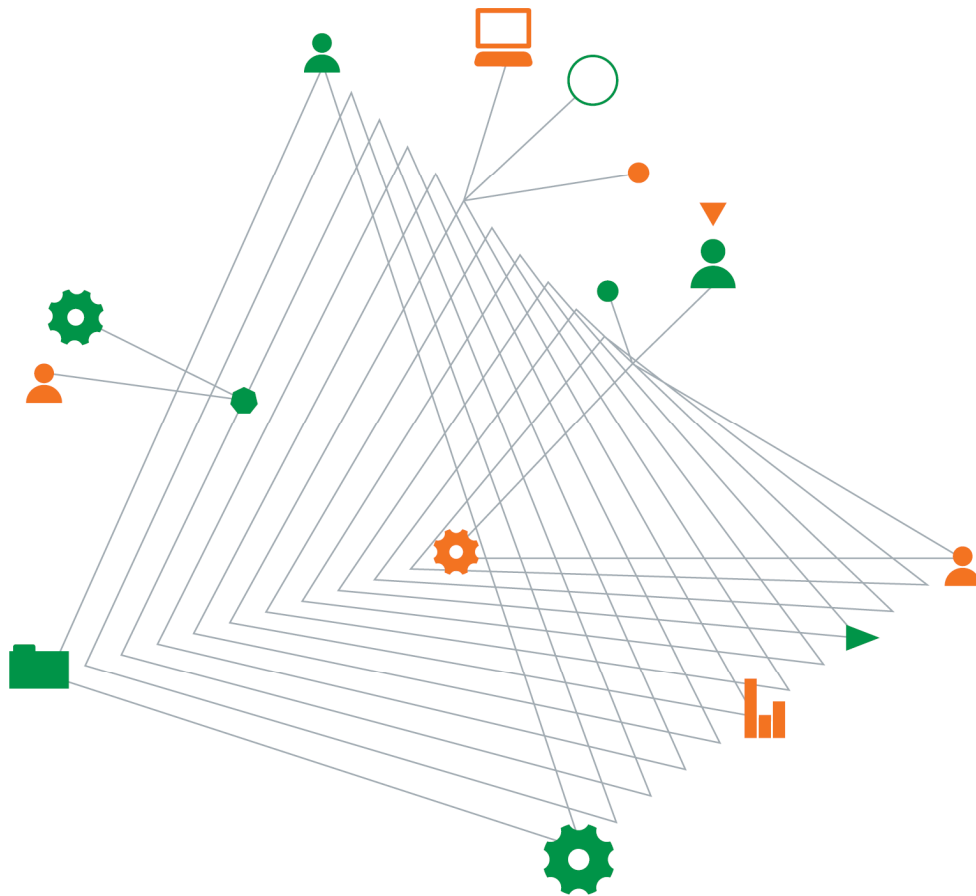


Richard Crookes Constructions

**Air Quality and Odour Management Plan
(AQOMP)**

Sydney Modern Gallery
Art Gallery Road, Sydney NSW

6 August 2021



Experience
comes to life
when it is
powered by
expertise

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Air Quality and Odour Management Plan (AQOMP)

Prepared for
Richard Crookes Constructions

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Table of Amendments

| Date | Chapter/Section | Amendments Made | By Whom |
|------------|--------------------------|---|---------|
| 17/06/2020 | Chapter 8, Table 4 | Site inspections – addition of water mist/spray as control measures | Coffey |
| 17/06/2020 | Chapter 8, Table 4 | Monitoring – deletion of dust deposition gauge monitoring requirement and instead particulate matter and respirable & inhalable dust monitoring recommended | Coffey |
| 17/06/2020 | Chapter 8, Table 4 | Monitoring – Inclusion of daily particulate monitoring (covering 2 fractions) for a month with equipment capable of remote logging and email/SMS alerts for exceedances | Coffey |
| 17/06/2020 | Chapter 8, Section 8.2.1 | New section added – Outcome of recent site audit conducted on 5 th June 2020 | Coffey |
| 06/08/2021 | Chapter 2, Section 2.1 | Site context and boundary updated (Figure 1) | Coffey |
| 06/08/2021 | Chapter 2, Section 2.2 | New additional sensitive receptors added including updated sensitive receptor map (figure 2) | Coffey |
| 06/08/2021 | Chapter 8, Table 4 | PM 10 and PM2.5 monitoring requirements | Coffey |

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1. Introduction

1.1. General

The Sydney Modern Gallery (SMG) is a planned major expansion of the existing Art Gallery adjacent to the Phillip Precinct of the Domain. The expansion is a separate building located north of the Eastern Distributor Motorway (EDM) in an area largely occupied by a disused Navy fuel bunker that was excavated into the hillside in the 1940's. The proposed gallery building will include several levels with different footprints that will involve further excavation west of the bunker adjacent to the EDM.

The SMG will be a multi-level structure. The entry level and Gallery 1 will be located over the existing EDM land bridge (RL 22.9m). The remaining four levels of galleries will be located north of the land bridge, will incorporate part of the disused fuel bunker and will also require excavation into the hillside to the west of the fuel bunker. Lowest gallery level coincides with the bunker floor at RL 1.15m.

Richard Crookes Constructions (RCC) requires an Air Quality and Odour Management Plan (AQOMP) for management of possible air quality and odour issues on the SMG site and to satisfy RCC's contract obligations associated with development of the SMG. RCC engaged Coffey Services Australia Pty Ltd (Coffey) to provide certain geotechnical and environmental professional services relevant to the SMG.

1.2. Objectives

The objectives of this AQOMP are to:

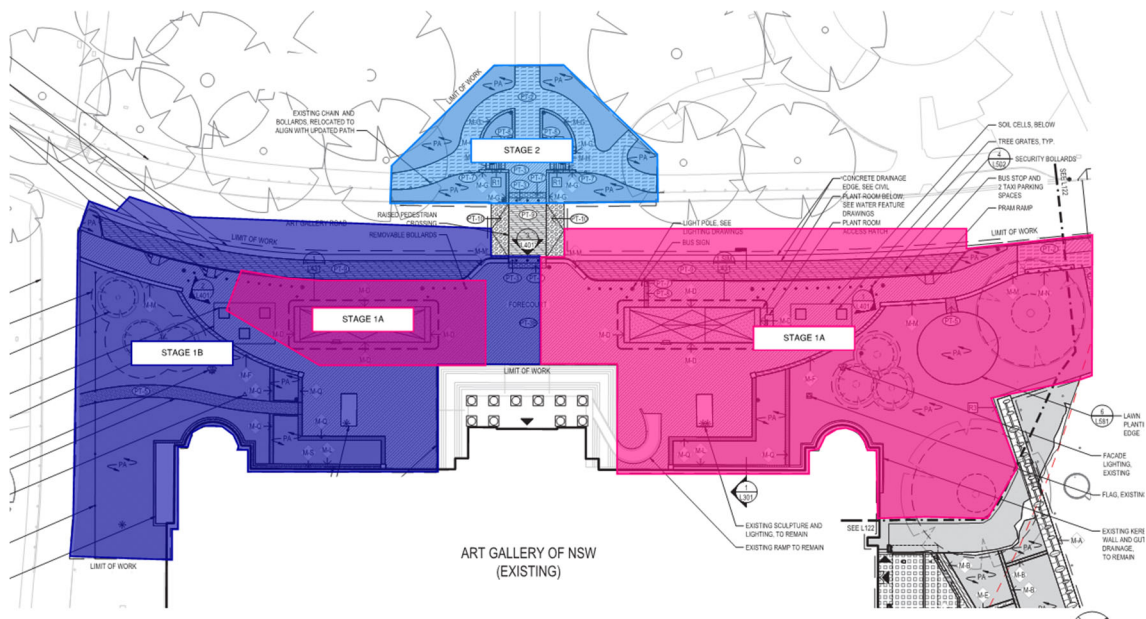
- Provide general guidance on the management of air quality and odour issues associated with remediation, excavation and construction;
- Provide guidance on the mitigation measures to be implemented during relevant construction activities; and
- Provide guidance on a monitoring program that enables assessment of the impacts of construction activities in potentially affected areas and/sensitive receptors.

2. Site description

2.1. Site location and identification

The site comprises the existing Gallery, the land bridge above the Cahill Expressway, and the land to the immediate north east of the Cahill Expressway. The majority of the land proposed to be developed lies on either the Cahill Expressway land bridge, or on Royal Botanic Gardens and Domain Trust land. The site's context and boundary is shown in Figure 1 below. The site is bounded by the Cahill Expressway (other than where the land bridge lies), Cowper Wharf Roadway and Lincoln Crescent (a local road). To the west, the site is bounded by the land bridge and Art Gallery Road.

Figure 1: Site Context and Boundary



2.2. Sensitive Receptors

The site is bound to the north and west by Royal Botanic Gardens and Domain Trust land, to the east by Lincoln Crescent and to the south by Cahill Expressway. There are two (2) sensitive receptors close to the development and are located immediately to the east and north of the site. The sensitive receptors are as below:

- Wharf Apartments – located to the east of the developments; ~~and~~
- Royal Botanic Gardens office building – located to the north of the development;
- Art Gallery of NSW; and
- The Terrace (Food and Dining Venue opposite the construction site).

Figure 2: Nearby Sensitive Receptors



3. Legal and other requirements

This section provides the relevant legislation and project requirements that apply to air quality and odour aspects of construction.

3.1. Legislation

Legislation relevant to air quality and odour management for the project includes:

- *Environmental Planning and Assessment Act 1979 (EP&A Act);*
- *Protection of the Environment Operations Act, 1997 (POEO Act); and*
- *Protection of the Environment Operations (Clean Air) regulation 2010 (POEO (Clean Air) Regulation 2010).*

The main guidelines, specification and policy documents relevant to this AQOMP include:

- National Environment Protection Council's (NEPC) – National Environment Protection Measure (NEPM) for Ambient Air Quality Guidelines;
- NSW EPA Local Government Air Quality Toolkit, Visual Guide: Dust from urban construction sites;
- AS/NZS 3580.1.1:2007 Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment OR AS 2922-1987 Ambient Air – Guide for the siting of sampling equipment;
- AS/NZS 3580.10.1:2003 Methods for sampling and analysis of ambient air – Determination of particulate matter – deposited matter – gravimetric method;
- Approved methods for the Sampling and Analysis of Air Pollutants in New South Wales (NSW DEC, 2006);
- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW DEC, 2005); and
- Guidance on the assessment of dust from demolition and construction (IAQM 2014). This provides guidance on how to assess the sensitivity of receptors and the risk of impact on those receptors due to the various components of the project construction

4. Existing Environments

4.1. Local Climate

Long-term meteorological data for the surrounding area is available from the Bureau of Meteorology (BoM) operated Automatic Weather Stations (AWS) at Observatory Hill and Fort Denison. The Observatory Hill AWS is located approximately 1,500 m north west of the site and records observations of a number of meteorological data including temperature, humidity and rainfall.

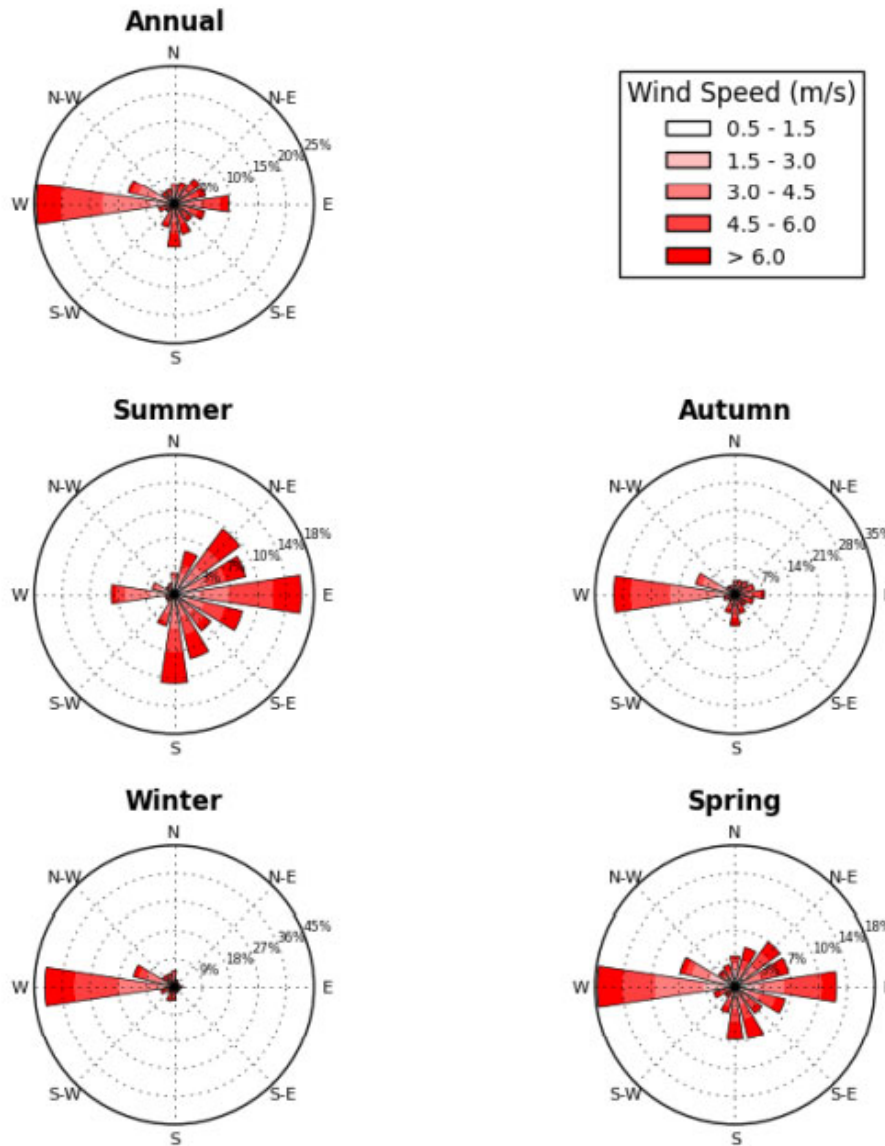
Long-term climate statistics are presented in Figure 3 below. Temperature data recorded at the Observatory Hill AWS indicates that January is the hottest month of the year, with a mean daily maximum temperature of 25.9°C. July is the coolest month with a mean daily minimum temperature of 8.1°C. June is the wettest month with an average rainfall of 132 mm falling over almost 9 days. There are on average 100 rain days per year, yielding 1213 mm of rain.

Figure 3: Long-term Climate Averages for Observatory Hill

| Observation | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|--|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|--------|
| 9am Mean Observations | | | | | | | | | | | | | |
| Temperature (°C) | 22.5 | 22.3 | 21.1 | 18.2 | 14.6 | 11.9 | 10.9 | 12.5 | 15.7 | 18.5 | 19.9 | 21.6 | 17.5 |
| Humidity (%) | 71 | 74 | 74 | 72 | 74 | 74 | 71 | 66 | 62 | 61 | 66 | 67 | 69 |
| 3pm Mean Observations | | | | | | | | | | | | | |
| Temperature (°C) | 24.8 | 24.9 | 24.0 | 22.0 | 19.4 | 16.9 | 16.4 | 17.5 | 19.2 | 20.7 | 22.1 | 23.8 | 21.0 |
| Humidity (%) | 62 | 64 | 62 | 59 | 57 | 57 | 51 | 49 | 51 | 56 | 58 | 59 | 57 |
| Daily Minimum and Maximum Temperatures | | | | | | | | | | | | | |
| Minimum (°C) | 18.7 | 18.8 | 17.6 | 14.7 | 11.6 | 9.3 | 8.1 | 9.0 | 11.1 | 13.6 | 15.6 | 17.5 | 13.8 |
| Maximum (°C) | 25.9 | 25.8 | 24.8 | 22.4 | 19.5 | 17.0 | 16.3 | 17.8 | 20.0 | 22.1 | 23.6 | 25.2 | 21.7 |
| Rainfall | | | | | | | | | | | | | |
| Rainfall (mm) | 101.1 | 118.0 | 129.7 | 127.1 | 119.9 | 132.0 | 97.4 | 80.7 | 68.4 | 76.9 | 84.3 | 77.3 | 1212.6 |
| Rain days | 8.6 | 9.0 | 9.8 | 9.0 | 8.7 | 8.7 | 7.5 | 7.2 | 7.2 | 7.9 | 8.4 | 8.0 | 100.0 |

As no anemometer is present at Observatory Hill, wind speed and direction observations were taken from the Fort Denison AWS located approximately 1.6km north of the site. Windrose plots showing the distribution of wind direction and wind speed at the Fort Denison BoM AWS between 2008 and 2013 are present in Figure 4 overleaf.

Figure 4: Windrose Plots



4.2. Ambient Air Quality

The NSW Office of Environment and Heritage (OEH) operates a network of air quality monitoring sites across the state. The nearest OEH air quality monitoring station to the Gallery site is located at Rozelle, approximately 5 km to the west.

Ambient pollution concentrations recorded at the Rozelle site between 1 July 2013 and 30 June 2014 Figure 5 overleaf.

Figure 5: Existing Ambient Pollutant Concentrations – Rozelle Monitoring Station (July 2013 to July 2014)

| Pollutant | Averaging Period | Background Concentration ($\mu\text{g}/\text{m}^3$) | Impact Assessment Criteria ($\mu\text{g}/\text{m}^3$) |
|------------------|-------------------------|---|---|
| PM ₁₀ | 24 hour Maximum | 59 | 50 |
| | Annual Average | 19 | 30 |
| TSP ¹ | Annual Average | 39 | 90 |

1 Scaled from PM₁₀ concentrations
 2 Not assessed. Used to calculate NO₂ transformation

5. Air Quality Assessment Criteria

5.1. Introduction

The NSW EPA’s Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (DEC, 2005) sets out applicable impact assessment criteria for a number of air pollutants. Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to air quality.

5.2. Pollutants of Interest

Wilkinson Murray conducted an initial Air Quality Assessment for the Sydney Modern Project (*Appendix AJ – Air Quality Assessment Report dated November 2017*), and identified that the major potential for air quality impacts would be associated with particulates or dust from excavation and construction works, and soil contaminants and/or odour in the remediation area. As per the findings, the pollutants of concern are:

- Particulate matter;
- Heavy metals in the form of lead;
- VOCs (specifically BTEX); and
- Odour.

5.3. Assessment Criteria

The ambient air quality criteria for the pollutants considered in this assessment are shown in the Table 1 overleaf.

Table 1: Impact Assessment Criteria

| Pollutant | Averaging Period | Criteria ($\mu\text{g}/\text{m}^3$) |
|--|------------------|---------------------------------------|
| Combustion Products and Dust | | |
| Total Suspended Particulates (TSP) | Annual | 90 |
| Fine Particulate Matter (PM_{10}) | 24 hours | 50 |
| | Annual | 30 |
| Soil Contaminants | | |
| Benzene | 1 hour | 29 |
| Ethylbenzene | 1 hour | 8,000 |
| Toluene | 1 hour | 360 |
| Xylenes | 1 hour | 190 |
| Lead | Annual | 0.5 |

A number of soil contaminants identified within the site have the potential to cause nuisance odours. Odour in a regulatory context needs to be considered in two similar, but different ways depending on the situation. It should be noted that odour refers to complex mixtures of odours, and not 'pure' odour arising from a single chemical. Odour from a single, known chemical very rarely occurs (when it does, it is best to consider that specific chemical in terms of its concentration in the air). In most situations, odour will be comprised of a cocktail of many substances that is referred to as a complex mixture of odorous pollutants, or more simply odour.

The NSW criteria for acceptable levels of odour range from 2 to 7 Odour Units (OU), with the more stringent 2 OU criteria applicable to densely populated urban areas and the 7 OU criteria applicable to sparsely populated rural areas. As the area surrounding the site is highly populated the applicable impact assessment criteria for odour is 2.0 OU. Table 2 below shows the impact assessment criteria for various complex mixtures of odorous pollutants on populations.

Table 2: Impact Assessment Criteria - Complex Mixtures of Odorous Pollutants

| Population of Affected Community | Impact Assessment Criteria (OU)* |
|--|----------------------------------|
| Urban (≥ 2000) and/or schools and hospitals | 2.0 |
| ~500 | 3.0 |
| ~125 | 4.0 |
| ~30 | 5.0 |
| ~10 | 6.0 |
| Single rural residence (≤ 2) | 7.0 |

* 99th percentile nose-response time

6. Environmental Aspects and Impacts

6.1. Construction Activities

Construction activities that have the potential to cause impacts to air quality include:

- General earthworks particularly during site establishment;
- Bulk earthworks;
- Application of lime during acid sulfate soil treatment;
- Topsoil / material handling including stockpiling, material loading and material haulage;
- Vehicular movements over unpaved surface;
- Wind erosion of exposed areas and temporary stockpiles;
- Tracking of dirt onto roads;
- Air emissions, other than dust, which may be generated by construction activities include:
 - Vehicle and plant exhaust emissions, which may be excessive if vehicles and plant are poorly maintained;
 - Odours/gases released during:
 - Excavations of organic or contaminated materials;
 - During sealing works;
 - Construction amenities – ablution facilities, waste storage, etc.

6.2. Dust Generation

In addition to the inherent risks of specific construction activities creating the potential to generate dust, a number of other environment factors also affect the likelihood of dust emissions. These include:

- Wind direction – determines whether dust and suspended particles are transported in the direction of the sensitive receivers;
- Wind speed – governs the potential suspension and drift resistance of particles;
- Soil type – more erodible soil types have an increased soil or dust erosion potential;
- Soil moisture – increased soil moisture reduces soil or dust erosion potential; and
- Rainfall or dew – rainfall or heavy dew that wets the surface of the soil and reduces the risk of dust generation.

6.3. Impacts

The potentials for impacts on air quality will depend on a number of factors. Potential impacts attributable to construction might include:

- Deposition of dust on surfaces where it may cause damage and/or lead to a need for increases cleaning or repair;
- Aesthetic effects that arise from visible airborne dust plumes and from deposits of dust on surfaces;

- Potential adverse health effects including eye, nose and throat irritation from excessive inhalation of fine particles;
- Impacts on residential sensitive receivers, including impacts on living areas, swimming pools and general amenities; and
- Complaints from the public relating to dust and/odours.

7. Air Quality Management and Mitigation Measures

A range of environmental requirements and control measures were identified in various environmental documents, including the EIS, Development Consent, supplementary assessments and from recent experience on similar projects. Environmental safeguards to manage air quality and odour impacts prior to and during construction works are identified in Table 3 overleaf. Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. These controls include the relevant legal and project requirements identified in various documents and standard practice measures specific to management of air quality and odour emissions.

Table 3: Project controls associated with management of air quality and odour emissions

| Reference | Measure/Requirement | Source/Resource Needed | When to implement | Responsibility |
|------------------|--|---|------------------------------------|--|
| General | | | | |
| AQ1 | Training will be provided to all project personnel, including relevant sub-contractors on sound air quality control practices and the requirements from this plan through inductions, toolboxes and targeted training | Induction | Pre-construction/Construction | Site Manager, Environmental Manager |
| AQ2 | Air quality control measures from this plan will be included in relevant Safe Work Method Statements (SWMS) | This plan | Pre-construction/Construction | Site Manager, Environmental Manager |
| AQ3 | Worker amenities located in a suitable location that would not expose local residential properties or commercial premises to bad odour, minimising omission of smoke and odours from worker amenities | Ancillary Facilities Assessment | Pre-construction/Construction | Site Manager |
| AQ4 | Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible | Construction Area Plan/Work Pack, Site Environmental Plan | Pre-construction/Construction | Site Manager, Environmental Manager |
| AQ5 | Ensure all air quality risks are considered as part of the development of Construction Area Plan | Site Environmental Plan | Pre-construction/Construction | Site Manager, Environmental Manager |
| Incidents | | | | |
| AQ6 | All environmental incidents will be managed in accordance with the RCC Incident Classification and Reporting Procedure. Where incidents cause or are likely to cause material harm to the environment, the incident will be immediately reported to NSW EPA and other authorities as per the Pollution Incident Response Management Plan | RCC Incident Reporting and Investigation Procedure | Construction/excavation/earthworks | Environmental Manager/Environmental Advisor/Site Manager |

| | | | | |
|-----------------------|---|---|---|---|
| AQ7 | Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation. Exceptional incidents include: <ul style="list-style-type: none"> • Wind speeds above 25 km/hr; • Dust emissions from non-project related construction projects; and • Dust and/or air emissions from other non-project related sources e.g. dust storms | Site diaries | Construction/excavation/earthworks | Site Supervisor |
| Community | | | | |
| AQ8 | Implement the Community Communication Strategy and associated community engagement activities before work commences on site. Notification of nearby residents and businesses may include letters and/or door knocking residents. | Community Communication Strategy | Pre-construction/ Throughout the entire duration of project | Community Relations Manager |
| AQ9 | Display the name and contact details of person(s) accountable for air quality and dust issues at the boundaries of each construction area. This may be the project hotline, environment manager/engineer or the site manager. | Community Communication Strategy/Construction Area Plan | Throughout the entire duration of project | Site Manager |
| AQ10 | Record all dust and air quality complaints in accordance with the Construction Complaints Management System and make the complaints log available to the Secretary upon request. | Complaints Management System | Throughout the entire duration of project | Site Manager, Community Relations Manager |
| Dust - general | | | | |
| AQ11 | Weather warnings and wind speeds above 25 km/hr to be reported to the Site Supervisor and Construction Teams | Daily prestart/toolbox | Throughout the entire duration of project | Environmental Advisor, Site Manager |
| AQ12 | Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as soon as practicable. | Site Environmental Plan/Construction Area Plan | Throughout the entire duration of project | Project Engineer, Site Supervisor |

| | | | | |
|-----------------------------|---|--|---|---|
| AQ13 | Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate | Site Environmental Plan/Construction Area Plan | Throughout the entire duration of project | Site Manager, Project Engineer, Environmental Manager |
| AQ14 | Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using appropriate cleaning methods. | Construction Area Plan, Spill Management Procedure (Construction Soil and Water Management Plan) | Throughout the entire duration of project | Site Manager, Project Engineer, Site Supervisor |
| AQ15 | Avoid dry sweeping of large areas | Construction Area Plan | Throughout the entire duration of project | Site Supervisor |
| Combustion Emissions | | | | |
| AQ15 | All construction plant and equipment must be maintained and operated to minimise emissions. Visible emissions should not be emitted for any period greater than 10 consecutive seconds. Notify EA of any defective emission controls. | POEO Act, RCC Standard Practice, Construction Area Plan | Throughout the entire duration of project | Project Engineer, Site Supervisor |
| AQ16 | <p>Ensure all construction vehicles comply with their relevant emission standards:</p> <ul style="list-style-type: none"> • Project would comply with the relevant emissions standards in Australian Design Rules (for heavy duty engines and vehicles); • Strategies for minimising air emissions from off road diesel equipment, including graders, bulldozers and loaders; and • Confirmation that all off road diesel equipment would meet best available diesel emissions standards or be fitted with an appropriate diesel exhaust treatment device where possible | Construction Area Plan | Throughout the entire duration of project | Project Engineer, Site Supervisor |
| AQ17 | Ensure that, where practicable engine idling is minimised when stationary or alternatively turn engines off while parked on site | Environmental Work Method Statements | Throughout the entire duration of project | Site Supervisor |

| | | | | |
|-------------------------------------|---|---|---|--|
| AQ18 | Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable and possible, and to connect to mains power as soon as possible. If generators are to be used, they are to be sited away from receivers | Environmental Work Method Statements | Throughout the entire duration of project | Project Engineer, Site Supervisor |
| Dust and Material Management | | | | |
| AQ19 | Limit exposed/excavation areas outside of the excavation enclosures, where feasible | Construction Area Plan, Construction Soil Management Plan | Throughout the entire duration of the project | Construction Manager, Project Engineer, Site Supervisor, Environmental Advisor |
| AQ20 | Seal haul roads outside the remediation areas. Limit accessibility to roads for construction vehicles, and implement site speed limits | Construction Area Plan | Throughout the entire duration of the project | Site Manager, Project Engineer |
| AQ21 | Cover all loads coming onto the site and departing site to prevent spillage/dust emissions | Environmental Work Method Statements, Air Quality Management and Monitoring Procedure | Throughout the entire duration of the project | Project Engineer, Site Supervisor |
| AQ22 | Stabilised access, rumble grids, wash bays or similar must be established for site entries and exits to minimise mud on public roads. Sweepers shall be used periodically to clean public roads where mud has been deposited. | Environmental Work Method Statements, Site Environmental Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor |
| AQ23 | Use dust sealants or hydromulch on exposed areas vulnerable to wind erosion | RCC Standard Practice, Environmental Work Method Statements | Throughout the entire duration of the project | Project Engineer, Site Supervisor |
| AQ24 | Where feasible, reduce handling/stockpiling of excavated materials through pre-testing and validation, allowing direct transport off-site | Site Environmental Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor, Environmental Advisor |
| AQ25 | Use solid 2.1m high hoardings at the site perimeter and wind barriers at internal excavation boundaries where possible. Water | Construction Area Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor, Environmental Advisor |

| | | | | |
|---|--|---|---|---|
| | <u>filled barriers with shade cloths to be utilised in areas/elevation where 2.1m solid hoardings cannot be intalled</u> | | | |
| AQ26 | Sweep and water haul routes, materials handling areas, site entry points and other areas as needed. | Construction Area Plan, Site Environmental Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor, Environmental Advisor |
| AQ27 | Adjust work practices based on wind and weather conditions, and real time dust monitoring | Construction Area Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor, Environmental Advisor |
| AQ28 | Undertake emergency dust suppression if needed during dust generating conditions (e.g. dry & windy weather) during longer non-working periods (e.g. long weekends, holidays) | Construction Area Plan, Site Environmental Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor, Environmental Manager |
| Stockpile Management | | | | |
| AQ29 | Maintain all stockpiles at manageable sizes to allow covering or spraying. Locate stockpiles to minimise wind erosion | Construction Area Plan, Site Environmental Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor, Environmental Advisor |
| AQ30 | Cover any stockpiles spoil material identified as being restricted, hazardous or special waste whilst no active, including overnight. | Site Environmental Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor, Environmental Advisor |
| AQ31 | Use water sprays to suppress dust emissions from spoil stockpiles, loading, and unloading activities, unless soil is damp | Site Environmental Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor, Environmental Advisor |
| AQ32 | Apply covers, odour sealant or odour suppressant to control odours generated at the point of excavation or at stockpiles, where required outside excavation enclosures. Where odorous contaminated spoil is encountered, implement contingency measures | Site Environmental Plan, Construction Area Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor, Environmental Advisor, Environmental Manager |
| Control Odours during excavation & stockpiling of contaminated soils | | | | |

| | | | | |
|------|--|--|--|---|
| AQ33 | Ensure an air quality consultant or hygienist is present on-site during work hours to undertake monitoring, managing odour suppressants and controls, reporting and implementing contingency measures if required | Air Quality Management & Monitoring Procedure, Site Environmental Plan | Excavation and earthworks | Project Engineer, Site Supervisor, Environmental Advisor, Environmental Manager |
| AQ34 | Undertaking the excavation works in a staged manner to limit the surface area of odorous material exposed | Site Environmental Plan, Environmental Work Method Statements | Excavation and earthworks | Project Engineer, Site Supervisor, Environmental Advisor, Environmental Manager |
| AQ35 | Application of odour suppressants e.g. Biosolve via spray applicator | Site Environmental Plan, Environmental Work Method Statements | Excavation and stockpiling of contaminated soil | Project Engineer, Site Supervisor, Environmental Advisor, Environmental Manager |
| AQ36 | Covering of the stockpiled soil to suppress the release of odours | Site Environmental Plan, Environmental Work Method Statements | Excavation and stockpiling of contaminated soil | Project Engineer, Site Supervisor, Environmental Advisor, Environmental Manager |
| AQ37 | Implement a reactive monitoring regime to allow early detection of air quality issues associated with remedial works, and allow real time assessment of various remediation works activities. Monitoring to be conducted at the Wharf Apartments (SR1) and Royal Botanic Gardens Offices (SR2) | Air Quality Management & Monitoring Procedure, Site Environmental Plan | Throughout the entire duration of the project | Project Engineer, Site Supervisor, Environmental Advisor, Environmental Manager |
| AQ38 | Monitoring of ambient air within the fuel bunkers during <ul style="list-style-type: none"> • Accessing the fuel bunkers for initial assessments. Monitoring should be carried out for confined spaces gases and VOCs (using PID) • Excavation/demolition of fuel bunkers – control of odours by odour suppression methods | Air Quality Management & Monitoring Procedure, Site Environmental Plan | Demolition/excavation/ working within fuel bunkers | Project Engineer, Site Supervisor, Environmental Advisor, Environmental Manager |

8. Review and Improvement

Indicative inspections, observations, monitoring and reporting requirements relevant to the management of air quality are identified in Table 4 below.

Table 4: Monitoring requirements relevant to management of air quality & odours

| Item | Frequency | Standards/Equipment | Reporting | Responsibility |
|---|--|--|--|--|
| Inspections | | | | |
| Site inspection | Daily | No visible dust emissions from site. Minimise gaseous emissions. Awareness of impending weather. | N/A | Site Supervisor, engineers, environmental team |
| Site inspection | Daily | No mud tracking off-site; check main exit/entry points and material on public roads. Dust controls (e.g. water mist/sprays , watering down of materials, temporary coverage of exposed areas) are being implemented and are working effectively. | Daily Dairy/Site Dairy | Site Supervisor/Environment Advisor |
| Site inspection | Weekly | No visible dust emissions. No continuous visible vehicle/plant/equipment emissions for longer than 10 seconds (POEO (Clean Air) Regulation 2010). | Environmental Inspection Checklist | Environment Advisor |
| Site inspection | Weekly | Haul road integrity to be maintained. | Site log book/Environmental Inspection Checklist | Site Supervisor or Environmental Advisor |
| Plant / equipment inspections including maintenance and emissions | Prior to use | Plant/equipment in good working order. No continuous visible vehicle/plant/equipment emissions for longer than 10 seconds (POEO (Clean Air) Regulation 2010). | Plant and vehicle inspection logs | Site Supervisor |
| Visual surveillance | Continual during activities with high potential to produce dust and during prolonged dry or windy conditions | No visible dust emissions. | Site Supervisor's Daily Dairy | Site Supervisor |
| Monitoring | | | | |
| Prevailing wind conditions and weather forecast from Bureau of Meteorology to be reviewed | Daily | Extreme weather, winds >25 km/hr. | Environmental Advisor to report to Site Supervisor | Environmental Advisor |
| Rainfall monitoring | Daily | Rainfall gauges will be checked after rainfall events. | Monitoring results | Environmental Advisor |

| | | | | |
|---|--|---|---|--|
| Dust Deposition Monitoring | Dust deposition monitoring—throughout during remediation works. During construction phase: Responsive monitoring if RCC receives any complaints from the sensitive receptors. | Approved Methods for Sampling and Analysis of Air Pollutants in NSW. Approved Methods for the Modelling and Assessment of Air Pollutants in NSW. Dust deposition gauges will be located in proximity to each of the construction compounds listed below. Precise locations for the gauges will be determined in accordance with the above guidelines and in consultation with the relevant landowner, where necessary: <ul style="list-style-type: none"> ● Wharf Apartment Boundary (SR1) — Northern end ● Wharf Apartment Boundary (SR1) — Southern end ● Royal Botanic Garden Offices (SR2) ● North of development zone ● South of development or close proximity to existing Art Gallery building | As agreed with RCC and requesting party/authority | Environmental and Sustainability Manager |
| PM10 & PM2.5 _{PM10} | Continuous—during excavation and earthworks. On an as needed basis (i.e. complaints from sensitive receptors or dust generating activities being carried out) | <u>AirMetER DX 2 – Fraction Optical Particle Counter.</u> Instrument to measure PM2.5 and PM10. Instrument capabilities to include threshold alert management (SMS and or email) Aeroqual Dust Sentry/DustTrak or similar. | As agreed with RCC and requesting party/authority SMS and email alerts for exceedances. Daily reporting Daily reports during monitoring | Environmental and Sustainability Manager |
| Lead (Pb) | During remediation works | Static air monitoring close to the sensitive receptor locations and/ or on-site boundary fences. | As agreed with RCC and requesting party/authority | Environmental and Sustainability Manager |
| Total Volatile Organic Compounds (TVOC) | Daily – only during remediation works | PID | Daily air monitoring logs | Environmental and Sustainability Manager |
| Odour | Morning, followed by afternoon if odour exceeds trigger level – only during remediation works | Field Olfactometer – Nasal Ranger Operational Manual V6.2. | Daily site logs and as agreed with RCC and requesting party/authority | Environmental and Sustainability Manager |

If air/dust monitoring indicates that mitigation measures are not fully effective or if dust complaints are received during construction, additional air/dust mitigation controls may be implemented. This AQOMP will be amended accordingly.

8.1. Continuous Improvement

Continuous improvement of this Plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

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

8.2. Auditing

It is recommended that audits (both internal and external) should be undertaken to assess the effectiveness of environmental controls in place, compliance with this plan, development consents and other relevant approvals, licenses and guidelines.

8.3. Training

It is recommended that site induction training should cover the site-specific air quality and odour management issues. The induction training should address elements related to air quality and odour management including:

- Existence and requirements of this plan;
- Relevant legislation;
- Roles and responsibilities for air quality management; and
- Air quality mitigation and management measures.

Targeted training in the form of toolbox talks or specific training should also be provided to personnel with key role in air quality management.

9. Limitations

It is the nature of air quality and odour investigations that the degree of variability in site conditions cannot be known completely and no sampling and analysis program can eliminate all uncertainty concerning the condition of the site. Professional judgement must be exercised in the collection and interpretation of the data.

In preparing the management plan, current guidelines for assessment and management were followed. This work has been conducted in good faith in accordance with Coffey's understanding of the client's brief and general accepted practice for environmental consulting.

This management plan was prepared for Richard Crookes Constructions with the objectives of providing general guidance on the management of air quality and odours. No warranty, expressed or implied, is made as to the information and professional advice included in this report. Anyone using this document does so at their own risk and should satisfy themselves concerning the applicability of its application and where necessary should seek expert advice in relation to the particular situation.

10. References

Coffey (2016) Sydney Modern Project – Groundwater monitoring adjacent to former fuel bunkers. GEOTLCOV25037AC-L01a. 19 May 2016.

Wilkinson Murray (2017) Sydney Modern Project, Art Gallery of NSW Extension – Air Quality Assessment

National Environment Protection Council's (NEPC) – NEPM for Ambient Air Quality Guidelines.

Protection of the Environment Operations (Clean Air) Regulation (2010)

AS2922 Ambient Air Guide for Citing of Sampling Equipment

AS 3580.10.1-1991 Methods of Sampling Analysis of Ambient Air

DEC (2005) - Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW

Protection of the Environment Operations Act 1997 (POEO Act)

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