

Holmes Dyer Pty Ltd
**Hackham Code Amendment -
Main South Road**
Preliminary Air Quality Study

REP/276274/AQ05-HK

Issue 5 | 1 October 2021

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party, excluding Holmes Dyer Pty Ltd, Renewal SA (SA Government), YAS Property and Development and the Attorney General's Department's Planning and Land Use Services (SA Government). No responsibility is undertaken to any third party.

Job number 276274

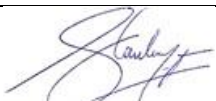
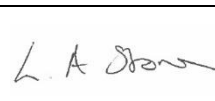

Arup Australia Pty Ltd ABN 76 625 912 665



Arup
Sky Park
One Melbourne Quarter
699 Collins Street
Docklands Vic 3008
Australia
www.arup.com

ARUP

Document verification

ARUP

Job title		Hackham Code Amendment - Main South Road		Job number 276274	
Document title		Preliminary Air Quality Study		File reference	
Document ref		REP/276274/AQ05-HK			
Revision	Date	Filename	AQ01 – Hackham Land Development_Air Quality Report.docx		
Issue 1	18 May 2020	Description	Issue		
			Prepared by	Checked by	Approved by
		Name	Stanley Gunawan	Lesley-Anne Stone	Daniel Osborne
		Signature			
Issue 2	20 May 2020	Filename	AQ02 – Hackham Land Development_Air Quality Report.docx		
		Description	Issue		
			Prepared by	Checked by	Approved by
		Name	Stanley Gunawan	Lesley-Anne Stone	Daniel Osborne
Issue 3	11 Aug 2021	Filename	AQ03 – Hackham Land Development_Air Quality Report.docx		
		Description	Issue		
			Prepared by	Checked by	Approved by
		Name	Stanley Gunawan	Lesley-Anne Stone	Daniel Osborne
Issue 4	1 Sept 2021	Filename	AQ04 – Hackham Land Development_Air Quality Report.docx		
		Description	Issue		
			Prepared by	Checked by	Approved by
		Name	Stanley Gunawan	Lesley-Anne Stone	Daniel Osborne
Issue 5	1 Oct 2021	Filename	AQ05 – Hackham Code Amendment_Air Quality Report.docx		
		Description	Final Issue		
			Prepared by	Checked by	Approved by
		Name	Stanley Gunawan	Lesley-Anne Stone	Daniel Osborne

		Signature		L. A. Stone	
Issue Document verification with document					
					<input checked="checked" type="checkbox"/>

Contents

	Page
Executive Summary	3
1 Introduction	5
2 Legislation, Policy and Guidelines	6
2.1 National Legislation	6
2.2 State Legislation, Policy and Guideline	6
3 Existing Environment	11
3.1 Identification of Relevant Commercial premises/ Industries	11
3.2 Transport Related Sources	13
3.3 1559 Piggot Range Road	13
3.4 Site Representative Meteorology	14
3.5 Existing Local Air Quality	14
4 Transportation Noise and Air Emissions Overlay	18
5 Evaluation Distances for Existing Sources	19
6 Suitability of the Proposed Land for Residential Development	23
6.1 Existing Air Quality Conditions	23
6.2 Emissions from nearby Quarries	23
6.3 Emissions from Other Industries	23
6.4 Emissions from Transportation	23
6.5 General Mitigation Strategies	24
7 Recommended Next Steps	27

Tables

Table 1 – Air Quality EPP maximum ground level concentrations

Table 2 – Air Quality EPP odour levels

Table 3 – McLaren Vale Quarries authorised activities under licence conditions

Table 4 – Nearby Quarries SA EPA Licence Conditions – Dust Conditions

Table 5 – Identified major transportation air emission sources

Table 6 – Air quality monitoring results for Southern Adelaide

Table 7 – SA EPA Evaluation distances for activities surrounding the land

Figures

Figure 1 – The Land site context

Figure 2 – ‘Type A, B or R’ roads classifications in the Greater Adelaide

Figure 3 – Location of nearby potential air and odour emission sources

Figure 4 – Location of former abattoir site

Figure 5 – Wind Rose for Noarlunga BoM Station

Figure 6 – Nearest SA EPA Air Quality Monitoring Station

Figure 7 – Noise and Air Emissions Overlay ‘Type A’ road (Main South Rd)
maximum distance

Figure 8 – Estimated SA EPA evaluation distances applicable for the identified
nearby industries

Figure 9 – Outdoor spaces located away from noise and emissions (Source: NSW
Department of Planning 2008)

Figure 10 – Variation in building facades increases the dispersion of air pollutants
and reduces the effects of canyoning (Source: NSW Department of
Planning 2008)

Figure 11 – Locate air intakes away from the source of polluted air (Source:
Department of Planning, Transport and Infrastructure 2012)

Executive Summary

Arup Australia Pty Ltd (Arup) has been engaged to undertake a preliminary air quality study for a proposed Code Amendment at Hackham (herein referred to as “the land” or “the Affected Area”).

The land is located in the proximity of a mixture of residential and commercial/industrial premises, such as McLaren Vale Quarries, Matt’s Paint and Panel, Samuel’s Gorge and Chapel Hill wineries, which generally generate emissions to air (such as dust and other pollutants) and odour. The land is also located next to Main South Road, a major arterial road. These sources could impact local air quality at the land.

Local Meteorology

Local meteorology conditions for the previous five years (January 2016 to December 2020) were reviewed from the Bureau of Meteorology (BoM) monitoring station at Noarlunga, located approximately 1.8 km west of the land. The prevailing wind direction in the area is northerly, with subsequent easterly and westerly wind directions.

Existing Air Quality Conditions

A review of the existing air quality conditions, sourced from a South Australian Environment Protection Authority (SA EPA) monitoring station is Southern Adelaide – Christie Downs, show that air quality standards are met, with the exception of occasional exceedances of the daily PM₁₀ standard. Exceedances of the daily PM₁₀ standard have previously been attributed by the SA EPA to sources such as bushfires, local construction activities or dust storms. While occasional exceedances have been recorded, this is common across Australia as the impacts of dust storms and bushfires are often experienced regionally. Any impacts would be temporary while the source persists. Existing local background air quality is considered to be suitable for residential development at the land.

Emissions from surrounding Industries

The existing McLaren Vale Quarries are located approximately 730 m to the south-south-east of the land, and currently operate under licence conditions (Licence 1298¹ and 2334²) issued by the SA EPA. The throughput of these quarries is unknown and at this stage no consultation with the quarry has been undertaken. However, the quarry’s licence conditions requires controls to prevent dust from leaving the premises. On this basis, it is assumed that the quarry has been providing dust emission control to the satisfaction of all relevant standards, policy and regulation. The land also lies outside of the adopted SA EPA evaluation distances applicable to the various quarries activities, which aims to separate

¹ https://www.publicregister.epa.sa.gov.au/document/Ac/sZ/vJAnVvOxYP_rE77miBr8ScA.pdf

² <https://www.publicregister.epa.sa.gov.au/document/n3/uv/kAhzw8uLjzb6wxbbnFlhtb8.pdf>

sensitive land uses from surrounding industry. Therefore the risk of air quality and odour impacts from the McLaren Vale Quarry at the land is low.

For the other identified industrial activities, such as the paint workshop and surrounding wineries, the land is located outside of the adopted SA EPA evaluation distances applicable to these activities and hence the risk of air quality and odour impacts from these industries at the land is expected to be low.

Emissions from Transportation

The land is located immediately adjacent to Main South Road, which is a National Association of Australian State Road Authorities (NAASRA) Class 2 arterial road with a SA EPA evaluation distance of 100 m, and a 'Type A' road with *Noise and Air Emissions Overlay* recommended separation distance of 150 m. While sensitive land uses can be built within these buffers, air quality risks need to be assessed and managed to demonstrate that adverse environmental impacts will not compromise amenity.

Based on the daily vehicle movements on Main South Road (to the south west of the Southern Expressway interchange), it is likely that air quality in the land located within the 150 m of the carriageway would be impacted by traffic-related pollution.

In-Principle Mitigation Strategies

In-principle air quality mitigation strategies are provided in Section 6.5 of this report for consideration as required by the *Noise and Air Emissions Overlay*, to minimise air quality impact and optimise amenity as much as practicable at the land, particularly in close proximity to Main South Road.

1 Introduction

Arup Australia Pty Ltd (Arup) has been engaged to undertake a preliminary air quality study for a proposed Code Amendment at Hackham (“the land” or “the Affected Area”).

This report reviews existing air quality conditions in the area including nearby sources of emissions to air. The report also outlines any potential planning constraints in relation to air quality if the land was re-zoned for residential purposes.

The Affected Area is shown in Figure 1.

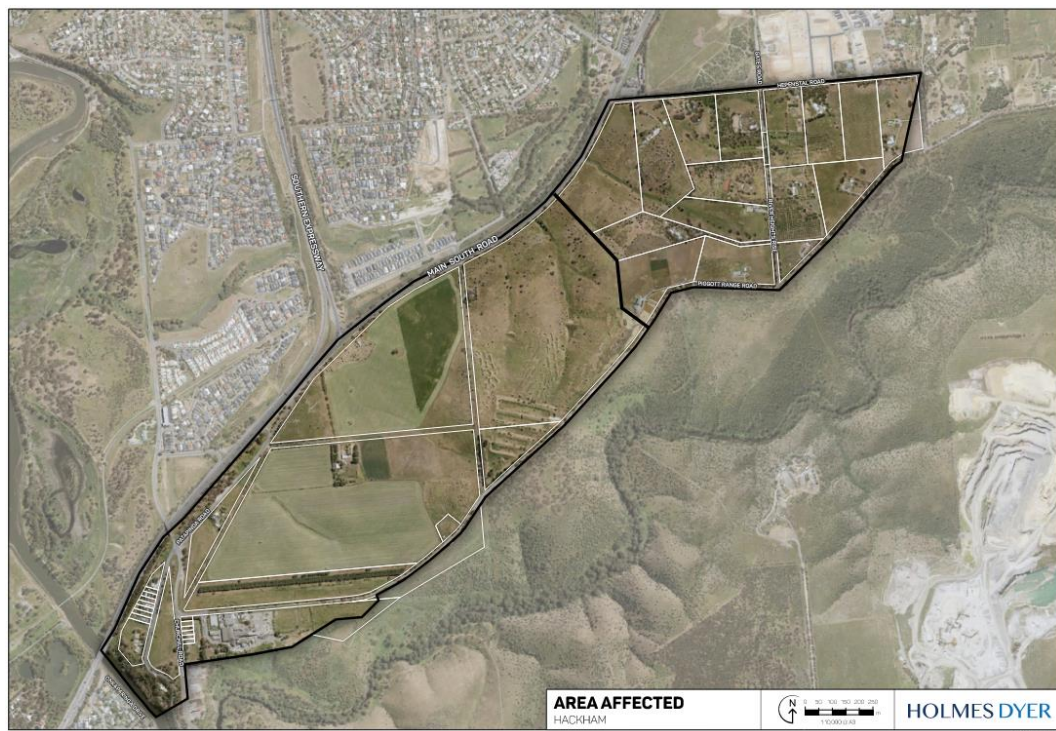


Figure 1 – The Land site context

2 Legislation, Policy and Guidelines

2.1 National Legislation

The National Environment Protection Council (Ambient Air Quality) Measure (NEPM AAQ) is the overarching Federal legislation that sets out the national environment protection standards and goals in relation to ambient air quality.

The NEPM AAQ standards apply to air quality experienced by the general population within a region, and not to air quality in areas within the region affected by localised air emissions, such as heavily trafficked streets. The goal of the NEPM AAQ was to achieve the standards with allowable exceedances, to minimise the adverse effects of emissions to air, as assessed in accordance with the associated monitoring protocol. The standards were set at a level intended to adequately protect human health and well-being. Standards, goals, monitoring and reporting protocols are stated for six common pollutants, namely:

- Carbon monoxide (CO);
- Nitrogen dioxide (NO₂);
- Photochemical oxidants (as ozone);
- Sulfur dioxide (SO₂);
- Lead; and,
- Particles as PM₁₀ and PM_{2.5}.

In addition to the NEPM AAQ, the National Environment Protection (Air Toxics) Measure (Air Toxics NEPM) provides a framework for monitoring, assessing and reporting on ambient levels of air toxics, such as volatile organic compounds (VOCs) (including hydrocarbons). The purpose of this NEPM is to collect information to facilitate the development of standards for ambient air toxics.

2.2 State Legislation, Policy and Guideline

2.2.1 Environment Protection (Air Quality) Policy

Air Quality in South Australia is managed under the *Environment Protection Act 1993*. The relevant state environment protection policy made under Section 28 of the Act is:

- South Australia – *Environment Protection (Air Quality) Policy 2016*

The *Environment Protection (Air Quality) Policy 2016* (Air Quality EPP) provides the legislative basis for air quality regulation and management in the state, including criteria for developing effective conditions to assist commercial premises and industries to improve their performance in minimising risk of air emissions through a system of licensing.

Air Quality EPP³ adopts the state-wide air quality requirements of the *National Environment Protection (Ambient Air Quality) Measures* (AAQ NEPM). AAQ NEPM is the statutory instrument which outlines agreed national objectives for protecting or managing certain aspects of the environment, as described in Section 2.1. The South Australian Government has monitoring and reporting responsibilities under the AAQ NEPM on the common air pollutant listed in Section 2.1. The air quality standards which apply at the land are shown in Table 1.

The Air Quality EPP also provides odour level criteria for locations close to odorous processes, these vary based on population level. These are shown in Table 2. These levels would need to be met to ensure amenity is protected.

Table 1 – Air Quality EPP maximum ground level concentrations

Pollutant	Averaging Period	Maximum Ground Concentration Levels
Carbon monoxide	1 hour	25 ppm
	8 hours	9.0 ppm
Nitrogen dioxide	1 hour	0.12 ppm
	1 year	0.03 ppm
Photochemical oxidants (ozone)	1 hour	0.1 ppm
	4 hours	0.08 ppm
Sulphur dioxide	1 hour	0.2 ppm
	1 day	0.08 ppm
	1 year	0.02 ppm
PM ₁₀	1 day	50 µg/m ³
	1 Year	25 µg/m ³
PM _{2.5}	1 day	25 µg/m ³
	1 Year	8 µg/m ³

Table 2 – Air Quality EPP odour levels

Number of People	Odour Units (3 minutes average, 99.9% of time)
2000 or more	2
350 – 1999 (inclusive)	4
60 – 349 (inclusive)	6
12 – 59 (inclusive)	9
Single residence (fewer than 12)	10

³ The Air Quality EPP has not yet been updated to account for the variation to the NEPM from April 2021, however this would be expected to happen in the near future.

2.2.2 State Planning Policy and Framework

The *State Planning Policies for South Australia* (31 January 2019) outline strategies focusing on the separation of industrial and sensitive land uses, to preserve communities and the environment from exposure to industrial emissions and hazards, altogether creating healthy cities and regions. State Planning Policy 11: *Strategic Transport Infrastructure* and State Planning Policy 16: *Emissions and Hazardous Activities* include measures to manage emissions to ambient air. The following clauses are relevant:

- **Clause 11.4:** *Minimise negative transport-related impacts on communities and the environment.*
- **Clause 16.1:** *Protect communities and the environment from risks associated with industrial emissions and hazards (including radiation) while ensuring that industrial and infrastructure development remains strong through:*
 - (a) *Supporting a compatible land use mix through appropriate zoning controls.*
 - (b) *Appropriate separation distances between industrial sites that are incompatible with sensitive land uses.*
 - (c) *Controlling or minimising emissions at the source, or where emissions or impacts are unavoidable, at the receiver.*

While the land would not include any processes which generate industrial emissions, there is the potential for local air quality to be impacted by industrial processes and major transport networks nearby. Relevant policy and guidelines are discussed in the sections below.

2.2.3 Noise and Air Emissions Overlay

The South Australian planning policy – *Noise and Air Emissions Overlay* (NAEO)⁴ contains planning policies to protect new noise and air quality sensitive development from noise and air emissions generated from major transport corridors (road and rail) and mixed land use. Noise and air quality sensitive development includes residential dwellings, nursing homes, educational institutions, hospitals, places of worship and caravan parks that accommodate existing long-term residential use.

When rezoned, the land is intended to have a primarily residential zone, located adjacent to an arterial road, namely: Main South Road. Under the NAEO, Main South Road is classified as ‘Type A’ road (refer to Figure 2). The South Australian Planning Policy: *Technical Information Sheet 8 – Noise and Air Emissions – Overlay 3* (April 2013) provides recommended separation distances between certain types of roads and sensitive land to protect amenity. This has been assessed for Main South Road and has been discussed further in Section 4.

⁴ *Noise and Air Emissions Overlay* (https://www.sa.gov.au/_data/assets/pdf_file/0009/18846/Tech_info_sheet_8.pdf)

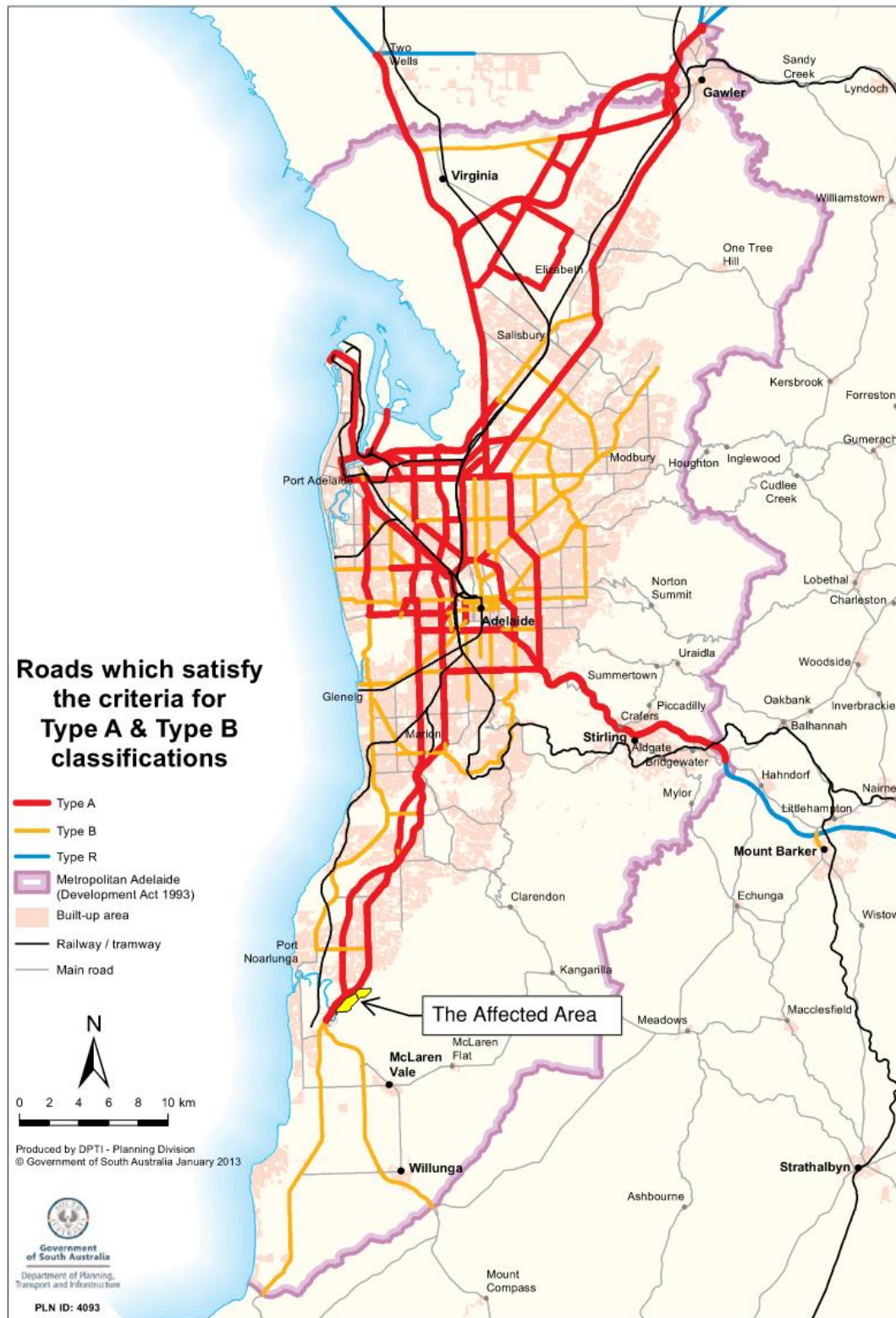


Figure 2 – ‘Type A, B or R’ roads classifications in the Greater Adelaide

2.2.4 Relevant Evaluation Distance Guidelines

The South Australia EPA (SA EPA) developed the *Evaluation distances for effective air quality and noise management* (August 2016) guideline to provide separation of sensitive land uses from industrial or commercial premises that generate noise and air emissions.

The SA EPA evaluation distances guideline provides the recommended minimum separation distances between industrial/commercial land uses and sensitive land uses. This applies to those activities where without some minimum separation, the SA EPA's experience indicates that the residual environmental risk remains unacceptable, even with the best management processes and technologies in place. Among other concerns, this recognises that despite implementation of best practice, plant and equipment can fail at times (upset or malfunction conditions) and atypical emissions may occur which impinge on neighbouring communities. Relevant emissions of consideration for this study are:

- Odour.
- Fugitive dust sources.

Maintenance of minimum separation distances for sensitive land uses does not imply SA EPA's (or relevant planning authority) approval, in the absence of appropriate justification. Proponents are still required to demonstrate in any development application that potential adverse environmental impacts have been adequately assessed and addressed.

Commercial/industrial premises that are identified as requiring separation from sensitive land uses by this guidance have been reviewed in the vicinity of the land. Compliance with SA EPA evaluation distance guideline is addressed in Section 4.

3 Existing Environment

3.1 Identification of Relevant Commercial premises/ Industries

Identification of nearby commercial/industry premises was based on a desk-top review of Google Map©, Google Street View© aerial photography and the Australian Government Department of *the Environment and Energy* – *National Pollutant Inventory* (NPI)⁵.

The land is proposed to be located close to commercial or industrial premises, such as quarries, an automotive painting workshop and wineries. In general, these industries can generate emissions to air (such as dust) and odour, which may impact local air quality at the land. These premises are all within one kilometre of the land, as shown in Figure 3.

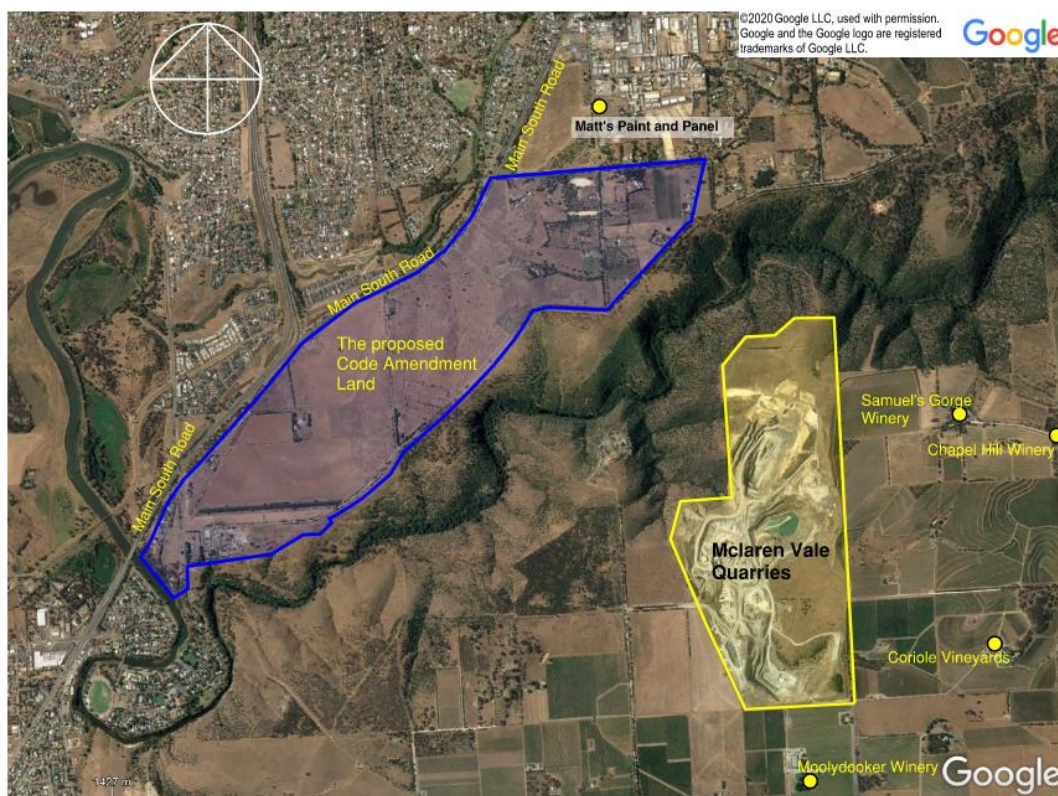


Figure 3 – Location of nearby potential air and odour emission sources

3.1.1 Mclaren Vale Quarries

The existing Mclaren Vale Quarries are located approximately 730 m to the south-south-east of the land (refer to Figure 3) and has been in operation since 1985. The main mining materials extracted from the quarries are:

⁵ Australian Government: Department of the Environment and Energy – National Pollutant Inventory (NPI) (<http://www.npi.gov.au/npidata/action/load/map-search>)

- Dolomite sand
- Ballast
- Gibbons
- Scalps
- Wet mix rubbles and crushed rocks

The McLaren Vale Quarries are currently operating under licence conditions (Licence 1298⁶ and 2334⁷) issued by the SA EPA. Under the licence conditions, the quarries are authorised to perform the following activities (Table 3).

Table 3 – McLaren Vale Quarries authorised activities under licence conditions

Mine and Lease Companies	Authorised Activities
Hallett Concrete Pty Ltd	<ul style="list-style-type: none"> • Concrete batching works
McLaren Vale Properties Pty Ltd	<ul style="list-style-type: none"> • Extractive industries

The above listed activities would typically have the potential to create dust, which could impact the surrounding environment if no appropriate controls are in place.

Review of the above-mentioned SA EPA Licences, The following dust related condition is included in the SA EPA operating licence 1298 (Table 4). Based on this condition, it is expected that the quarry proponents have been providing dust emissions control within their industrial premises.

There is no dust or odour specific condition in Licence 2334.

Table 4 – Nearby Quarries SA EPA Licence Conditions – Dust Conditions

Mine and Lease Companies	Licence Number	Dust or Odour Related Conditions
Hallett Concrete Pty Ltd	1298	Section 1 (1.1) Dust Prevention (S-7) – The Licensee must take all reasonable and practicable measures to prevent dust from leaving the Premises.

The likely impact of the above-mentioned premises on the proposed land is discussed in Section 6.2.

Note that the quarries boundary lines shown in Figure 3 are approximation only, in the absence of consultation with the quarry to obtain detailed information.

3.1.2 Wineries

Wine production facilities may generate odour, resulting from the management of raw materials, wastewater, solid and semi-solid by-products from the winemaking process.

⁶ https://www.publicregister.epa.sa.gov.au/document/Ac/sZ/vJAnVvOxYP_rE77miBr8ScA.pdf

⁷ <https://www.publicregister.epa.sa.gov.au/document/n3/uv/kAhzw8uLjzb6wxbbnFlhtb8.pdf>

The closest winery is approximately one kilometre to the south-east of the land, with other wineries more than 1 km from the land (Figure 3).

3.2 Transport Related Sources

Road traffic is also a major source of air pollutant emissions that has the potential to impact ambient air quality at the land. The main road closest to the land with associated vehicle numbers are presented in Table 5. The likely impact of traffic-related pollution on the proposed land is discussed in Section 6.4.

Refer to Figure 3 for the locations of the arterial roads mentioned in Table 5.

Table 5 – Identified major transportation air emission sources

Source	Vehicle usage	Traffic volumes ⁸
Main South Road (north-east of Southern Expressway intersection)	Cars and occasional heavy vehicles	15,800 AADT (2020-2021 year)
Main South Road (south-west of Southern Expressway intersection)	Cars and occasional heavy vehicles	52,800 AADT (2020-2021 year)

3.3 1559 Piggot Range Road

The Affected Area for the Code Amendment includes an industrial site at 1559 Piggott Range Road, Old Noarlunga (refer to Figure 4). Based on publicly available information⁹, this existing industrial site is a former abattoir, which is no longer in operation.



Figure 4 – Location of former abattoir site

⁸ (<http://location.sa.gov.au/viewer/?map=hybrid&uids=138>)

(Traffic Volumes - Traffic Volume Estimates 2021 (kml) - data.sa.gov.au)

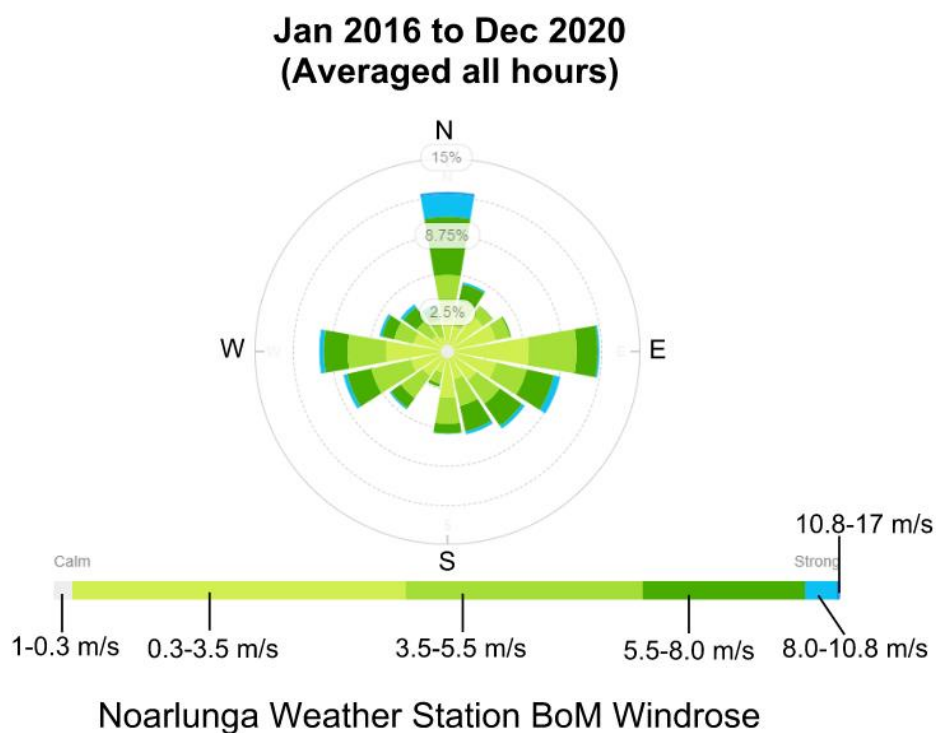
⁹ <https://www.onkaparingacity.com/files/assets/public/development-applications/fact-sheets/factsheet-old-noarlunga-shooting-range-may-2021.pdf>

3.4 Site Representative Meteorology

Local meteorology conditions, including wind direction and speed, affect the dispersal of pollutants in the local area.

Meteorological data for the previous five years (January 2016 to December 2020) was reviewed from the Bureau of Meteorology (BoM) monitoring station at Noarlunga (-35.167°, 138.500°, Station ID 023885). This station is located approximately 1.8 km west of the land, and meteorological data from this station are expected to be representative of site conditions due to the close proximity.

The annual wind rose in Figure 5 shows that the prevailing wind direction in the area is northerly, with subsequent easterly and westerly wind directions.



Source: Willy Weather (using data available from the Bureau of Meteorology)

Figure 5 – Wind Rose for Noarlunga BoM Station

3.5 Existing Local Air Quality

The current locality of the site is relatively suburban with a mixture of residential and commercial premises. The main contributors to local air pollution in the area are expected to be from the nearby quarries and local traffic particularly associated with Main South Road, which is the main road located adjacent to the land.

Existing air quality monitoring data for the area were sourced from the SA EPA website for Air Quality Monitoring Reports and Summaries¹⁰. The nearest air

¹⁰ https://www.epa.sa.gov.au/data_and_publications/air_quality_monitoring/reports_and_summaries

quality monitoring station is Southern Adelaide – Christie Downs (-35.13493°, 138.49516°)¹¹, approximately 3.4 km north-west of the land. This location is deemed representative of the land due to its close proximity as well as similar land uses with a mixture of residential, suburban and commercial premises. This station monitors PM₁₀, nitrogen dioxide (NO₂), and ozone (O₃), and the associated concentration levels for the previous five years (January 2014 to December 2018¹²) are summarised in Table 6.

The Christie Downs monitoring station does not record carbon monoxide (CO), sulfur dioxide (SO₂) and PM_{2.5} ground level concentrations. However, CO and PM_{2.5} have been consistently low and below the criterion, as evidenced by monitoring stations at typical suburban areas in Adelaide CBD and North Adelaide. Similarly, SO₂ has been consistently low and well below the criterion, as evidenced by monitoring stations at typical suburban areas in North- Western Adelaide (Le Fevre 1 and Le Fevre 2).

Based on the SA EPA air quality monitoring data from 2014 to 2018 shown in Table 6, air quality standards are expected to be met at the land. Exceptions may occur as shown in the recent data for the daily mean standard in 2014, 2016 and 2018. These exceedances have been attributed by SA EPA to smoke from local bushfires, local dust storms and nearby construction activities.

¹¹ <http://location.sa.gov.au/viewer/>

¹² EPA air quality data for year 2019 onwards are not available publicly at the time of writing.



Figure 6 – Nearest SA EPA Air Quality Monitoring Station

Table 6 – Air quality monitoring results for Southern Adelaide

Pollutant	Standard	Southern Adelaide – Christie Downs (3.4km from the land)				
		2014	2015	2016	2017	2018
NO ₂						
Maximum hourly mean	0.12 ppm	0.039 ppm	0.036 ppm	0.032 ppm	0.038 ppm	0.040 ppm
O ₃						
Maximum hourly mean	0.10 ppm	0.077 ppm	0.068 ppm	0.065 ppm	0.065 ppm	0.060 ppm
Four-hourly mean	0.08 ppm	0.062 ppm	0.063 ppm	0.059 ppm	0.060 ppm	0.055 ppm
PM ₁₀						
Maximum daily mean	50 µg/m ³	50 µg/m ³ (highest level below standard criteria) There was one exceedance this year: <ul style="list-style-type: none">on 3rd April with highest level at 58 µg/m³	47 µg/m ³	37 µg/m ³ (highest level below standard criteria) There was one exceedance this year due to: <ul style="list-style-type: none">Regional dust storm on 27th April with highest level at 56 µg/m³	31 µg/m ³	47 µg/m ³ (highest level below standard criteria) There were four exceedances this year due to: <ul style="list-style-type: none">Prescribed burn for Mt Lofty Ranges on 21st March with highest level at 63 µg/m³Fires and dust storm on 11th April with highest level at 56 µg/m³ andLocalised construction works on 7th June with highest level at 51 µg/m³Localised construction works on 5th July with highest level at 66 µg/m³

4 Transportation Noise and Air Emissions Overlay

The land is currently located adjacent to a 'Type A' classified road (Main South Road), under the NAE0 – refer to Section 2.2.3. Table 2 of the South Australian Planning Policy: *Technical Information Sheet 8 – Noise and Air Emissions – Overlay 3* (April 2013) provide a maximum applicable distance for 'Type A' road classification, with different speed categories, which aims to separate sensitive land uses from the road network to protect amenity. Main South Road has a sign posted speed limit of 80 km/h, for which a 150 m maximum overlay distance from the road carriageway boundary is recommended. A 150 m buffer from the road carriageway boundary has been included in Figure 7.

In order to protect air quality, amenity risks to the proposed residential development located within the overlay need to be assessed and managed. These can be managed in a number of ways through building and streetscape design that result in the dispersal of pollutants. This is discussed further in Section 6.5.

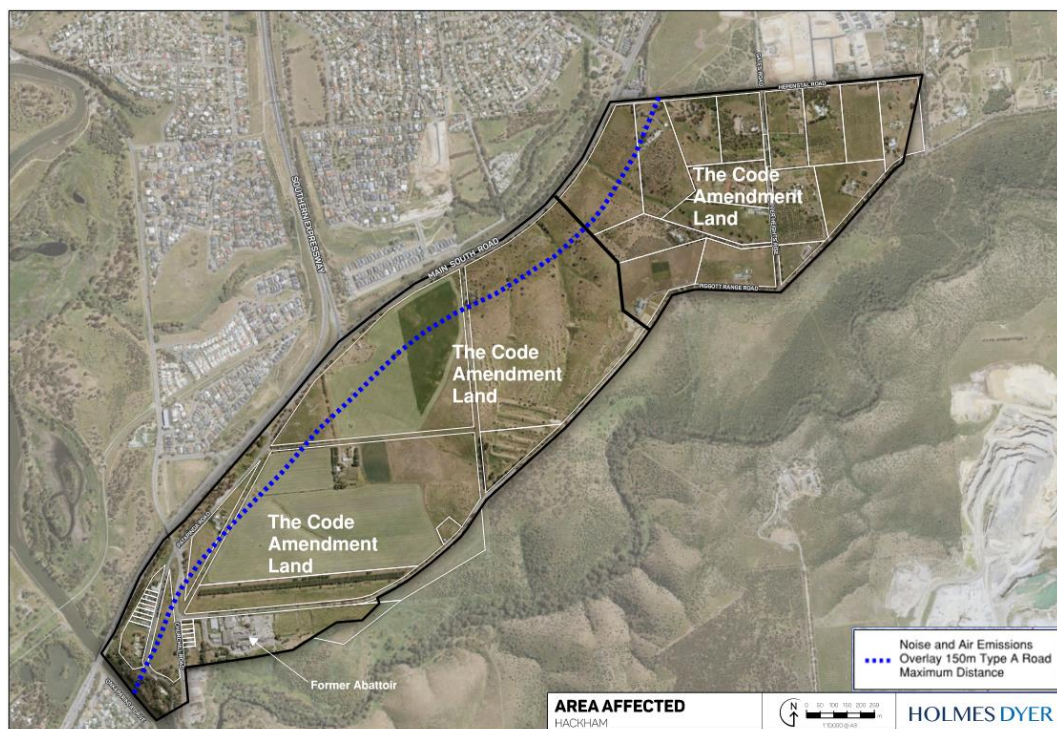


Figure 7 – Noise and Air Emissions Overlay 'Type A' road (Main South Rd) maximum distance

5 Evaluation Distances for Existing Sources

The SA EPA has published a guideline which provides recommended evaluation distance to protect amenity where sensitive land uses are planned in the vicinity of existing facilities that may generate significant emissions to air.

Nearby existing facilities for which the SA EPA guideline would apply are:

- McLaren Vale Quarries, may include activities such as concrete batching, extractive industries, rock crushing, grinding or milling. The concrete batching works trigger an evaluation distance of 200 m, the crushing works trigger an evaluation distance of 500 m and the overall quarry area evaluation distance is subject to individual assessment under the extractive industries condition. As rock crushing could happen at any location within the quarries, for conservatism, the 500 m evaluation distance is indicatively applied to the entire quarry boundary.
- Matt's Paint and Panel is likely to include spray painting and powder coating. It is assumed that this facility has the capacity to use up to, but not exceeding 100 litres/day of paint or 10 kg/day of dry powder, triggering an evaluation distance of 100 m.
- Samuel's Gorge and Chapel Hill wineries, include activities such as mechanically treated wastewater, triggering an evaluation distance of 300 m.
- The nearby wineries make use of water storage lagoons without any aeration devices. As a worst-case, it is assumed that the lagoons have biological oxygen demand (BOD) of greater than 4,000 mg/l, triggering an evaluation distance of 1 km.
- Main South Road, being a National Association of Australian State Road Authorities (NAASRA)¹³ Class 2 arterial road, triggers an evaluation distance of 100 m.

The evaluation distances of the above-mentioned facilities as well as potential air quality impacts are summarised in Table 7, and shown in a map in Figure 8.

Note that these evaluation distances and the extent of the source footprint are preliminary in nature, based on approximation only via a review of aerial imagery.

¹³ https://icsm.gov.au/sites/default/files/Assessing_Feasibility_National_Road_Classification.pdf

Table 7 – SA EPA Evaluation distances for activities surrounding the land

Activity type	Additional activity notes	Evaluation distance (metres)	Description of typical activities and potential air quality impacts	Potentially Applicable nearby Industries
Concrete batching works	--	200	Dust generation at concrete batching facilities usually results from vehicle movements on unsealed working areas, disturbance by vehicles of cement and aggregate dust on the ground, blow-outs from cement storage silos, and vehicle loading and unloading. Further, dust issues off-site can arise if mud or cement and aggregate dust is dragged by trucks from the site and dries on the adjoining roadway. There is potential for dust generation with delivery of sand and aggregates, cement and fly ash (a cementitious material used to enhance the quality of concrete and similar to cement), loading of the aggregate weigh-hoppers, and loading of the trucks.	McLaren Vale Quarries
Crushing, grinding or milling	Rock, ores or minerals	500	Potential sources of dust generation include the delivery of bulk material to the property, the movement of material, crushing of material, and transfer to and from trucks.	McLaren Vale Quarries
Extractive industries	--	Individual assessment	The main concern is dust, which are generated at sites from excavation areas, haul roads, raw feed and product stockpiles, processing and screening plants, blasting, rock crushers, mobile screening plants, crushing, grinding and milling.	McLaren Vale Quarries
Surface coating	Spray painting and powder coating with a capacity to use up to but not exceeding 100 litres/day of paint or 10 kg/day of dry powder.	100	Spray painting and powder coating involve the application of protective material on surfaces. Spray painting typically requires solvents to evaporate, usually organic volatiles, although now more water-based paints are being used. Powder coating includes the spraying of powder onto surfaces and curing in an oven. Solvent emissions include gaseous reaction products such as formaldehyde during drying and curing, and isocyanates. These emissions can cause odour nuisance and may also impact on human health. Dry application can result in powder coating fallout of paint particles or powder over-spray, and powder recovery system, in which case fabric should be used. The main potential air quality impacts are dust, volatile organics and odour.	Matt's Paint and Panel

Activity type	Additional activity notes	Evaluation distance (metres)	Description of typical activities and potential air quality impacts	Potentially Applicable nearby Industries
Wineries or distilleries	Mechanically treated wastewater (including the use of aeration devices)	300	Odours and air emissions can result from the storage and management of raw materials, by-products from the winemaking process and wastewater. Anaerobic decomposition of organic matter and solids produces odour, which can cause nuisance.	Samuel's Gorge Winery Chapel Hill Winery
	Wastewater storage lagoons without any aeration device : BOD >4,000 mg/l	1,000		Refer to Figure 8
Major roads	Class 1, 2, 3, 6 and 7 roads are considered to be major roads	100	Emissions from cars, trucks, buses and motor bikes, can have an impact on air quality. Emissions from motor vehicles include particulate matter, oxides of nitrogen, carbon monoxide and benzene.	Main South Road (classified as NAASRA Class 2 arterial road)

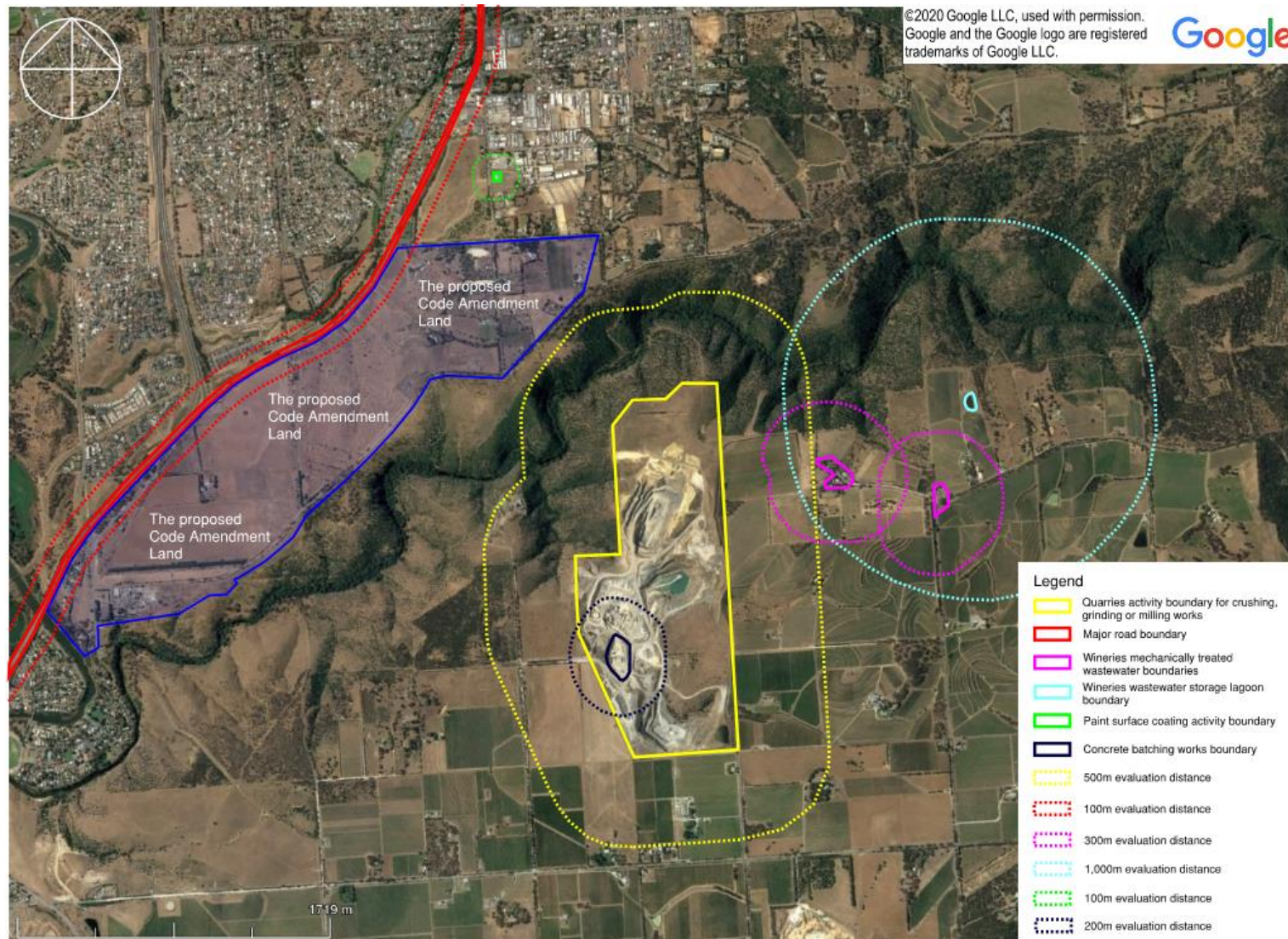


Figure 8 – Estimated SA EPA evaluation distances applicable for the identified nearby industries

6 Suitability of the Proposed Land for Residential Development

6.1 Existing Air Quality Conditions

A review of the existing air quality conditions in the vicinity of the land shows that air quality standards are met, with the exception of occasional exceedances of the daily PM₁₀ standard. Exceedances of the daily PM₁₀ standard have previously been attributed by SA EPA to sources such as bushfires, local construction activities or dust storms. While occasional exceedances have been recorded, this is common across Australia as the impacts of dust storms and bushfires are often experienced regionally. Any impacts would be temporary while the source persists.

Existing air quality is considered to be suitable for residential development at the land.

6.2 Emissions from nearby Quarries

SA EPA evaluation distances for the quarry facilities which include concrete batching and rock crushing, grinding and milling works, are shown in Figure 8. The land lies outside of adopted SA EPA evaluation distances, and therefore the risk of air quality and odour impacts from the McLaren Vale Quarry is low.

Extractive Industries evaluation distances have not been included in Figure 8, as this is reliant on detailed air quality assessment information carried out by the processing facilities, which have not been made available to Arup at this time. However, the quarry's licence conditions require dust to be controlled to prevent dust from leaving the premises. Therefore, in the absence of detailed information, it is assumed that the quarry has been providing dust emission control to the satisfaction of all relevant standards, policy and regulation.

6.3 Emissions from Other Industries

For the other identified industrial activities in Table 7, such as Matt's Paint and Panel and the surrounding wineries, the adopted SA EPA evaluation distances do not overlap the land's boundary. Hence, the risk of air quality and odour impacts from these industries is low.

6.4 Emissions from Transportation

The land is located immediately adjacent to Main South Road, which is a NAASRA Class 2 arterial road. There are recommendations for the separation of sensitive land uses from roads included in both the SA EPA Evaluation Distance guideline and the NAEQ, 100 m and 150 m respectively. While sensitive land uses can be built within these buffers, air quality risks need to be assessed and managed to demonstrate to SA EPA (or relevant planning authority) that adverse

environmental impacts will not compromise amenity and will meet appropriate environmental criteria, such as the ground level concentration (GLCs) and odour levels within the *Environment Protection (Air Quality) Policy 2016* (refer to Section 2.2).

At this stage, no monitoring or quantitative assessment of pollutant concentrations adjacent to Main South Road has been undertaken. Daily vehicle movements on Main South Road north-east of the Southern Expressway intersection (see Table 5) are low, less than 16,000 vehicles per day. It's unlikely that there would be significant air quality impacts for those areas of the land adjacent to this section of Main South Road.

However, daily vehicle movements for the section of Main South Road to the south west of the Southern Expressway intersection are much higher and would likely generate emissions to a level that would impact local air quality. Therefore, air quality impacts could occur for those areas of the land within the 150m buffer applied to Main South Road (refer to Figure 7).

Based on the above, in-principle air quality mitigation strategies are provided in Section 6.5 for consideration as required by the NAEQ, to minimise air quality impact and optimise amenity as much as practicable at the land, particularly in close proximity to Main South Road.

6.5 General Mitigation Strategies

The in-principle air quality mitigation strategies below were sourced from the South Australian Government – Department of Planning, Transport and Infrastructure (DPTI) guideline titled; *Reducing noise and air impacts from road, rail and mixed land use – A guide for builders, designers and the community* (2012), as recommended in the SA EPA evaluation distance guideline (Section 4).

Whilst it is not anticipated that the surrounding activities would have a significant impact on local air quality at the proposed land to categorise them unsuitable for development, locations next to busy roads may experience elevated pollutant concentrations under certain weather conditions, which could impact the amenity of users. For those areas of land adjacent to Main South Road (south-west of the Southern Expressway intersection), the 150 m buffer recommended by the NAEQ policy should be maintained as far as practicable to protect amenity. This does not mean that this land cannot be included for development but should be reserved for less sensitive uses such as landscaping or playing fields where users would be transient, rather than for dwellings.

Development of the land for residential purposes has the potential to generate dust during the construction phase and increase vehicle emissions in the area during the operational phase due to residential traffic travelling to and from the land.

The land would likely contain at least one main route, if not more, through the site which would carry all local traffic into and out of the land. Although it is unlikely that increased traffic travelling to and from the land would significantly impact local air quality in the surrounding area, nevertheless, internal roads need to be considered in the design of the land. Therefore, the following strategies have been

provided in-principle for consideration to minimise air quality impacts and optimise amenity as far as practicable at the land.

- Locate ground level private and communal open space away from the emission source (Figure 9), introduce a buffer between residential development and busy roads or other sources.
- Consideration should be given to locating air intakes away from busy roads or other sources.
- Avoid the use of confined outdoor spaces oriented towards busy roads or other sources that could trap polluted air and restrict air circulation.
- Encourage air dispersal by:
 - Having fewer confined areas to enable winds and breezes to disperse and carry away air pollutants (i.e. carefully consider the orientation and continuity of open spaces, their dimension and shape, topography and the layout of buildings surrounding the area).
 - Stepping back the upper storeys of roadside buildings to increase dispersion of air pollutants (Figure 11).
 - Providing a variety in frontages such as setting upper floors back from the street frontage helps disperse air (Figure 10).
 - Using two-sided balconies to allow optimise cross breezes.

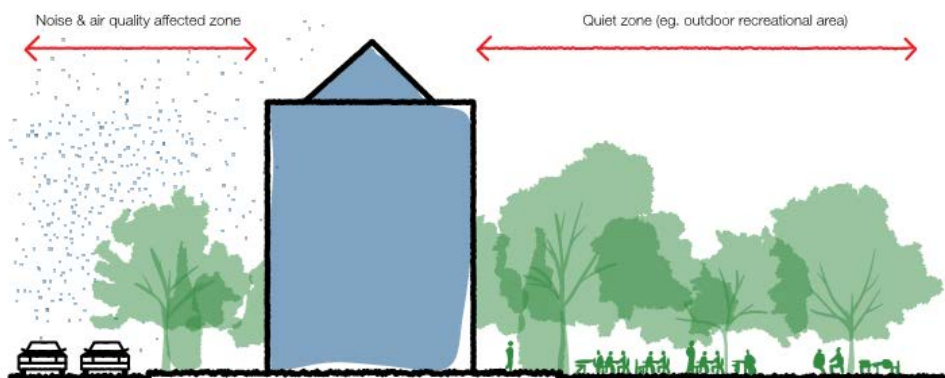


Figure 9 – Outdoor spaces located away from noise and emissions (Source: NSW Department of Planning 2008)

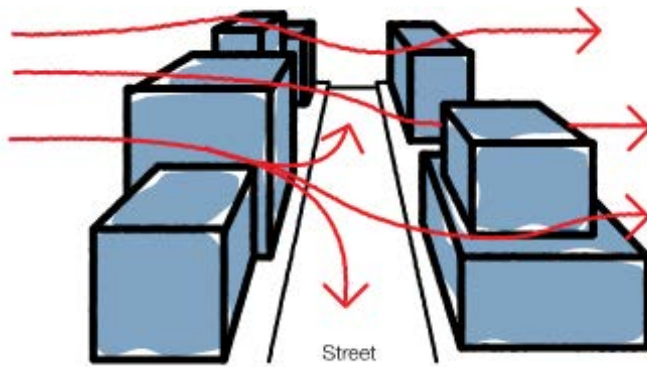


Figure 10 – Variation in building facades increases the dispersion of air pollutants and reduces the effects of canyoning (Source: NSW Department of Planning 2008)

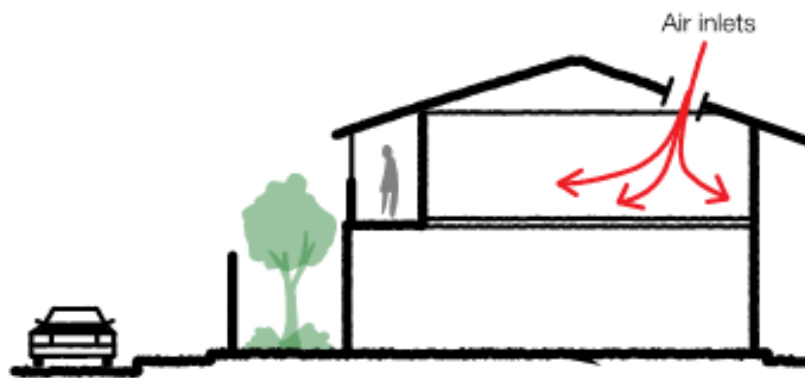


Figure 11 – Locate air intakes away from the source of polluted air (Source: Department of Planning, Transport and Infrastructure 2012)

7 Recommended Next Steps

Based on the outcome of this report, it is unlikely that local air quality at the land is significantly impacted by surrounding land uses and sources. The design of should take into consideration the recommendation for a 150 m buffer between residential dwellings (or other sensitive uses of the development) and the Main South Road carriageway boundary (south west of the Southern Expressway intersection). This will assist in protecting amenity for future residents.

Should further detailed investigations be sought, this could involve consultation with McLaren Vale quarry, SA EPA, Council or stakeholders to seek further information and understand any dust or odour complaints lodged for the area that may have been a result of the nearby quarry or winery operations. This would also allow the air quality control measures implemented at the quarries or wineries to be understood to determine if these are suitable to minimise impacts at the land once occupied. It would also provide the opportunity to develop more effective and efficient mitigation strategies to protect amenity at the land if required.