ACOUSTICS AND AIR

MINTO WAREHOUSING & LOGISTICS HUB

AIR QUALITY ASSESSMENT

REPORT NO. 16048
VERSION A

MARCH 2016

PREPARED FOR

TACTICAL GROUP
LEVEL 15, 124 WALKER STREET
NORTH SYDNEY NSW 2060

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DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
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A	Final	5 April 2016	John Wassermann	-

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50 YEARS 1962–2012

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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.

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.

Fugitive Emissions – Emissions not caught by a capture system.

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

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

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.

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.

1 INTRODUCTION

Wilkinson Murray Pty Limited has been commissioned to undertake a qualitative air quality assessment associated with the proposed construction and operation of a Warehouse and Logistics Hub (WH & LH) at 5 and 9 Culverston Road, Minto. This assessment has been prepared to form part of the Environmental Impact Statement to be submitted to the Department of Planning and Environment as a State Significant Development.

The key issues to be addressed as identified in the Secretary's Environmental Assessment Requirements (SEARS), together with the relevant cross-reference, are documented in Table 1-1.

Table 1-1 SEARS – Key Issues

SEARS – Air Quality	Report Reference
An assessment of the air quality impacts at private properties during construction and operation of the development, in accordance with relevant Environment Protection Authority guidelines.	Sections 5.1, 5.2
Details of mitigation, management and monitoring measures required to prevent and/or minimise emissions.	Sections 5.2

2 SITE DESCRIPTION

2.1 Site Location

The proposed development site is located at 5 and 9 Culverston Road, Minto, covering an area of approximately 29.63 ha. The site is bounded by Airds Road to the north and west and Rose Payten Drive to the south, which is elevated with respect to the site. To the east the site adjoins a drainage corridor and the Main Southern Railway line.

The site is currently used for a vehicle storage and processing facility with hardstand, shade structures and a warehouse building currently existing. Access to the site is via Culverston Road from the round-about intersection of Culverston Road and Airds Road.

The site is located within the Campbelltown Local Government Area (LGA), approximately 50 km south-west of the Sydney CBD. It is in close proximity to major transport infrastructure including the Hume Motorway Narellan Road (A9), Camden Bypass, Camden Valley Way and the M7 Motorway.

The subject site is surrounded by similar industrial and warehouse developments. The nearest residential development is located in the suburbs of Woodbine, approximately 300 m to the west and Leumeah, approximately 500 m to the east.

The location of the site and surrounding land uses are shown in Figure 2-1 and Figure 2-2.

Figure 2-1 Site Location

Image supplied by Willow Tree Planning courtesy of SIX Maps

Figure 2-2 Site & Surrounding Development

Image supplied by Willow Tree Planning courtesy of SIX Maps

2.2 Proposed Development

The project involves developing the site for the purpose of a Warehouse Logistics Hub. Use of the facilities will be for warehousing and distribution on a 24 hour, 7 day basis, consistent with surrounding operations.

The proposed development will be undertaken in three stages and includes:

- Four (4) warehouses including a total of four (4) offices, loading docks and car parking.
  - **Warehouse 1A** – 40,000 m^2 GFA
    Office – 2,000 m^2 GFA
  - **Warehouse 1B** – 22,000 m^2 GFA;
    Office – 1,000 m^2
  - **Warehouse 1C** – 22,000 m^2 GFA;
    Office – 2,300 m^2
  - **Warehouse 1D** – 23,000 m^2 GFA;
    Office – 1,00 m^2

  Total Building Area = 112,000 m^2
- Approximately 6 ha for storage associated with warehousing and logistics.
- 200 employees.

The warehouses will be accessed by a total of 71 loading docks, 16 of which are recessed. Goods will arrive and depart from Culverston Road. Light vehicles would park in the allocated parking area adjacent to each warehouse, and heavy vehicles would progress to the truck loading/unloading areas alongside each warehouse. Once in location these trucks would be loaded/unloaded via manual handling equipment. Loaded trucks would then be distributed to the designated destination via the nearby major road network.

The proposed warehouse buildings will be steel-framed with precast concrete wall panel dado walls (to 3 m height) and metal cladding wall panels above and metal roof sheeting. The maximum ridge height is generally 13.7 m.

An external paved storage area will receive large freight on heavy vehicles direct from Culverston Road at an entrance in the northern and southern ends of the storage area. Heavy vehicles will enter and exit through these points. Empty heavy vehicles would then either circulate around the eastern perimeter of the storage area to the cul-de-sac at the southern end of Culverston Road to exit the site, or continue to warehouse 1A for re-loading and distribution to market.

The external storage area would operate in conjunction with warehouse 1A initially, with potential for future association with subsequent warehouse stages if operations require this service. The storage area would be used for the temporary storage of large freight, some of which will be containerised. The large freight would then be forwarded internally within the site to warehouse 1A for processing, assembly, and subsequent distribution to customers via the nearby major road network.

3 AIR QUALITY CRITERIA

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 application air quality criteria for each pollutant.

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.

The ambient air quality criteria for the pollutants considered in this assessment are shown in Table 3-1.

Table 3-1 Impact Assessment Criteria - Criteria Pollutants

Pollutant	Averaging Period	Criteria (µg/m^3)
Nitrogen dioxide (NO_2)	1 hour	246
	Annual	62
Total suspended particulates (TSP)	Annual	90
Fine particulate matter (PM_{10})	24 hours	50
	Annual	30
Carbon Monoxide	8 hours	10,000
Ozone	1 hour	214 µg/m^3
	4 hours	171 µg/m^3

3.1 Particulates

The presence of particulate matter in the atmosphere can have an adverse effect on health and amenity. Particles lodged in the lungs can affect the respiratory system, especially if they contain adsorbed acid gases such as sulphur dioxide.

The health effects of particles are largely related to the extent to which they can penetrate the respiratory tract. Larger particles, that is those greater than 10 µm in aerodynamic diameter, generally adhere to the mucus in the nose, mouth, pharynx and larger bronchi and from there are removed by either swallowing or expectorating. The nature of particles in the air has an inverse relationship between the size of the particle and its diameter, so that as a particle diameter decreases, the number of similarly sized particles increases. This relationship is a factor resulting in increased scientific concern about the effects of fine particles. Fine particles are of concern for two principal reasons, since they have the ability to penetrate deeper into the lungs and the increased number of similarly sized particles that can reach the deep regions of the lung, like the alveolar sacs. The presence of particles can inflame tissue in this region and behind the alveolar sacs, since it is quite sensitive to foreign material. The human body does have defences against deposition of particles in this region but due to the increased number of particles this mechanism may be unable to cope, resulting in inflammation of the alveolar sacs. The health effects of particulate matter are further complicated by the chemical nature of the particles and by the possibility of synergistic effects with other air pollutants such as sulphur dioxide.

3.2 Carbon Monoxide

When CO is inhaled, it enters the blood stream and may disrupt the supply of essential O_2 to the body's tissues. The health effects of CO results principally from its ability to displace O_2 from haemoglobin, forming carboxyhaemoglobin (COHb). The normal function of haemoglobin is to transport O_2 from the lungs to all body tissues. The consequent reduced O_2 availability can give rise to a wide range of health effects (depending on how much the supply of oxygen to the body is impeded). These health effects are usually related to blood levels of COHb (expressed as a percentage), which can in turn be related to exposure as a function of exposure time, as well as concentration.

However, there is evidence of risk to individuals with cardiovascular disease when the carboxyhaemoglobin concentration reaches 4%, and the World Health Organisation (WHO) recommends that ambient concentrations be kept to values that would protect individuals from exceeding the 4% level.

The 15 minute goal of 87 ppm, the 1 hour goal of 25 ppm and 8 hour goal of 9 ppm adopted by the EPA reflects the "no-observed effects" level with a significant margin of safety.

3.3 Nitrogen Oxides

The most important nitrogen compounds present in urban locations are nitric oxide (NO) and nitrogen dioxide (NO_2), referred to collectively as NO_x.

Nitric oxide is much less harmful to humans than is nitrogen dioxide and is not generally considered as a pollutant with health impacts at the concentration levels normally found in the urban environment. Concern with nitric oxide relates to its transformation to nitrogen dioxide and its role in the formation of photochemical smog.

A variety of respiratory system effects have been reported to be associated with exposure to NO_2. Young children and asthmatics are the groups at greatest risk from ambient NO_2 exposure. Chronic bronchitis and individuals with emphysema or other chronic respiratory diseases may also be sensitive to NO_2 exposure.

There are no air quality goals for nitric oxide. The EPA standard for NO_2 is 0.12 ppm or 246 µg/m^3 and 0.03 ppm or 62 µg/m^3 (annual).

3.4 Ozone

Ozone (O_3) can irritate the lining of the nose, airways and lungs. People who are exposed to enough ozone might feel some pain in their ears, eyes, nose and throat, and they might start to cough. At ground level, when meteorological conditions are right, elevated levels of ozone are produced by reactions involving sunlight and other air pollutants, such as nitrogen oxides (NO_X) and volatile organic compounds (VOCs). Combustion processes, including motor vehicle engines, and particularly bushfires, are major sources of nitrogen oxides and VOCs.

4 EXISTING AMBIENT AIR QUALITY

4.1 Local Air Quality

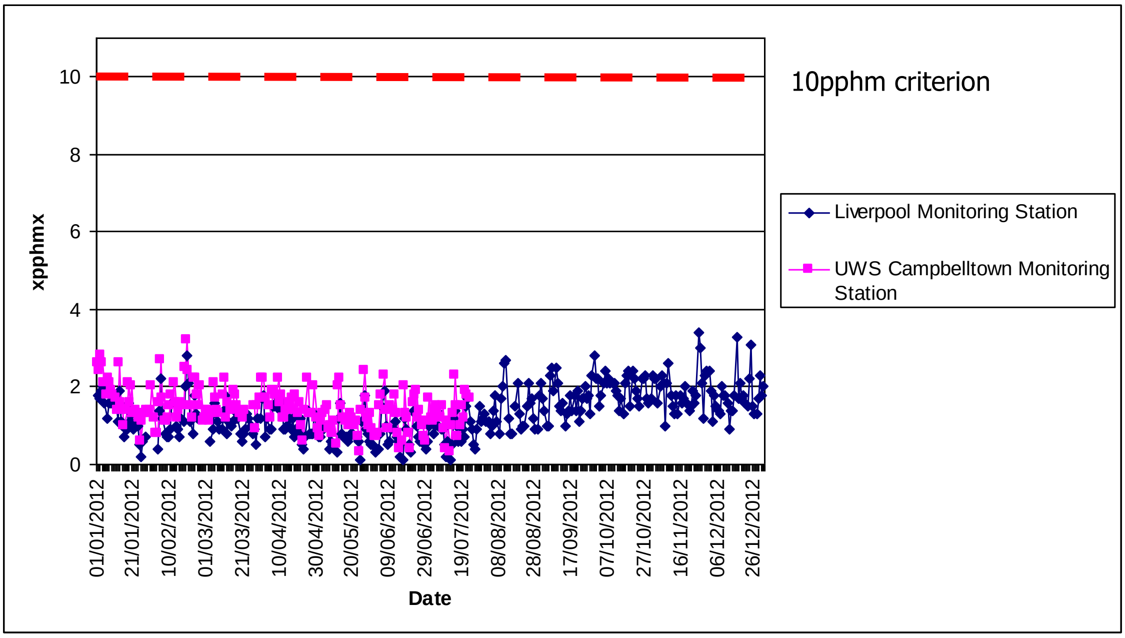
The closest NSW EPA air quality monitoring station located to Minto is the Campbelltown West station. Table 4-1 shows 2012 /2013 results for nitrogen oxides, carbon monoxide and particulate matter monitoring. These levels have been presented in this report to show typical pollutant concentrations in the Minto area.

Table 4-1 Summary of Air Quality Monitoring Conducted at the Campbelltown West EPA monitoring station.

Date	NO_2 monthly average [$\mu g/m^3$]	CO maximum 8hr Average [mg/m3]	PM10 monthly average [$\mu g/m^3$]
		Air Quality Criteria (Refer to Table 3-1)	
	62	**11**	**30**
Sep-12	24	1.8	17.1
Oct-12	22	2.6	19
Nov-12	20	0.8	19.5
Dec-12	16	2	20.9
Jan-13	14	0.84	20.5
Feb-13	14	0.5	16.5
Mar-13	18	0.84	17
Apr-13	24	1.2	13.7
May-13	24	6.0	14.4
Jun-13	22	3.0	9.6
Jul-13	28	3.0	12.8
Aug-13	22	1.2	11.8
Annual Average	21	-	16

With regard to ozone the closest EPA air quality monitoring stations are located at Liverpool and Campbelltown. Figure 4-1 shows the results of 1 hour ozone monitoring.

Figure 4-1 Summary of Ozone Air Quality Monitoring



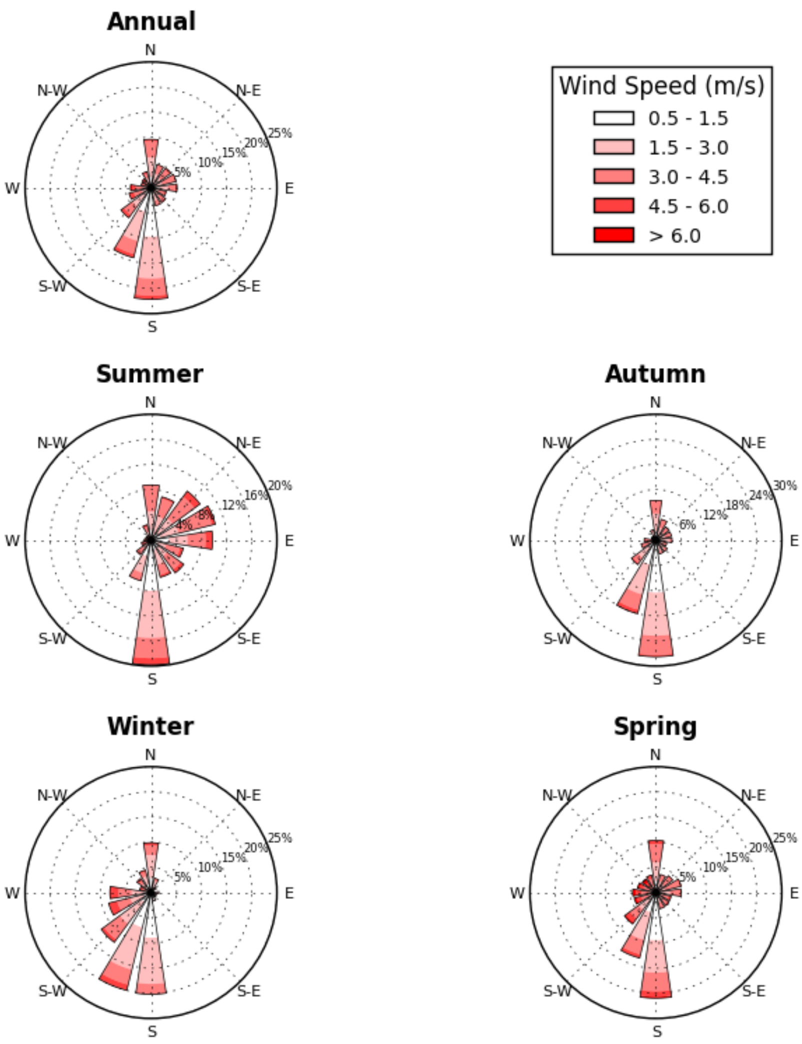
As can be seen in Table 4-1 and Figure 4-1, the monitoring results indicate that the regional air quality is well below NSW air quality objectives; therefore, the area has capacity for additional development.

4.2 Local Meteorology

Local representative meteorological data for the Project area and its wider surroundings were retrieved from the Campbelltown Bureau of Meteorology (BOM) monitoring site.

Figure 4-2 shows the annual and seasonal wind roses for the area. On an annual basis winds from the south dominate the wind distribution pattern. The summer winds tend to blow primarily from the south, however, there are also significant north east components. Winter, Autumn and Spring appear similar in makeup where winds blow primarily from the south.

Figure 4-2 Windroses from Campbelltown BOM 2013



5 REVIEW OF POTENTIAL AIR QUALITY IMPACTS

5.1 Operational Air Quality Impacts

The Minto area is an existing industrial and retail/business area. The WH & LH project involves the development of warehousing and logistics facilities that are consistent with neighbouring land use and is not expected to generate a significant amount of air emissions within the local or regional air shed for construction or the operation of the facility. The WH & LH site is well separated from sensitive land uses.

Any increase in air quality emissions would be from traffic. An analysis of traffic movements generated as a result of the project has been carried out by Ason Group. Existing traffic volumes on the road network surrounding the site have been established by peak hour turning counts for Airds Road at the roundabout junctions of Culverston Road and Rose Payton Drive and at the intersection of Campbelltown Road and Rose Payton Drive. A 24 hour, 7 day tube count was carried out on Culverston Road. The results of the base counts together with the projected morning and afternoon peak traffic generated by the proposed WH&LH are shown in Table 5-1. The percentage increase in the road traffic generated as a result of the additional traffic is included.

Table 5-1 Existing and Projected Peak Traffic Flows

Location	AM Peak			PM Peak		
	Existing	Projected	Increase	Existing	Projected	Increase
Airds Rd north of Culverston Rd	446	454	2%	620	628	1%
Airds Rd south of Rose Payton Dr	672	680	1%	885	893	1%
Rose Payton Dr	1449	1473	2%	1531	1556	1%
Campbelltown Rd north of Rose Payten Dr	4042	4106	2%	4413	4481	1%
Campbelltown Rd south of Rose Payten Dr	3329	3385	2%	3753	3813	1%

The maximum increase in traffic as a result of the project is less than 2%. Exhaust emissions of particulates, oxides of nitrogen (NO_X), carbon monoxide and hydrocarbons can be expected from vehicles travelling to and from the site. It is expected that all vehicles accessing the warehousing and logistic facilities would have compliance with relevant and current emission standards as prescribed in Australian design rules. Based upon the network analysis and traffic demand modelling, the additional traffic generated by the proposed WH&LH will not result in any significant increase in air quality on the road network surrounding the project. There are no residential receivers on Airds Road, Culverston Road and Rose Payten Drive around the site. There are residential receivers on Campbelltown Rd however they are typically greater than 25 metres from the road and with less than 2 percent increase in traffic volumes will not be significantly impacted.

5.2 Construction Air Quality Impacts

Construction is estimated to take place over approximately 36 months. The works would commence in the first quarter of 2017 and be carried out over three (3) stages as follows:

- **Stage 1** – Warehouse 1A;
- **Stage 2** – Warehouse 1B + 1C; and
- **Stage 3** – Warehouse 1D

The construction works have been divided into three 'phases' which may potentially overlap. The order of the phases may also be subject to minor changes.

A summary of the indicative activities occurring throughout each of the construction phases is shown in Table 5-2.

Table 5-2 Construction Activities

Construction Phase	Activities
Phase 1 – Site preparation, bulk earthworks and utilities infrastructure	• Establishment of construction compound fencing and hoardings • Installation of temporary sediment and erosion control measures • Vegetation clearance and demolition of existing shade structures and removal of pavements as required • Installation of temporary site offices and amenities • Establishing construction traffic management devices • Set up of construction monitoring equipment • Stockpiling and/or placement of imported clean fill • Installation of permanent drainage and other utilities
Phase 2 – Construction and fit-out of: Stage 1 Warehousing (approx. 40,000 m^2); Stage 2 Warehousing (approx. 44,000 m^2); Stage 3 warehousing (approx. 23,000 m^2)	• Importation and placement of engineering fill • Compaction of engineering fill • Excavation, foundation and floor slab installation • Erection of framework and structural walls • Installation of roofing and wall coverings • Internal fit out of building • Final connection of new utilities • Landscaping and surrounds • Preparation of warehouse access road and carpaking areas • Forming of new kerbs, gutters, medians and other structures • Construction of asphalt and concrete pavements • New line marking, lighting and sign posting • Removal of construction traffic management and opening of the facility to traffic

Construction Phase	Activities
Phase 3 – Miscellaneous structural construction and finishing works	• Decommissioning/demobilisation of construction sites • Landscaping • Rehabilitation of affected areas • Post-construction condition surveys • Removal of construction environmental controls • Removal of construction ancillary facility related traffic signage

Construction air quality impacts are influenced by a variety of factors including prevailing wind direction, temperature, time of day, topography and the construction activities.

The prevailing wind directions for the Campbelltown area is south as seen Figure 4-2. The closest residential receivers are east and west of the site and would be unlikely to be impacted from construction activities. However, due to the nature of the construction activities, there is the potential for air pollution due to suspended dust particles at neighbouring industrial sites. The dust which generally emanates from a site are usually caused by either wind or traffic generated on hardstand areas.

Dust emissions during construction works are considered manageable in accordance with standard best practice controls. As part of the Construction Environmental Management Plan (CEMP) a construction air quality management plan should be developed (post approval) considering the following measures to minimise the potential for dust generation:

- letter box drop to noise sensitive receivers to inform them of potential work that could result in dust;
- minimising the area of disturbance as far as practicable during works;
- promptly stabilising/revegetating disturbance areas;
- air quality complaints handling procedure;
- monitoring of dust emissions during construction to confirm compliance;
- minimising drop heights for materials being worked on the site;
- keeping exposed surfaces moist;
- limit vehicle speeds on the construction site to less than 30 km/h; and
- ensuring trucks are covered and do not track sediment onto public roads.

Diesel emissions from off road plant and equipment may also be considered in the air quality assessment of construction. Exhaust emissions of particulates, oxides of nitrogen (NO_X), carbon monoxide and hydrocarbons can be expected from off road construction vehicles working on the site. To minimise off road vehicle emissions the construction air quality management plan, where practical, would develop procedures where off road vehicle emission are reduced by reducing idling and ensuring equipment is correctly maintained. Where practical diesel equipment will be used with best available diesel emissions standards.

6 CONCLUSION

It is proposed to construct and operate a Warehouse and Logistics Hub (WH & LH) at 5 and 9 Culverston Road, Minto.

Wilkinson Murray Pty Ltd has been commissioned by to undertake a qualitative air quality assessment of the construction and operation of the site. It is concluded that air quality impacts from the proposed construction and operation are low risk and it is recommended that, as part of the CEMP, a construction air quality management plan be developed to implement reasonable and feasible measures to control particulate emissions from fugitive dust sources and off road diesel vehicles.

7 REFERENCES

NSW Department of Environment and Conservation (2005)

"Approved Methods for the Modelling and Assessment of Air Pollutants in NSW", August 2005.