description of complaint
- The requested remedy/action
- Immediate action, if required
- If the complaint is dust related, analysis of real-time monitored data will be undertaken at the time of the complaint. Control measures in place at the time of the complaint will be noted.
- Notification of the complaint and response measures to be issued to all employees and sub-contractors via communal notice board and outlined in following weeks' toolbox meeting to raise awareness.

All complaints will be referred to WAMC for entry into the Complaints Register and the management of outcomes.

All complaint reports will be available for inspection by the relevant authority on request.

# 9 ON-SITE MANAGEMENT

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## 9.1 TRAINING

All employees, contractors and utility staff working on site will undergo site induction training relating to environmental issues, including dust management. The induction training will address the following elements related to dust management:

- The existence and requirements of this plan
- Work hours and the requirement for strict compliance
- Delivery hours, trucking routes and loading/unloading locations
- Air quality management measures
- On-site meteorological data that will guide daily works
- Project environmental responsibilities
- Location of sensitive receptors
- The importance of regular plant maintenance.

Records would be kept of all personnel undertaking the site induction and training, including the contents of the training, date and name of trainer/s.

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## 9.2 INSPECTIONS AND AUDITING

Audits (both internal and external) may be undertaken to assess the effectiveness of environmental controls, compliance with this AQMP and other relevant approvals, licences and guidelines.

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## 9.3 NON-COMPLIANCES

All air quality (dust) monitoring data will be recorded and reviewed by the WAMC Project Administrator or HSE Representative. Issues of concern or non-compliance will be documented and discussed with the view of resolving the issue or determining a way forward. Where identified exceedances may impact the safety of people or property, work at the concerned site shall cease immediately. Typical emergency situations that may result in substantial air quality impacts may include substantial air quality events during out of hours works. These events are considered highly unlikely, however in the event of such an event occurring:

- Work would cease immediately.
- Any occupants would be evacuated with due consideration to safety.
- The area would be secured to prevent unauthorised access.

An Environmental Incident Report form would be completed by the Project Site Manager or the Environmental Representative for any incident causing air quality impacts on local residences. This form should identify the cause of the incident, the investigation of corrective actions and close out of the problem.

### 9.3.1 CORRECTIVE ACTIONS

When required, the following corrective actions will be implemented:

- Where persistent dust generation occurs e.g. during dry periods and high winds, the activity will be identified and its intensity reduced or ceased until favourable conditions arise.

- Equipment, plant machinery and vehicles observed to be creating excessive visible or odorous emissions will be removed from site immediately and replaced or repaired.
  - Once a complaint has been received, the HSEC will implement a corrective action to rectify any problems associated with the dust source.
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## 9.4 REPORTING

Records relating to air quality for the project shall be maintained for a period of five years in the site environmental register or equivalent. These records shall include details related to air quality management, including:

- Training/inductions records
  - Equipment inspections
  - Air quality monitoring reports
  - Audit or reviews
  - Communication regarding air quality management
  - Details of complaints
- 

## 9.5 PLAN REVIEW

Continual improvement of this plan will be achieved by the continual evaluation of environmental management performance against proposed control measures, environmental policies, objectives and targets for the purpose of identifying opportunities for improvement. The continual improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management which leads to improved environmental performance
- Determine the root cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative action
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets.

Changes to this plan will be approved by WAMC representatives and stakeholders (if required) and documented in the document control section for each revision. A copy of the updated plan and changes will be distributed to all relevant stakeholders.

# 10 REFERENCES

- ANSTO 2021a, In-site Waste Characterisation of Fill Materials on the Upper Terrace at a legacy radium extraction plant, Hunters Hill NSW 2021
- ANSTO 2021b, Radiation Management Plan for Remediation Works at Nelson Parade, Hunter Hill 2021
- Australian Standard 3580.1.1:2007 *Methods for the Sampling and analysis of ambient air – Guide to siting air monitoring equipment*
- ANSTO 2020, In-situ waste characterisation of fill materials at a legacy radium extraction plant, Hunters Hill, NSW, July 2020, Australian Government
- National Environment Protection (Ambient Air Quality) Measure, 2016
- National Environment Protection (Air Toxics) Measure, 2011
- NSW EPA, 2020, Contaminated Land Guidelines: Guidelines for Consultants Reporting on Contaminated Land
- NSW EPA, 2016, Approved Methods for the Modelling and Assessment of Air Emissions in NSW
- NSW Government, Environment Planning and Assessment Act 1979
- NSW Government, Protection of the Environment Operations Act, 1997
- NSW Government, Contaminated Lands Management Act 1997
- NSW Government, Protection of the Environment Operations (Clean Air) Regulation 2010
- NSW Government 2021, Conditions of Consent, SSD 08\_0008, Department of Planning Industry and Environment, 2021
- Parsons Brinckerhoff 2012, Environmental Assessment: Volume 1 Main Report, Remediation of Former Radium Hill Company Site, Nelson Parade Hunters Hill, 2012
- WSP 2019, Air Quality Impact Assessment, Former Radium Hill Site, Hunters Hill Remediation 2019
- WSP 2020a, Remediation Action Plan, Numbers 5, 7, 9, 11, 13 and 15, and Adjoining Foreshore, Nelson Parade, Hunters Hill, NSW
- WSP 2020b, Hunters Hill Remediation, Preferred Project Report 2020
- WSP 2020c, Air Quality Assessment of Updated Remediation Action Plan for the Radium Hill Company site, 2020
- WSP 2021a, Hunters Hill Remediation, Remediation Environment Management Plan 2021
- WSP 2021b, Hunters Hill Remediation Project, Unexpected Finds Protocol, 2021
- WSP 2021c, Unexpected Finds Protocol for the Proposed Remediation Works at 7, 9 and 11, and Foreshore Areas Fronting Numbers 5, 7, 9, 11 and 13 Nelson Parade, Hunters Hill, NSW 2021

# 11 LIMITATIONS

This Report is provided by WSP Australia Pty Limited (WSP) for Property NSW (Client) in response to specific instructions from the Client and in accordance with WSP's proposal dated 27 April 2021 and agreement with the client dated 11 May 2021 (Agreement).

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