ACOUSTICS AND AIR

ST MARYS DEVELOPMENT SITE
BASINS C & V6

AIR QUALITY CONSTRUCTION IMPACTS

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PREPARED FOR

MARYLAND DEVELOPMENT COMPANY PTY LTD
LEVEL 14, TOWER THREE, INTERNATIONAL TOWERS SYDNEY
EXCHANGE PLACE, 300 BARANGAROO AVENUE
BARANGAROO NSW 2000

WILKINSON MURRAY

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Final	20 November 2019	Sam Demasi	John Wassermann

Note

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Wilkinson Murray is an independent firm established in 1962, originally as Carr & Wilkinson. In 1976 Barry Murray joined founding partner Roger Wilkinson and the firm adopted the name which remains today. From a successful operation in Australia, Wilkinson Murray expanded its reach into Asia by opening a Hong Kong office early in 2006. Today, with offices in Sydney, Newcastle, Wollongong, Orange, Queensland and Hong Kong, Wilkinson Murray services the entire Asia-Pacific region.

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GLOSSARY OF AIR QUALITY TERMS

Air Pollution – The presence of contaminants or pollutant substances in the air that interfere with human health or welfare or produce other harmful environmental effects.

Air Quality Standards – The level of pollutants prescribed by regulations that are not to be exceeded during a given time in a defined area.

Air Toxics – Any air pollutant for which a national ambient air quality standard (NAAQS) does not exist (i.e. excluding ozone, carbon monoxide, PM-10, sulphur dioxide, nitrogen oxide) that may reasonably be anticipated to cause cancer; respiratory, cardiovascular, or developmental effects; reproductive dysfunctions, neurological disorders, heritable gene mutations, or other serious or irreversible chronic or acute health effects in humans.

Airborne Particulates – Total suspended particulate matter found in the atmosphere as solid particles or liquid droplets. Chemical composition of particulates varies widely, depending on location and time of year. Sources of airborne particulates include dust, emissions from industrial processes, combustion products from the burning of wood and coal, combustion products associated with motor vehicle or non-road engine exhausts, and reactions to gases in the atmosphere.

Area Source – Any source of air pollution that is released over a relatively small area, but which cannot be classified as a point source. Such sources may include vehicles and other small engines, small businesses and household activities, or biogenic sources, such as a forest that releases hydrocarbons, may be referred to as nonpoint source.

Concentration – The relative amount of a substance mixed with another substance. Examples are 5 ppm of carbon monoxide in air and 1 mg/l of iron in water.

Emission – Release of pollutants into the air from a source. We say sources emit pollutants.

Emission Factor – The relationship between the amount of pollution produced and the amount of raw material processed. For example, an emission factor for a blast furnace making iron would be the number of pounds of particulates per ton of raw materials.

Emission Inventory – A listing, by source, of the amount of air pollutants discharged into the atmosphere of a community; used to establish emission standards.

Flow Rate – The rate, expressed in gallons -or litres-per-hour, at which a fluid escapes from a hole or fissure in a tank. Such measurements are also made of liquid waste, effluent, and surface water movement.

Fugitive Emissions – Emissions not caught by a capture system.

Hydrocarbons (HC) – Chemical compounds that consist entirely of carbon and hydrogen.

Hydrogen Sulphide (H_2S) – Gas emitted during organic decomposition. Also, a by-product of oil refining and burning. Smells like rotten eggs and, in heavy concentration, can kill or cause illness.

Inhalable Particles – All dust capable of entering the human respiratory tract.

Nitric Oxide (NO) – A gas formed by combustion under high temperature and high pressure in an internal combustion engine. NO is converted by sunlight and photochemical processes in ambient air to nitrogen oxide. NO is a precursor of ground-level ozone pollution, or smog.

Nitrogen Dioxide (NO_2) – The result of nitric oxide combining with oxygen in the atmosphere; major component of photochemical smog.

Nitrogen Oxides (NO_x) – A criteria air polluant. Nitrogen oxides are produced from burning fuels, including gasoline and coal. Nitrogen oxides are smog formers, which react with volatile organic compounds to form smog. Nitrogen oxides are also major components of acid rain.

Mobile Sources – Moving objects that release pollution; mobile sources include cars, trucks, buses, planes, trains, motorcycles and gasoline-powered lawn mowers.

Particulates; Particulate Matter (PM-10) – A criteria air pollutant. Particulate matter includes dust, soot and other tiny bits of solid materials that are released into and move around in the air. Particulates are produced by many sources, including burning of diesel fuels by trucks and buses, incineration of garbage, mixing and application of fertilizers and pesticides, road construction, industrial processes such as steel making, mining operations, agricultural burning (field and slash burning), and operation of fireplaces and woodstoves. Particulate pollution can cause eye, nose and throat irritation and other health problems.

Parts Per Billion (ppb)/Parts Per Million (ppm) – Units commonly used to express contamination ratios, as in establishing the maximum permissible amount of a contaminant in water, land, or air.

PM10/PM2.5 – PM10 is measure of particles in the atmosphere with a diameter of less than 10 or equal to a nominal 10 micrometers. PM2.5 is a measure of smaller particles in the air.

Point Source – A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g. a pipe, ditch, ship, ore pit, factory smokestack.

Scrubber – An air pollution device that uses a spray of water or reactant or a dry process to trap pollutants in emissions.

Source – Any place or object from which pollutants are released.

Stack – A chimney, smokestack, or vertical pipe that discharges used air.

Stationary Source – A place or object from which pollutants are released and which does not move around. Stationary sources include power plants, gas stations, incinerators, houses etc.

Temperature Inversion – One of the weather conditions that are often associated with serious smog episodes in some portions of the country. In a temperature inversion, air does not rise because it is trapped near the ground by a layer of warmer air above it. Pollutants, especially smog and smog-forming chemicals, including volatile organic compounds, are trapped close to the ground. As people continue driving and sources other than motor vehicles continue to release smog-forming pollutants into the air, the smog level keeps getting worse.

1 INTRODUCTION

It is proposed to construct two detention basins (Basin C and Basin V6) to detain, treat and attenuate stormwater runoff from Village 3 and Village 6 that form part of the Jordan Springs development. The basins are located to the north-western extent of the St Marys Development Site (within Wianamatta Regional Park). The Basins would act as wetlands and act as water quality improvement basins with the provision for active stormwater detention during high flows.

Basin C will have a surface area of approximately 1.8 hectares and a notional depth of 1.7m, whereas Basin V6 will have a surface area of approximately 0.3 hectares and a notional depth of 1.6m.

Each basin is designed to contribute to the water quantity and quality management objectives under the *Sydney Regional Environmental Plan No. 30 – St Marys* (SREP 30) and Penrith City Council's (Council) Water Sensitive Urban Design Policy (December 2013). The basins will incorporate the features for both water quality treatment and detention including a drainage inlet point, low level culvert outlet, spillway with erosion protection and vegetated slopes to provide effective nutrient removal. An access track along the side of each basin with access ramps will be constructed for regular inspection and maintenance access.

Wilkinson Murray Pty Limited (WM) has been commissioned by Maryland Development Company Pty Ltd (MDC) to undertake an air quality assessment as required by the Secretary's Environmental Assessment Requirements (SEAR) 1360, reissued 14 October 2019 to accompany an Environmental Impact Assessment (EIS). The relevant section of the SEAR is reproduced below:

> *"air quality – including:*
>
> - *a description of all potential sources of air and odour emissions;*
> - *an air quality impact assessment in accordance with relevant Environment Protection Authority guidelines; and*
> - *a description and appraisal of air quality impact mitigation and monitoring measures"*

During the operation of the Basins, there are no significant odours or air quality impacts expected.

The construction of the Basins is also not expected to result in significant odours.

During construction however, and particularly the earthworks and haulage stage, dust will be generated and may impact the surrounding receivers. On this basis, the assessment will focus on dust impacts occurring during the construction stage only.

As required by the SEARS, Environmental Protection Authority (EPA) guideline documents have been considered in preparing this assessment, however it is noted that the EPA does not at this stage have specific guidelines to consider dust from construction sites in terms of a risk assessment and management approach. It has developed a guideline entitled '*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*" (2017), however, this guideline considers detailed modelling approaches and is not specifically relevant to construction dust impacts. A detailed modelling approach is not necessary for short term construction impacts that can be managed.

A risk-based approach has however been developed in the United Kingdom by the Institute of Air Quality Management (IAQM). The guideline is entitled "*IAQM Guidance on the Assessment of Dust from Demolition and Construction"* (IAQM, 2014).

This approach has been widely used for performing qualitative assessments of dust emissions from construction sites and has been used in NSW by Wilkinson Murray and other consultants.

Furthermore, it has been accepted as a suitable approach in the absence of any guidance by Australian regulatory authorities.

Mr Sam Demasi is suitability qualified to prepare a Construction Air Quality (Dust) Impact Statement. He is employed as an Associate of Wilkinson Murray and has been involved in many similar construction projects and prepared many similar assessments.

A review of this report shall be undertaken by Mr John Wassermann, a Director of Wilkinson Murray with over 30 years' experience in the field of acoustics and air quality. He has been involved in many similar construction projects and prepared many construction impact statements and management plans. He is a member of the Australian Acoustical Society (AAS) and of Clean Air Society of Australia & New Zealand (CASANZ).

Wilkinson Murray is a member firm of CASANZ.

2 SITE DESCRIPTION & SURROUNDING SENSITIVE RECEIVERS

The basins are located to the north-western extent of the St Marys Development Site (within Wianamatta Regional Park) at Llandilo, Sydney.

Penrith City Council is the local government.

Basin C will have a surface area of approximately 1.8 hectares and a notional depth of 1.7m, whereas Basin V6 will have a surface area of approximately 0.3 hectares and a notional depth of 1.6m. The main work locations between the two basins are separated by approximately 320m.

The immediate area around the basins is typically Regional Parkland. The closest residential receivers are single and double storey free standing houses in all locations. These residential receivers are likely to be impacted by dust generated by the works associated with the site.

Figure 2-1 shows both basins and the surrounding area including the sensitive receivers. All residential receivers identified are single and double storey, free standing houses that have a clear line of site to works unless a solid boundary fence exists.

Xavier College includes both single and double storey buildings. The grounds are closest to the works occurring on-site. Both the grounds and class rooms are partially shielded from the basin works occurring on-site.

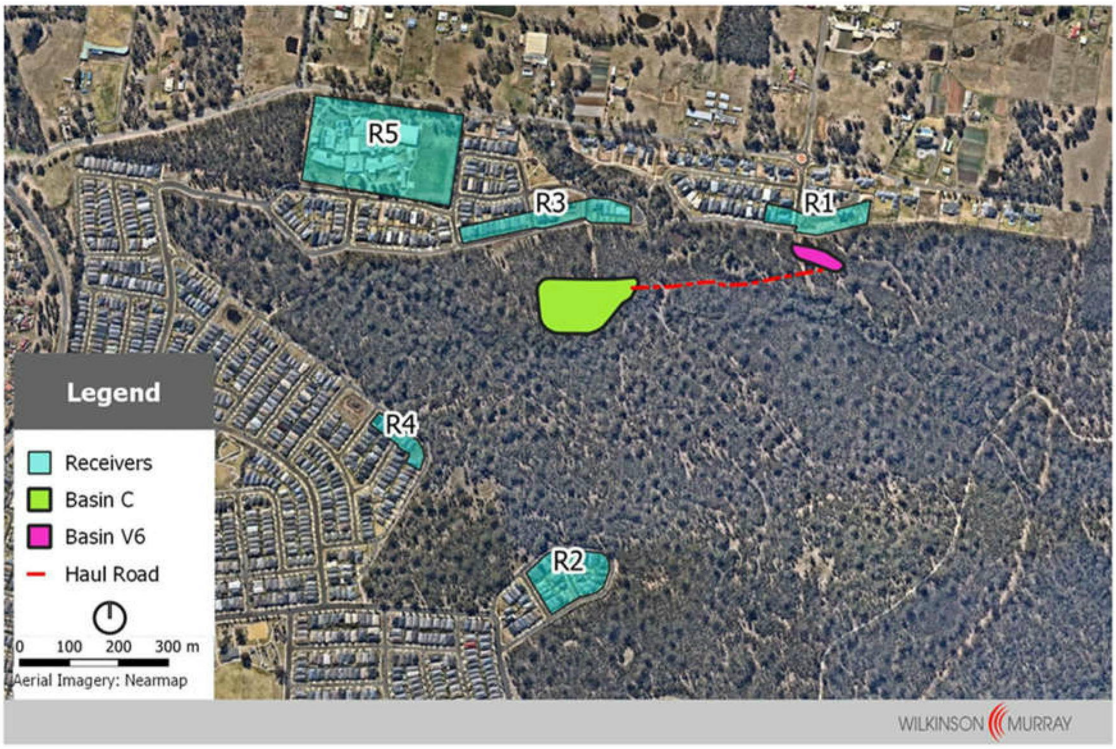
Table 2-1 provides as summary of the most relevant surrounding receivers. All receivers are located within Jordan Springs except for Xavier College, which is in Llandilo.

Table 2-1 Surrounding Sensitive Receivers

Receiver ID	Address	Orientation	Approx. distance to works
R1	Delany Circuit & Cerdon Place	North from Basin V6	40m (30m to access road)
R2	Izaac Circuit	South-west from Basin V6	720m
R3	Agnes Way & Bethany Circuit	North from Basin C	105m
R4	Matthew Bell Way	South-west from Basin C	320m
R5	Xavier College	North-west from Basin C	250m (active recreation area) 350m (classrooms)

With respect to construction traffic (particularly heavy vehicles), there are two routes available (refer **Figure 2-2**). Construction traffic Route 1 will allow trucks up to 23m in length whereas Route 2 will allow trucks up to 19m in length.

Figure 2-1 Site Location and Surrounding Receivers



Source: Nearmap (as modified by WM)

Figure 2-2 Off-site Construction Traffic Routes

Source: McLaren Traffic Engineering (as modified by WM)

3 OVERVIEW OF CONSTRUCTION WORKS

3.1 Works Programme

The anticipated construction staging is provided in **Table 3-1**.

Table 3-1 Construction Staging and Duration

Stage	Duration
Site Establishment	2 weeks
Excavation & Haulage	12 weeks
Civil Works & Landscaping	16 weeks
Commissioning / Testing & Finishing	4 weeks

Note: For the purpose of this assessment, excavation & haulage are considered as earthworks.

3.2 Hours of Work

In line with EPA guidelines, it is expected that Standard Construction Hours will be conditioned as follows:

- Monday to Friday 7:00am to 6:00pm;
- Saturday 8:00am to 1:00pm; and
- No work on Sunday and Public Holidays.

AIR QUALITY CRITERIA

3.3 Introduction

The NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (the Approved Methods, 2017) sets out applicable impact assessment criteria for several air pollutants.

Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to air quality. The sections below identify the pollutants of interest in this study and the applicable air quality criteria for each pollutant.

3.4 Pollutants of Interest

Potential air pollutants associated with the Project comprise dust and particulate matter. Specifically, the following pollutants are identified:

- Total Suspended Particulates (TSP);
- Particulate Matter (PM_{10} and $PM_{2.5}$); and,
- Deposited Dust.

3.5 Impact Assessment Criteria

The Approved Methods specifies air quality assessment criteria for assessing impacts from dust generating activities. These criteria are consistent with the National Environment Protection (Ambient Air Quality) Measure (NEPC, 2016). It is noted that there are no criteria specified for deposited dust within the NEPC.

Table 0-1 summarises the air quality goals for dust and particulate matter that are relevant to this study. The air quality goals relate to the total concentrations of dust and particulate matter in the air and not just that from the project. Therefore, some consideration of background levels needs to be made when using these goals to assess impacts.

Table 0-1 Impact Assessment Criteria – Dust and Particulate Matter

Pollutant	Averaging period	Impact	Criteria
Total suspended particulates (TSP)	Annual	Total	90 µg/m³
Particulate matter ≤10 µm (PM_{10})	Annual	Total	25 µg/m³
	24-hour	Total	50 µg/m³
Particulate matter ≤2.5 µm ($PM_{2.5}$)	Annual	Total	8 µg/m³
	24-hour	Total	25 µg/m³
Deposited dust (DD)	Annual	Total	4 g/m²/month
	Annual	Incremental	2 g/m²/month

4 EXISTING ENVIRONMENT

4.1 Local Climate

Meteorological conditions strongly influence air quality. Most significantly, with respect to dust and particulate matter from construction activities, wind speed and wind direction affect the dispersion of air pollutants.

Observations of wind speed and direction from the Office of Environment and Heritage (OEH) air quality monitoring station (AQMS) at St Marys have been selected to represent typical wind patterns in the area surrounding the site. The St Marys AQMS is located approximately 9 kilometres south-south east of the site.

Figure 4-1 presents annual and seasonal "wind rose" plots for the St Marys AQMS for the period 2013 to 2018, inclusive. As can be seen from the plots, southerly and south-south-westerly winds are most common in all four seasons.

4.2 Local Ambient Air Quality

Data from the St Marys AQMS has been used to establish typical ground level concentrations of particulate matter in the area surrounding the Proposal. A summary of the PM_{10} and $PM_{2.5}$ monitoring results collected at the St Marys AQMS over the period 2013 – 2018 is presented in **Table 4-1**.

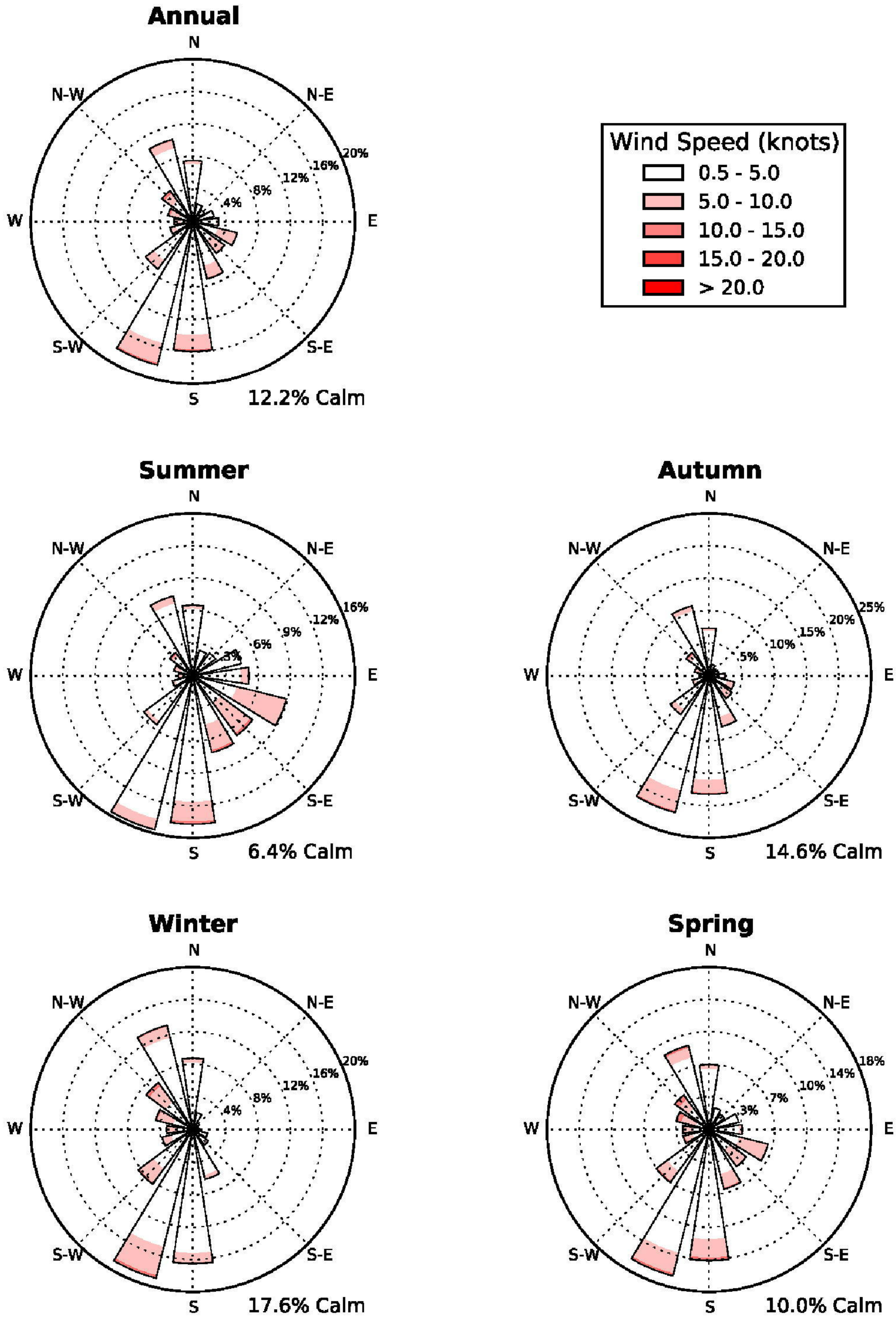
It is noted that observations of $PM_{2.5}$ at the St Marys AQMS began in 2016.

Table 4-1 Particulate Matter Monitoring Results – St Marys

Year	PM_{10} (µg/m^3) Annual Average	$PM_{2.5}$ (µg/m^3) Annual Average
2013	16.0	No data
2014	16.7	
2015	15.0	
2016	16.1	7.8
2017	16.2	7.0
2018	19.5	7.7

A review of the data from St Marys and comparison to the impact criteria indicates that the measured annual average PM_{10} has been typically between 15.0 and 19.5 µg/m^3 over the 5-year period which is below the impact criteria of 25 µg/m^3. Regarding the $PM_{2.5}$ monitored results, the range has been consistent and between 7.0 and 7.8 µg/m^3. These measured are only marginally below the impact criteria of 8 µg/m^3.

Figure 4-1 Windrose Plot – St Marys OEH AQMS, 2013-2018



5 ASSESSMENT

5.1 Assessment Methodology

This section presents a qualitative assessment of potential air quality impacts associated with the proposed works and has been conducted in general accordance with the methodology described in *Guidance on the assessment of dust from demolition and construction* (IAQM, 2014) prepared by the UK Institute of Air Quality Management (IAQM).

This approach presents the risk of dust soiling and human health impacts associated with four types of activities that occur on construction sites (demolition, earthworks, construction and trackout) and involves the following steps:

- Step 1: Screen the need for a detailed assessment;
- Step 2: Assess the risk of dust impacts arising, based on:
  - The potential magnitude of dust emissions from the works; and
  - The sensitivity of the surrounding area.
- Step 3: Identify site-specific mitigation; and
- Step 4: Consider the significance of residual impacts, after the implementation of mitigation measures.

The process outlined above will be applied to both the excavation and haulage activities associated with the construction of the Basins. These two activities will result in the likely highest generation of dust. For these activities, the worst-case impacts will be considered, thereby leading to a conservative assessment of the potential risks for human health and dust soiling impacts.

Trackout is defined by the IAQM guideline as:

> *"The transport of dust and dirt from the construction/demolition site onto public road net-work, where it may be deposited and then re-suspended by vehicles using the network. This arises when heady duty vehicles (HDVs) leave the construction/demolition site with dusty materials, which may then spoil onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site."*

5.2 Risk Assessment of Dust Impacts from Proposed Works

The following qualitative risk assessment of potential dust impacts has been conducted for the proposed works at Basins C and V6.

5.2.1 Step 1 – Screen the need for a detailed assessment

The IAQM guidance recommends that a risk assessment of potential dust impacts from construction activities be undertaken when sensitive human receptors are located within:

- 350m of the boundary of the site; or,
- 50m of the route(s) used by construction vehicles on public roads up to 500m from the site entrance(s).

As can be seen in **Figure 2-1**, a number of residential receivers are located within 350m of the site, 500m of the site access and within 50m of routes used by construction traffic. Therefore, an assessment of dust impacts is considered necessary under the guideline.

5.2.2 Step 2A – Potential dust emission magnitude

In accordance with the IAQM guidance (Section 7, Step 2: Assess the Risk of Dust Impacts), dust emission magnitudes from earthworks may be defined as:

- **Large:** total site area >10,000m^2, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100,000 tonnes;
- **Medium:** total site area 2,500m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m – 8m in height, total material moved 20,000 tonnes – 100,000 tonnes; and,
- **Small:** total site area <2,500m^2, soil type with large grain (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <20,000 tonnes.

The areas affected by the proposed earthworks are in excess of 10,000 m^2 and the material to be removed would exceed 100,000 tonnes.

With regard to dust "trackout" associated with haulage activities, dust emission magnitudes may be defined as:

- **Large:** >50 heavy vehicle outward movements per day, potentially dusty surface material, unpaved road length > 100m;
- **Medium:** 10-50 heavy vehicle outward movements per day, moderately dusty surface material, unpaved road length 50m – 100m; and,
- **Small:** <10 heavy vehicle outward movements per day, surface material with low potential for dust release, unpaved road length <50m

The excavation works will result in the highest number of heavy vehicle movements, expected to be more than 50 heavy vehicle movements per day leaving the site, and all on-site haulage would include unpaved sections of road more than 100m long.

Considering the above, the dust emission magnitude is:

- **Large** for earthworks.
- **Large** for trackout.

5.2.3 Step 2B – Sensitivity of surrounding area

The sensitivity of the surrounding area to dust impacts considers a number of factors, including:

- Specific receptor sensitivities;
- The number of receptors and their proximity to the works;
- Existing background dust concentrations; and,

- Site-specific factors that may reduce impacts, such as trees that may reduce wind-blown dust.

In accordance with the IAQM guideline, the residential receptors for this project are considered to have the following receptor sensitivity:

- **High** sensitivity to dust soiling.
- **High** sensitivity to human health.

Considering the above receptor sensitivities and the estimated number of receptors (2.7 persons per household as per 2016 Census for Penrith LGA) from the earthworks and from trackout, **Figure 5-1** and **Figure 5-2** have been reproduced from the IAQM (only show the "high" receptor sensitivity applicable to this project) so that the sensitivity of the area can be determined.

For human health impacts, the mean background PM_{10} concentration of below 24 µg/m^{3}has been used given the local ambient air quality measured (refer **4.2**).

Figure 5-1 Area Sensitivity Decision Matrix – Dust Soiling

Receptor Sensitivity	No. of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low

Figure 5-2 Area Sensitivity Decision Matrix – Human Health

Receptor Sensitivity	Annual Mean PM_{10} concentration	No. of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	> 32 µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low Risk	Low	Low	Low
	< 24 µg/m^3	>100	Medium	Low Risk	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low

The sensitivity of the surrounding area has been determined to be:

- For earthworks:
  - **Low** sensitivity to dust soiling.
  - **Low** sensitivity to health impacts.
- For trackout:
  - **High** sensitivity to dust soiling.
  - **Low** sensitivity to health impacts.

5.2.4 Step 2C – Define the risk of impacts

To define the risk of impacts, the dust emission magnitude ("large" for this site) is combined with the sensitivity of the area, as per **Table 5-1** and **Table 5-2** for earthworks and trackout, respectively.

Table 5-1 Risk of Dust Impacts – Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 5-2 Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

In accordance with **Table 5-1**, the proposed earthworks are considered to have a **low risk** of both dust soiling and human health impacts.

In accordance with **Table 5-2**, the haulage activities are considered to have a **high risk** of dust soiling impacts and a **low risk** of human health impacts.

It is important to note that the above risks assume that ***dust mitigation measures are not implemented***.

5.2.5 Step 3 – Site-specific mitigation

The IAQM guidance document identifies a range of appropriate dust mitigation measures that should be implemented as a function of the risk of impacts. These measures are presented in **Section 6**.

5.2.6 Step 4 – Significance of residual impacts

In accordance with the IAQM guidance document, the final step in the assessment is to determine the significance of any residual impacts, following the implementation of mitigation measures. To this end, the guidance states:

> *For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be "not significant".*

Based on the proposed earthworks, and the advice in the IAQM guidance document, it is considered unlikely that these works would result in unacceptable air quality impacts, subject to the implementation of the mitigation measures outlined in **Section 6**.

6 MITIGATION & MANAGEMENT

6.1 Dust Mitigation Measures

The preceding assessment of potential dust impacts from the proposed works indicates the following risk if dust mitigation measures are not implemented:

- The proposed earthworks are considered to have a **low risk** of both dust soiling and human health impacts.
- The proposed haulage activities are considered to have a **high risk** of dust soiling impacts and a **low risk** of human health impacts.

Accordingly, the following mitigation measures are recommended to minimise impacts associated with dust from the proposed Basin works.

- **Communications**
  - Develop and implement a stakeholder communications plan that includes community engagement before work commences on site, and:
    - Displays the name and contact details of the Responsible Person accountable for air quality and dust issues on the site boundary.
    - Displays the head or regional office contact information.
  - Develop and implement a Dust Management Plan (DMP) that considers, as a minimum, the measures identified herein.
- **Site management**
  - Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
  - Make the complaints log available to relevant authorities (Council, EPA, etc).
  - Record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action taken to resolve the situation in the log book.
  - Hold regular liaison meetings with any other high-risk construction sites within 500 m of the site boundary to ensure plans are coordinated.
- **Monitoring**
  - Undertake daily on-site and off-site inspection, where receptors are nearby, to monitor dust. Record inspection results and make available to relevant authorities. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of the site boundary, with cleaning to be provided if necessary.
  - Carry out regular on-site and off-site inspections to monitor compliance with the DMP, record inspection results, and make inspection log available to relevant authorities.
  - Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during any periods of prolonged dry or windy conditions.
  - Agree any dust monitoring locations with the relevant authority. Where possible, commence baseline monitoring at least 10 days before work commences on site.

- **Preparing and maintaining the site**
  - Plan site layout so that machining and dust generating activities are located away from receptors, as far as possible.
  - Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
  - Avoid site runoff of water or mud.
  - Keep site fencing, barriers and scaffolding clean using wet methods.
  - Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If being re-used, keep materials covered.
  - Cover, seed or fence stockpiles to prevent wind erosion.
- **Construction vehicles and sustainable travel**
  - Ensure all vehicles switch off engines when stationary - no idling vehicles.
  - Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
  - Impose and signpost a maximum-speed-limit of 25 kph on surfaced and 15 kph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided).
  - Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
  - Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
- **Measures for general construction activities**
  - Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
  - Use enclosed chutes and conveyors and covered skips.
  - Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
  - 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 wet cleaning methods.
- **Measures specific to haulage**
  - Use water-assisted dust sweeper(s) on the access and local roads, as necessary.
  - Avoid dry sweeping of large areas.
  - Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
  - Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
  - Record all inspections of haul routes and any subsequent action in a site logbook.
  - Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
  - Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

6.2 Dust Monitoring

It is recommended that dust monitoring is conducted during the works at locations representative of the most potentially affected sensitive receptors. The monitoring locations should have regard for the location of dust generating equipment and activities and the prevailing weather conditions.

The monitoring equipment should be capable of measuring ambient PM_{10} concentrations and providing notifications when levels exceed certain threshold values. The notifications should be provided in a timely fashion, say within one hour, to facilitate the implementation of reactive management. It is recommended that optical type equipment, such as an Aeroqual Dust Sentry, is used for the monitoring. While it is noted that these units are not approved under the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (EPA, 2007), they are well suited to reactive management of construction dust as they can provide data in near real-time and have significantly lower capital costs compared to other equipment.

The trigger levels in **Table 6-1** are proposed for reactive management. These values have been developed with a view to ensuring that ambient dust and particulate matter concentrations in the surrounding area comply with the criteria presented in **Table 0-1** but are expressed in time scales short enough to support reactive management. Similar trigger levels have been used on other large dust generating activities in NSW.

Table 6-1 Reactive Management Trigger Levels – PM_{10}

Trigger Stage	Averaging Period	Trigger Value (µg/m³)	Action Required
1 Investigate	1 hour	85	Site Manager to undertake review of possible dust sources operating during the average period. Identify possible measures for these activities; action if deemed necessary.
	3 hours	80	
2 Action	1 hour	470	Site Manager to attend site and ensure implementation of the control. Effectiveness of control actions to be reviewed and escalate where appropriate.
	3 hours	160	
3 Stop Work	1 hour	940	Targeted shut down of dust-generating activities until the measured pollutant levels are below the stated trigger value. Identify long-term solutions to dust issues.
	3 hours	320	

Real time monitoring of meteorology to include basic levels such as wind speed, direction, air temperature and rainfall is also recommended.

7 CONCLUSION

Wilkinson Murray Pty Limited has prepared an air quality construction assessment associated with the construction of two detention basins (Basin C and Basin V6) located to the north-western extent of the St Marys Development Site (within Wianamatta Regional Park).

From our assessment, it is necessary that a detailed construction dust management plan is prepared once a contractor has been secured and the construction approach finalised. This plan is to include the dust generated by construction traffic on the public road network.

A qualitative assessment of potential impacts associated with the proposed works has been conducted in general accordance with the methodology described in *Guidance on the assessment of dust from demolition and construction* (IAQM, 2014) prepared by the UK Institute of Air Quality Management (IAQM).

In accordance with the IAQM assessment methodology, the proposed works are considered to have a "High Risk" of dust soiling effects and a "Low Risk" of health impacts. Accordingly, a range of management and mitigation measures have been identified to minimise these impacts.

Subject to the implementation of mitigation measures, the residual effects of dust from the project are expected to be not significant and to have a low risk of generating unacceptable air quality impacts.

Real time dust monitoring and reactive management has been recommended to confirm that dust impacts associated with the works are acceptable. The monitoring is to include real time meteorology.