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Additional Air Assessment

Oakdale Estate

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Goodman Property Services Pty Limited
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Additional Air Assessment

Oakdale Estate

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR Consulting) has been commissioned by Goodman Limited (Goodman) to undertake an Air Quality Assessment (AQA) for earthwork activities being undertaken on Lot 1 A, 1B and 1C to support a Section 75W application for the Oakdale Estate.

The AQA has been prepared with reference to Environment Protection Authority (EPA) *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (hereafter "the Approved Methods").

The Scope for the AQA has been designed to assess the anticipated air quality impacts associated with the earthworks.

2 PROJECT DESCRIPTION

It is proposed that in the order of 143,400 m^3 of fill material is to be imported to the Oakdale site. The works proposed for the site includes the following:

- Bulk earthworks incorporating cut to fill and imported filling to:
  - Construct the Estate Road extension.
  - Raise the level of Lot 1C to match the pad level of Lot 1B.
- Construction of earth retaining walls to the perimeter of Lot 1C.

The overall timeframe for the works is a 162 day period.

The site location is shown in **Figure 1**. A plan of the Oakdale site is given in **Figure 2**.

Figure 1 Locality Map

Figure 2 Site Plan Lot 1A, 1B and 1C

3 BASELINE AIR QUALITY CONDITIONS

As illustrated in **Figure 1,** immediately surrounding the site to the north, west and south west is undeveloped land. Immediately to the south and east is PGH Bricks and Pavers. The M7 Motorway is located approximately 2.6 km to the east.

A search of the NPI Database has identified the following sources of air pollution within the adjoining area:

Table 1 Local Sources: NPI Sources in the vicinity of the Oakdale development

Name	Process	Significant Emissions	Location (UTM)	Approx Distance to Project Site
PGH Bricks and Pavers	Brick and paver manufacturing	Particulate	299680,6250160	0.34km

A review of their Environmental Protection licence (Licence number 123) indicates it has approval to mine for minerals, and crush, grind and separate up to 30,000 tonnes of material. It is considered that the PGH Bricks and Pavers site may represent a source of local dust emissions, in the local area.

Looking further afield, the site may be potentially affected by air pollution (with notable emissions) from the following sources within a nominal 10km radius of the Project Site:

Table 2 Local Sources: NPI Sources with Notable Emissions within 10km of the Project Site

Name	Process	Significant Emissions	Location (UTM)	Approx Distance to Project Site
Austral Bricks Plants 1,2,3	Clay brick manufacturing	Fluoride and particulate	301830,6255190	3.5km
One Steel	Iron smelting and steel manufacturing	Carbon monoxide	301040,6261980	6.8 km

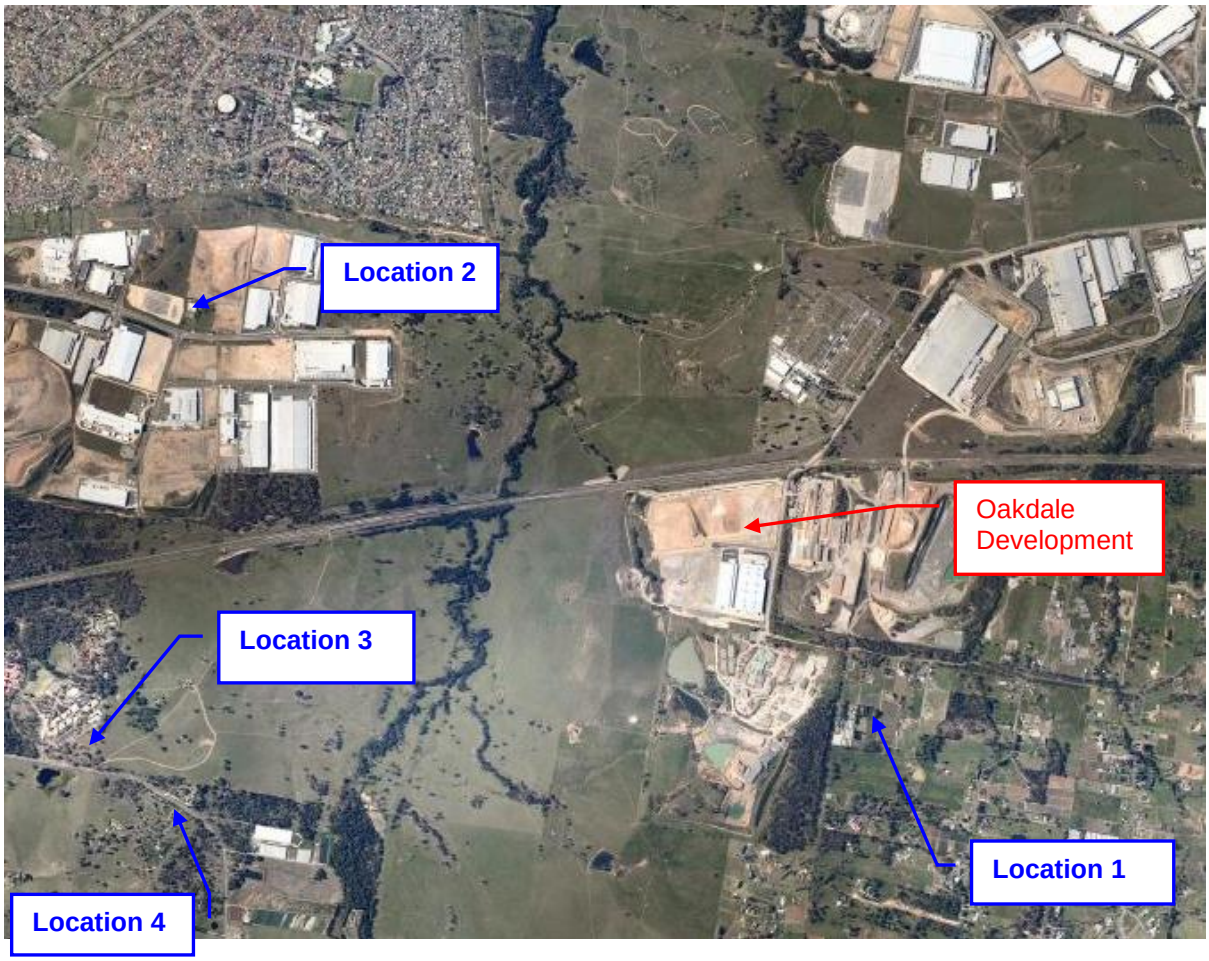
4 SURROUNDING RECEPTORS

The desk top study indicates that there are a number of sensitive receivers in the vicinity of the Project Site. The SLR Consulting Noise Impact Assessment identifies the nearest sensitive receptor locations as:

- Residences located on Burley Road, Horsley Park (approximately 890 m east of the site).
- Residence on Lenore Lane Erskine Park (approximately 2.4 kilometres north-west of the site).
- Emmaus College located at Erskine Park (approximately 2.8 km west of the site).
- Residences located on Aldington Road, Kemps Creek (approximately 2.6 km west of the site).

Figure 3 illustrates the locality of the proposed development in relation to the nearest sensitive receivers.

Figure 3 Receiver Locations



5 PROJECT AIR QUALITY CRITERIA

The following air quality targets outlined in **Table 1** and **Table 2** have been identified as appropriate for the project:

Table 3 Air Quality Standards & Goals for Particulate Matter

Pollutant	Standard / Goal	Agency
Particulate matter <10 μm (PM_{10})	50 μg/m^3 (24hr maximum)	EPA, NEPM Criteria
	30 μg/m^3 (annual mean)	EPA long-term reporting goal

Table 4 NSW OEH Criteria for Dust Deposition

Pollutant	Averaging periods	Maximum increase in deposited dust level [1, 2]	Maximum total deposited dust level [1, 2]
Deposited Dust	Annual	2 g.m^2/mth	4 g/m^2/mth

Note 1: Source: NSW OEH "Approved Methods & Guidance for the Modelling and Assessment of Air Pollutants in NSW", 2005.

Note 2: Dust is assessed as Insoluble Solids as defined by AS 3580.10.1-2003.

6 HISTORIC SITE ACTIVITIES AND SITE SPECIFIC DUST MONITORING

6.1 Overview

For the period, May 2010 to June 2012 approximately 300,000 m^3 of fill was imported onto the Oakdale site.

Figure 4 and **Figure 5** illustrate the site and areas where fill has been imported.

Figure 4 View looking South from the Northern Border (14 September 2011)

Figure 5 View Looking North East from the South West (14 September 2011)

6.2 Background Dust Monitoring

Earthworks at the project site were sporadically conducted from April 2008 - May 2009. During this ime, dust deposition monitoring was conducted at the site.

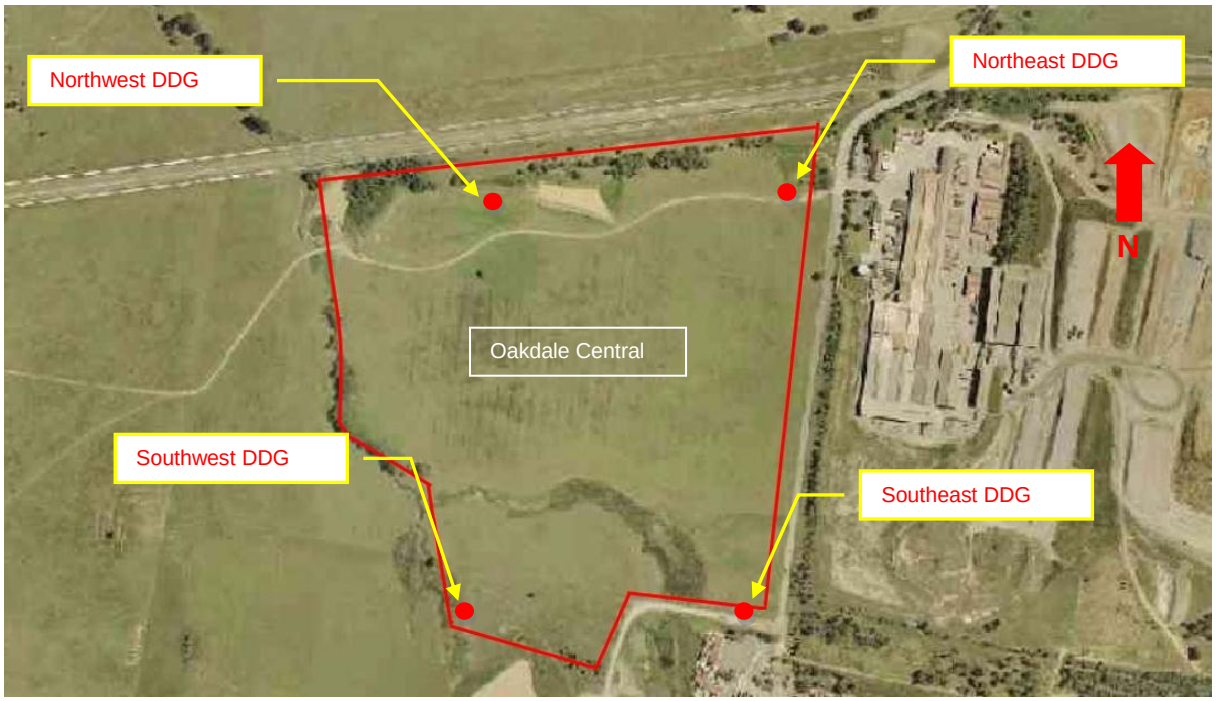
6.2.1 Monitoring Locations

Gravimetric dust deposition monitoring using dust deposition gauges (DDGs) for the Oakdale Project Site was conducted at the following locations:

- "Northwest" DDG at the centre of the northern section of the Project Site adjacent to the water pipe boundary.
- "Northeast" DDG at the north-eastern corner of the Project Site adjacent to Old Wallgrove Road.
- "Southwest" DDG at the centre of the southern section of the Project Site on the eastern side of the creek entrance.
- "Southeast" DDG in the south-eastern corner of the Project Site at the junction of Old Wallgrove Road.

Figure 6 illustrates the locations of the DDGs at the Project Site, with the site boundary shown in red.

Figure 6 Dust Deposition Monitoring Locations



Source: Google Earth 2011.
Note: Project Site boundary denoted in red.

6.2.2 Results

Table 5 presents the historic annual average dust deposition monitoring results at the Austral Bricks Project Site for the period 17 April 2008 - 22 May 2009.

Table 5 Background Deposited Dust Monitoring (prior to site activities starting)

Location	Period	Data Points	Deposited Dust Average (g/m^2/mth)
Northwest	17/4/2008 – 22/5/2009	12	12.0
North East	17/4/2008 – 22/5/2009	12	8.8
Southwest	17/4/2008 – 22/5/2009	12	1.9
Southeast	17/4/2008 – 22/5/2009	12	10.9
Site Average			**8.4**

The results show that over a period of one year when earthworks were limited and sporadic, annual average deposited dust concentrations were very high at three of the four site boundary monitoring locations.

It is possible these high dust concentrations could be attributable to the extractive activities occurring adjacent to the Project Site.

This indicates that the background deposited dust levels surrounding the Oakdale site exceed the project air quality target for deposited dust, and should be considered when interpreting deposited dust levels during construction of the Oakdale site.

6.3 Compliance Dust Monitoring

SLR Consulting has conducted compliance deposited dust monitoring for the Oakdale development since May 2010. As detailed in **Section 3.1**, over this time 300,000 m^3 of fill has been imported onto the site. The results of deposited dust monitoring over this period are detailed in **Table 6**.

Table 6 Deposited Dust Monitoring Results during Site Works

Location	Period	Data Points	Deposited Dust Average ($g/m^2/mth$)
Northwest	4/5/2010 – 12/3/2012	22	3.8
North East	17/4/2008 – 22/5/2009	22	1.7
Southwest	17/4/2008 – 22/5/2009	22	3.3
Southeast	17/4/2008 – 22/5/2009	20	4.1
Site Average			**3.2**

Table 6 indicates that during the importation of 300,000 m^3 of fill, deposited dust levels were below measured background levels (refer **Table 5**). The overall site average was below the project air quality target for deposited dust concentrations.

The results indicate that the importation of 300,000 m^3 of fill did not increase deposited dust levels on the boundary of the project site.

7 AIR QUALITY ASSESSMENT

7.1 Qualitative Assessment

The potential for dust formation during construction activities is difficult to quantify and is dependent on a number of factors. These include the type of activity to be undertaken, soil and substrata type, the number of preceding dry days, prevailing wind speed as well as the shape, size, density and moisture content of dust particles, as well as the geographical distribution of those activities.

Due to the difficulties in quantifying meaningful dust emission levels, emphasis is placed upon identifying the activities which cause dust propagation and formulating suitable control strategies to manage those risks. Receptors within 100 m of the construction site are generally considered to experience the most significant impacts from construction dust, USEPA (1985).

The main impacts are considered likely to be short term nuisance caused by the settling of construction dust on properties, vehicles and street furniture. Impacts may also be found up to 500 m from active construction sites, Bate (1990), and may include visual effects such as reduced visibility and the coating, soiling, physical and/or chemical contamination and corrosion of artefacts, coating of vegetation and contamination of soils and most importantly health effects due to inhalation and dermal absorption through the skin.

The most significant potential impact on air quality during the importation of fill and the earthworks phase of the development is likely to be associated with dust and fine particulate materials, with key activities identified as:

- ground breaking and site preparation;
- excavation;
- wind blown material from stockpiles;
- material transfer to and from trucks; and

- vehicle/plant movements on unpaved roads and over construction sites.

7.1.1 Construction Odour

Given the historic unimproved land uses, it is considered that earthwork activities would not cause any significant odour emissions.

7.1.2 Earthwork Vehicle Emissions

There is also the potential for earth moving vehicle and plant exhaust emissions to impact on air quality, including site vehicles, vehicles and vessels carrying materials to and from the construction sites, mobilisation of plant, site visits, worker journeys etc.

It is estimated that peak heavy vehicle numbers will occur during the importation of fill at a level of 20 vehicle movement per hour over an eight (8) hour day (reference Construction Traffic Management Plan – Traffix 12 250 Report V1 dated 23/72012).

Given the nearest receiver is 890 metres away, it is considered that emissions from vehicles would not cause impact.

7.2 Quantitative Assessment

As detailed in **Section 6.3**, 300,000 m^3 of fill has already been imported onto the site. During this period, deposited dust levels were below measured background levels (refer **Table 5**). The overall site average was below the project air quality target for deposited dust concentrations.

The results indicate that the importation of 300,000 m^3 of fill did not increase deposited dust levels on the boundary of the project site.

It is proposed that 143,400 m^3 of fill be imported onto site. It is therefore considered that if the rate of soil being imported onto the Oakdale site is undertaken at a similar rate. It would be reasonable to conclude that if the relevant site mitigation measures are employed, deposited dust levels should be below measured background levels.

8 MITIGATION

It is not anticipated that any construction or operational phase activities would give rise to significant air impacts. However, the following mitigation measures are proposed, so that the impacts associated with the development are minimised as far as practicable and the best practice measures are employed.

8.1 Dust Management

The generation of dust is of concern during construction. The following procedures and requirements will be followed during the life of each project to minimise the dust generated by the project:

- Watering of roads and sealing of roads where possible
- Wind breaks composed of earth banks and other screens to protect areas by reducing capacity of the wind to raise dust.
- Trucks entering and leaving the site will be well maintained in accordance with the manufacturer's specification to comply with all relevant regulations. Fines may be imposed on vehicles which do not comply with smoke emission standards. Truck movement should be controlled on site and restricted to designated roadways. Truck wheel washes or other dust removal procedures will be installed to minimise transport of dust offsite.

- If necessary amending of construction during periods of high wind covering watering/revegetating of stockpiles and exposed areas.

The following are basic procedures which will be adopted on site to control dust and other emissions from construction operations and on-site equipment. The aim of these procedures is to minimise off-site dust nuisance and air quality impacts.

- Activities carried out on site will be such as to ensure that all equipment used and all facilities erected are designed and operated to control the emission of smoke, dust, fume and other objectionable matter into the atmosphere.
- Precautions to be taken include spraying of earthworks, roads and other surfaces as necessary with water or other suitable liquids, providing dust suppression equipment to any onsite materials batching plant, sealing of temporary haul roads and the modification of operations during high or unfavourable wind conditions.
- Working areas and access roads will be stabilised as soon as practicable to prevent or minimise wind blown dust.
- All disturbed areas will be stabilised as soon as practicable to prevent or minimise wind blown dust.
- All unsealed trafficable areas be kept sufficiently damp during working hours to minimise wind blown or traffic generated dust emissions. Continued use of water on dirt roads helps the formation of a crust so that dust is not as easily generated.
- Water sprays, sprinklers and water carts may be employed if needed to adequately dampen stockpiles, work areas and exposed soils to prevent the emissions of dust from the site. Water carts and other equipment will be available to enable watering at least at an hourly rate of 2 litres per square metre.
- Stockpiles and handling areas will be maintained in a condition which minimises wind blown or traffic generated dust. Areas that may be inaccessible by water carts will be kept in a condition which minimises wind blown or traffic generated dust using other means.
- All equipment for dust control will be kept in good operating condition. The equipment will be operable at all times with the exception of shutdowns required for maintenance. Construction equipment will be properly maintained to ensure exhaust emissions comply with the Protection of Environmental Operations (POEO) Act.
- If visible smoke can be seen from any equipment (while working on a construction site) for longer than 10 seconds duration, the equipment will be taken out of service and adequately repaired or tuned so that smoke is no longer visible for periods longer than 10 seconds.
- Cleared vegetation, demolition materials and other combustible waste material will not be burnt on site.
- Silt will be removed from behind filter fences and other erosion control structures on a regular basis, so that collected silt does not become a source of dust.
- No dust, soil or mud shall be deposited from any vehicle on public roads. Where wheel washing facilities are provided on construction works area, all drivers of construction vehicles shall utilise the wheel wash prior to leaving the works area and entering public roads.
- Any dust soil or mud deposited on public roads by sub contractors construction activities and vehicle movements shall be removed immediately and disposed of appropriately
- Hire agreements will contain provisions to stand down equipment which has excessively smoky exhaust.

8.2 Dust Mitigation

The EPA has reviewed the environmental hazards associated with construction sites and prepared a general document containing safeguards to protect the environment during such activities. Many of these safeguards relate to controlling water pollution and run-off, however, these procedures frequently help in control of air pollution. The recommendations by the EPA are those which will, in general, need to be implemented at the various sites of construction and include:

- Watering of roads and sealing of roads where possible.
- Wind breaks composed of earth banks and other screens to protect areas by reducing capacity of the wind to raise dust.
- Trucks entering and leaving the site should be well maintained in accordance with the manufacturer's specification to comply with all relevant regulations. All trucks entering and leaving the construction site should have their loads covered. Fines may be imposed (by the NSW OEH) on vehicles which do not comply with smoke emission standards. Truck movement should be controlled on site and restricted to designated roadways. Truck wheel washes or other dust removal procedures should be installed to minimise transport of dust offsite onto public roads.
- If necessary amending of construction during periods of high wind.
- Covering/watering/revegetating of stockpiles and exposed areas.

The following headings outline specific controls and approaches to minimise impacts from wind erosion and spoil stockpiles.

8.3 Wind Erosion

- Watering of exposed surfaces/application of a crusting agent will be carried out during dry weather, if necessary.
- When winds reach (or exceed) a velocity of 2.5 metres per second, the frequency of water shall increase. When winds exceed 10 metres / second for 10 minutes, work will cease.
- Progressive rehabilitation of exposed sites on completion of different work stages to be undertaken where practical.

8.3.1 Spoil Stockpiles

- Minimising of spoil stockpiling on site.
- Minimising the number of work faces on stockpiles.
- Stockpiles to be temporarily covered (if short term) or sprayed with water/crusting agent (Polo Dust Bind) (long-term) to keep dust to a minimum.
- When conditions are excessively dusty such that the project air quality goals are anticipated to be exceeded, then all dust generating activities shall cease until conditions improve/dust suppression can be adequately carried out.

9 DISCUSSION AND CONCLUSION

SLR Consulting has undertaken an air quality assessment for earthwork activities being undertaken on Lot 1 A, 1B and 1C to support a Section 75W application for the Oakdale Estate.

This air quality assessment has examined the baseline conditions likely to be encountered at the project site and identified potential air quality impacts associated with the earthworks phase of the proposed development. Based upon the information available at the time, it was not determined that any processes or activities would cause significant emissions to air, and that baseline conditions would not be significantly impacted.

A range of mitigation measures have been proposed to control dust emissions associated with the earthwork phase, as appropriate to demonstrate adequate measures are in place to proactively manage risk.

It is not considered that there are any air quality considerations that would cause any significant concern, and based upon the assumptions presented in this report, that air quality should not be a constraint to planning approval for the development.

10 CLOSURE

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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