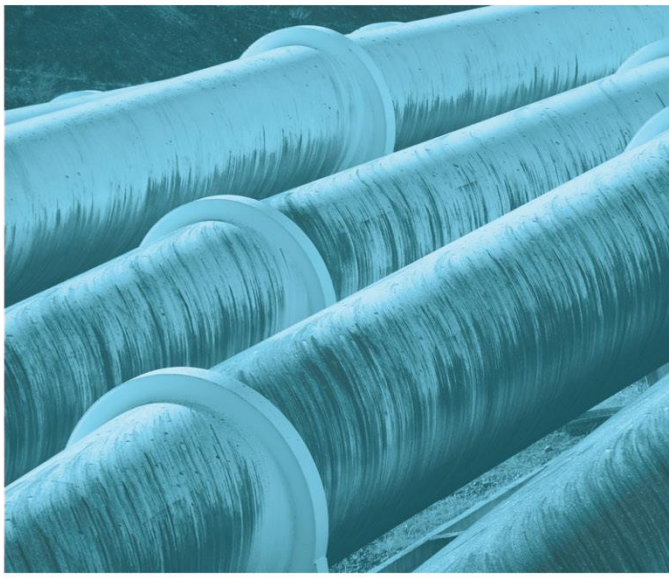



Construction Air Quality Impact Assessment

New Wee Waa High School

Prepared for NSW Department of Education
October 2021

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SYDNEY
Ground floor, 20 Chandos Street
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Level 1, 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

ADELAIDE
Level 4, 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE
Ground floor, 188 Normanby Road
Southbank VIC 3006
T 03 9993 1900

PERTH
Level 9, Suite 2, 109 St Georges Terrace
Perth WA 6000

CANBERRA
Level 2, Suite 2.04
15 London Circuit
Canberra City ACT 2601

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EMM Sydney
Ground floor, 20 Chandos Street
St Leonards NSW 2065

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

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Prepared by

Paul Boulter
Associate Director, Air Quality
27 October 2021

Approved by

Scott Fishwick
National Technical Leader, Air Quality
27 October 2021

Executive Summary

A State Significant Development (SSD) application is being prepared by the NSW Department of Education for the construction of a new high school in Wee Waa ('the project'). This air quality impact assessment (AQIA) for the construction of the project was prepared to support the SSD application. It is considered that the operational impacts of the project on air quality, as well as potential sources of odorous air pollutant emissions, would be negligible.

The AQIA followed the *Guidance on the Assessment of Dust from Demolition and Construction* published by the Institute of Air Quality Management (IAQM) in the United Kingdom. In the IAQM assessment procedure, activities at construction sites are divided into four types: demolition (not relevant to this project), earthworks, construction and track-out. A risk-based methodology is then used to consider amenity impacts due to dust soiling, health effects due to an increase in exposure to PM_{10}, and harm to ecological receptors.

In relation to dust soiling impacts, the risk associated with track-out was determined to be high, and that associated with earthworks was determined to be medium. Construction was determined to be low-risk. For human health and ecological impacts the risks were determined to be either negligible or low.

The Construction Environmental Management Plan (CEMP) for the project will include measures to manage dust. As track-out was determined to be high-risk activity for dust soiling impacts, the CEMP should pay particular attention to the dust generated from this activity.

Recommended mitigation measures include logging dust complaints, carrying out regular inspections and recording results, providing adequate water supply for dust suppression, ensuring that vehicles entering and leaving sites are covered to prevent escape of materials during transport, and avoiding unnecessary trips.

The proposed mitigation measures are considered sufficient to ensure off-site impacts from the project are effectively managed.

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1 Introduction

1.1 Background

A State Significant Development (SSD) application is being prepared by the NSW Department of Education for the construction of a new high school in Wee Waa ('the project'). EMM Consulting Pty Ltd (EMM) has been engaged by the Department of Education to prepare an air quality impact assessment (AQIA) for the construction of the project to support the SSD application.

1.2 Project description

Students and staff were evacuated from the current Wee Waa High School site due to ongoing health issues in late 2020. Students are currently co-located within the town's primary school in an overcrowded site. A ministerial announcement on 3 June 2021 committed to the construction of a new high school at Wee Waa on existing Department of Education-owned land, and adjacent Crown land, as an urgent priority. The site is located on Mitchell Street/Kamliaroi Highway, and is legally described as Lot 1 DP577294, Lot 2 DP550633 and Lots 124-125 DP757125.

This report accompanies the SSD application, which seeks consent for the construction of the new school. The school will service 200 students with potential to grow to a total capacity of 300 students, subject to further funding and service need, and 61 staff. The school will include a two-storey building, an indigenous learning centre, sporting fields and associated civil and utilities works. For a detailed project description, refer to the EIS prepared by Ethos Urban.

1.3 Secretary's Environmental Assessment Requirements (SEARs)

The SSD application is being prepared in accordance with the requirements of the Planning Secretary's Environmental Assessment Requirements (SEARs), issued by the NSW Department of Planning, Industry and Environment on 6 July 2021.

With respect to air quality, the requirements of the SEARs are presented in Table 1.1. The table also shows where the relevant SEARs requirements have been addressed in this report.

Table 1.1 Secretary's Environmental Assessment Requirements

Key issue	Requirement	Relevant report section
Air Quality Assessment	Provide an air quality impact assessment that considers dust, odour generation and airborne particulate matter concentration at residential receptors, including existing levels and impacts of construction and operation. This should include all reasonable and feasible control measures to minimise and monitor particulate matter and dust emissions on the surrounding residences, landscapes and the nearby public school.	This report addresses construction impacts. Operational impacts on air quality, and impacts from odorous emission sources, are likely to be negligible, and have not been assessed.
Relevant Policies and Guidelines	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW EPA 2017).	The Approved Methods focus on assessment using atmospheric dispersion models. This assessment uses a risk-based approach to assessing construction impacts that has been used widely in NSW.

2 Construction dust risk assessment

2.1 Overview

This section of the report provides an assessment of the dust impacts associated with the construction of the project. The assessment follows the *Guidance on the Assessment of Dust from Demolition and Construction* published by the Institute of Air Quality Management in the United Kingdom (IAQM 2014).

The main air pollution and amenity issues[1] at construction sites are:

- annoyance due to dust deposition (soiling of surfaces) and visible dust plumes;
- elevated concentrations of airborne particulate matter less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}) due to dust-generating activities; and
- exhaust emissions from diesel-powered construction equipment[2].

Very high levels of soiling can also damage plants and affect the diversity of ecosystems.

Dust emissions can occur during the preparation of the land (eg demolition and earthmoving) and during construction itself. They can vary substantially from day to day depending on the level of activity, the specific operations being undertaken, and the weather conditions.

The risk of dust impacts from a construction site is related to the following:

- the nature of the activities being undertaken;
- the duration of the activities;
- the size of the site;
- the meteorological conditions (wind speed, direction and rainfall), as adverse impacts are more likely to occur downwind of the site and during drier periods;
- the proximity of receptors to the activities;
- the sensitivity of the receptors to dust;
- the adequacy of the mitigation measures applied to reduce or eliminate dust.

Any effects of construction on air pollution and amenity would generally be temporary and relatively short-lived. Moreover, mitigation should be straightforward, as most of the necessary measures are routinely employed as 'good practice' on construction sites. The IAQM approach therefore aims to identify risks and to recommend appropriate mitigation measures.

1 There are other potential impacts, such as the release of heavy metals, asbestos fibres or other pollutants during the demolition of certain buildings. These issues need to be considered on a site by site basis (IAQM 2014).

2 Exhaust emissions from on-site plant and site traffic are unlikely to have a significant impact on local air quality, and in the majority of cases they will not need to be quantitatively assessed (IAQM 2014).

2.2 Details of construction

2.2.1 Construction footprint

The construction footprint for the project (as shown in Figure 2.2) covers an area of approximately 8 hectares.

2.2.2 Construction activities

The main construction activities of relevance to air quality will include:

- clearing of vegetation;
- establishing stormwater drainage systems, and temporary berms to prevent excess stormwater run-off;
- erosion and sediment controls;
- establishing internal site construction access roads, laydown areas and a dedicated construction management compound with temporary offices and site facilities;
- bulk earthworks to create the general levels for buildings, outdoor recreational areas;
- stockpiling and conditioning of existing topsoils;
- site reprofiling, including construction of batters to create building pads;
- provision of services to the site including sewerage connection, water and gas;
- excavations associated with buildings;
- provision of below-ground building services including plumbing and drainage;
- building piles and slab construction;
- building construction;
- laying stormwater drainage pipes and placing pits;
- constructing kerbs and gutters for roads; and
- paving of car parks.

2.2.3 Construction timing

The anticipated programme of works is:

- construction commencement in March 2022; and
- completion and handover in October 2022.

The proposed working hours are:

- Monday to Friday - 7:00am to 6:00pm;

- Saturdays - 7:00am to 1:00pm; and
- Sundays and Public Holidays - no work.

2.3 Risk assessment

In the IAQM assessment procedure, activities at construction sites are divided into four types:

1. Demolition, which is any activity that involves the removal of existing structures.
2. Earthworks, which covers the processes of soil stripping, ground levelling, excavation and landscaping. Earthworks will primarily involve excavating material, haulage, tipping and stockpiling.
3. Construction, which is any activity that involves the provision of new structures, modification or refurbishment.
4. Track-out, which involves the transport of dust and dirt by vehicles from the construction site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

The assessment method considers three separate dust impacts:

- annoyance due to dust soiling;
- the risk of health effects due to an increase in exposure to PM_{10}; and
- harm to ecological receptors.

The procedure for assessing risk is shown in Figure 2.1. Professional judgement is required in some cases, and where justification cannot be given, a precautionary approach is adopted. The assessment is used to define appropriate mitigation measures to ensure that there will be no significant residual effects.

The key steps in the procedure are as follows:

- Step 1 – a screening requirement for a detailed assessment based on the proximity of surrounding receptors;
- Step 2 – an assessment of the risk of dust impacts and the sensitivity of surrounding receptors;
- Step 3 – a determination of site-specific mitigation;
- Step 4 – consideration of residual effects and significance; and
- Step 5 – an assessment report (this document).

The following sections document the construction dust assessment for the project, and recommended mitigation measures are provided in Section 3.

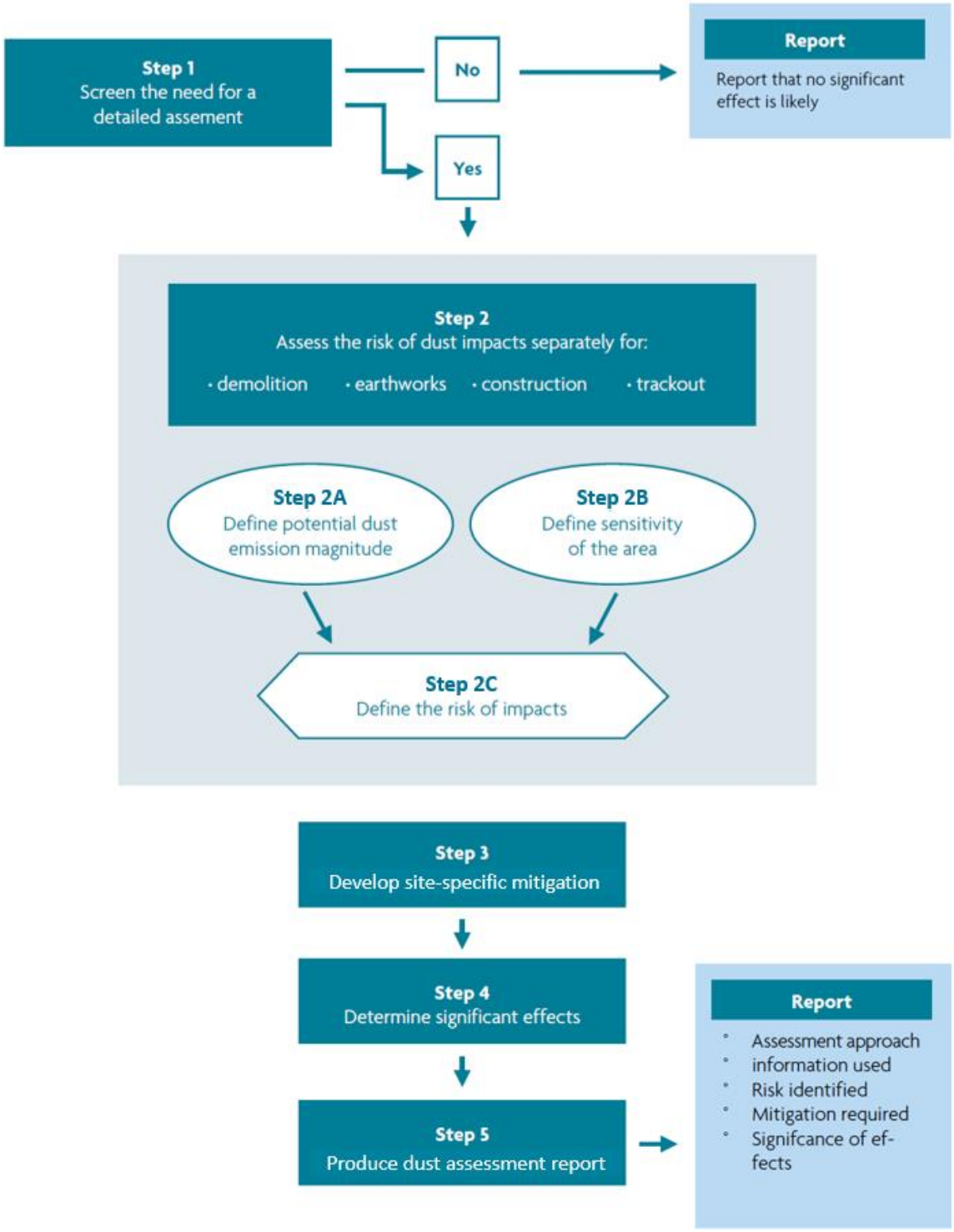

Figure 2.1 Procedure for the assessment of construction dust

2.4 Step 1 – Screening

The IAQM guidance specifies that a detailed construction dust assessment should be undertaken if:

- a human receptor[3] is located within 350 m of the site boundary;
- an ecological receptor[4] is located within 50 m of the site boundary; or
- a human/ecological receptor is within 50 m of a route used by construction vehicles up to 500 m from a site entrance.

The footprint for the project, and the locations of receptors, are shown in Figure 2.2.

The results of Step 1 are summarised in Table 2.1. As there were human receptors within 350 m of the boundary of the construction footprint, and ecological receptors within 50 m of the boundary, the proposed construction activities triggered the requirement for a detailed assessment of construction impacts.

Table 2.1 Results of Step 1

Human receptors		Ecological receptors		Detailed assessment required
Within 350 m of site boundary	**Within 50 m of route used by construction vehicles**	**Within 50 m of site boundary**	**Within 50 m of route used by construction vehicles**	
Yes	Yes	Yes[(a)]	Yes[(a)]	Yes

(a) The ecological receptors were considered to be particularly sensitive to dust.

2.5 Step 2 – Assessment of risk of dust impacts

The IAQM guidance dictates that the risk category for dust impacts from construction activities should be allocated based on the following:

- the scale and nature of works (Step 2A); and
- the sensitivity of the area to dust impacts (Step 2B).

These factors are then combined to determine the risk of impacts from the construction activities (Step 2C). The risk rating process is addressed in the following sections.

2.5.1 Step 2A – Scale and nature of works

The scale and nature of demolition, earthworks, construction and track-out activities were determined. The IAQM guidance prescribes a range of criteria that classify the magnitude of each activity as either large, medium or small (see Table A.1 of Appendix A). The proposed activities were reviewed in order to allocate a potential dust emission magnitude in accordance with the guidance, and the findings are summarised in Table 2.2.

[3] A 'human receptor' refers to any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to PM_{10} over a time period relevant to air quality standards and goals. In terms of annoyance effects, this will most commonly relate to dwellings, but may also refer to other premises such as museums, galleries, vehicle showrooms, food manufacturers, electronics manufacturers, amenity areas and horticultural operations.

[4] An 'ecological receptor' refers to any sensitive habitat affected by dust soiling. This includes the direct impacts on vegetation or aquatic ecosystems of dust deposition, and the indirect impacts on fauna (eg on foraging habitats).

Table 2.2 Dust emission potential

Activity	Project details	Potential dust emission magnitude
Demolition	No demolition required.	Not applicable
Earthworks	Cut and fill.	Large
Construction	Designed for Manufacture and Assembly school buildings and playing fields.	Small
Track-out	Construction vehicles moving within the site may be required to traverse greater than 100 m along exposed soil areas. External vehicle movements would be along sealed roadways.	Large

2.5.2 Step 2B – Sensitivity of area

In determining the sensitivity of the area to dust impacts, soiling, human health and ecological receptors are treated separately.

i Dust soiling effects on people and property

For dust soiling impacts, the sensitivity of the local area is defined based on the sensitivity of receptors and their number (see Table A.2 of Appendix A).

For earthworks, construction and track-out, the receptors within 350 m of the construction footprint were allocated a 'high' sensitivity rating for dust soiling on the basis that they were mostly residential.

Figure 2.2 shows the IAQM distance bands for construction and the receptors for dust soiling impacts (noting that there is no 200 m distance for dust soiling impacts). The numbers of buildings in each distance band were estimated using GIS, with receptor types being identified from Google Earth.

The exact counting of the number of human receptors is not required by the guidance. Instead it is recommended that judgement is used to determine the approximate number of buildings within each distance band. For buildings which are not dwellings professional judgement should be used to determine the number of human receptors. For this assessment, the following numbers of human receptors per building were assumed:

- residential property = 1 (by convention in the IAQM guidance)
- small/medium commercial = 2
- large commercial = 5
- services = 2

The resulting numbers of human receptors and IAQM distance band are shown in Table 2.3.

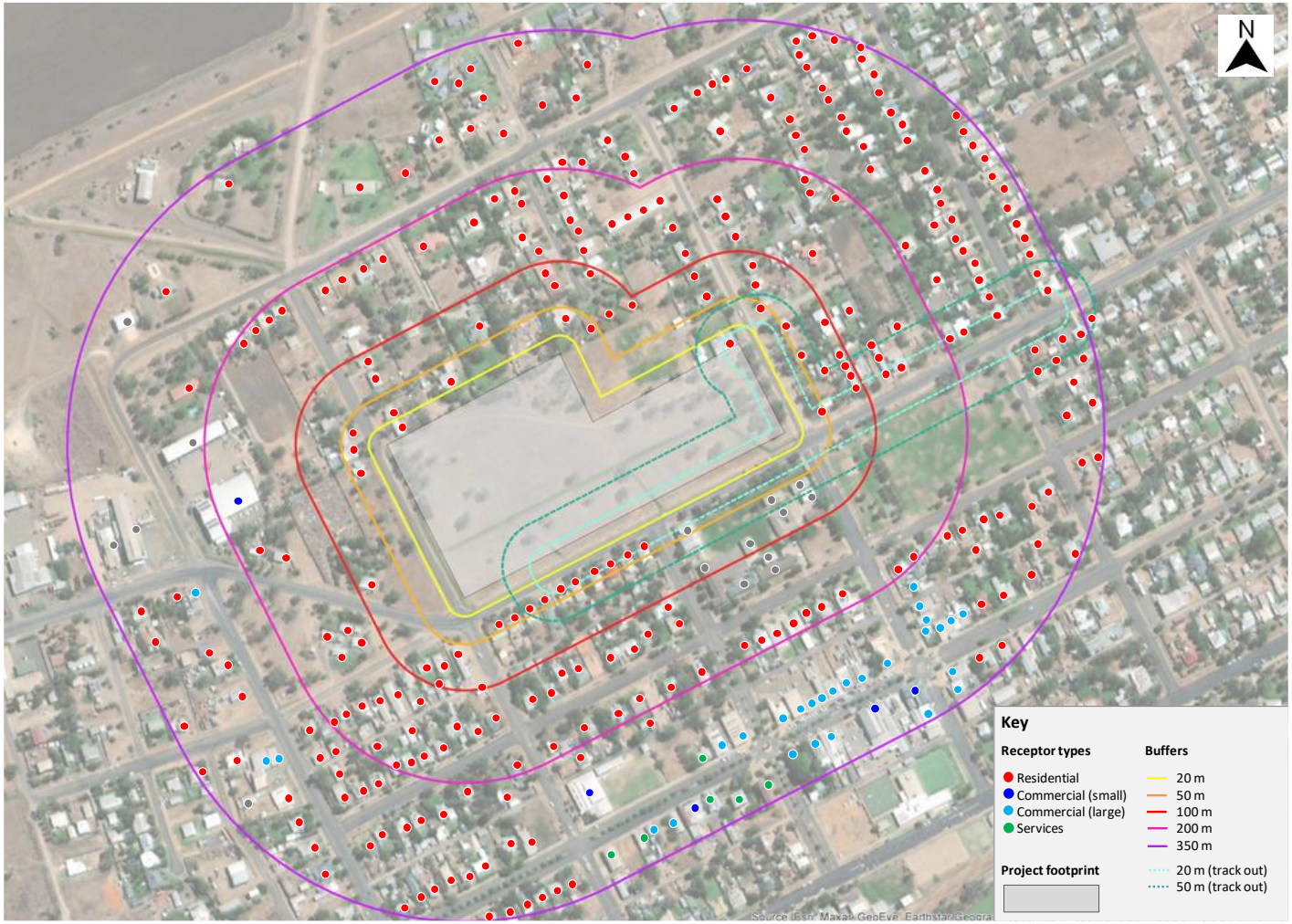

Figure 2.2 **Construction footprint for the project, buffers zones and receptors for construction impacts**

Table 2.3 Numbers of human receptors for dust soiling impacts

	Number of human receptors by distance from construction footprint boundary or haul routes			
Activity	**<20 m**	**20-50 m**	**50-100 m**	**100-350 m**
Demolition	Not applicable			
Earthworks, construction	2	19	26	315
Track-out	15	17	-	-

Based on the receptor sensitivity and the numbers of receptors within certain distances from construction activities, the sensitivity to dust soiling effects for earthworks and construction was determined to be 'medium', and for track-out it was determined to be 'high' (Table 2.4).

Table 2.4 Summary of sensitivity of area to dust soiling impacts

Activity	**Sensitivity of local area to dust soiling impacts**
Demolition	Not applicable
Earthworks	Medium
Construction	Medium
Track-out	High

ii Human health impacts

The IAQM guidance defines the approach for categorising the sensitivity of the local area to human health impacts, taking into account the sensitivity of receptors in the area, the proximity and number of receptors, and annual mean concentrations of particulate matter less than 10 µm in aerodynamic diameter (PM_{10}) (see Table A.3 of Appendix A).

As with dust soiling, the receptors in the area of the project were allocated a 'high' sensitivity rating for human health.

Figure 2.2 shows the IAQM distance bands for construction and the receptors for human health impacts. For human health impacts the 200 m distance is included. The resulting numbers of human receptors and IAQM distance band are shown in Table 2.5.

Table 2.5 Numbers of human receptors for human health impacts

	Number of human receptors by distance from construction footprint boundary or haul routes				
Activity	**<20 m**	**20-50 m**	**50-100 m**	**100-200 m**	**200-350 m**
Demolition	Not applicable				
Earthworks, construction	2	19	26	92	223
Track-out	15	17	-	-	-

Annual mean PM_{10} concentrations between 2012 and 2020 were obtained from the air quality monitoring stations at Narrabri and Tamworth, operated by the NSW Department of Planning, Industry and Environment (DPIE). The Narrabri station is the closest location to the project where air quality is monitored routinely.

The annual mean concentrations are summarised in Table 2.6. PM_{10} concentrations were systematically higher in 2019 (and in 2018 at some locations) than in previous years, and not representative of historical levels. The PM_{10} concentration at Narrabri in 2020 (12.4 µg/m^3) was considered to be representative for the project area. This corresponded to the lowest concentration band (<15 µg/m^3)[5] in the IAQM guidance.

Table 2.6 Annual mean PM_{10} concentrations (DPIE)

Year	Annual mean PM_{10} concentration (µg/m^3)	
	Narrabri	**Tamworth**
2012	-	15.9
2013	-	16.6
2014	-	15.8
2015	-	14.1
2016	-	15.3
2017	-	15.3
2018	14.3	20.1
2019	23.2	33.7
2020	12.4	16.8

Based on these assumptions, the sensitivity of the local area to human health impacts for earthworks, construction and track-out was determined to be 'low' (Table 2.7).

Table 2.7 Summary of sensitivity of area to human health impacts

Activity	Sensitivity of local area to human health impacts
Demolition	Not applicable
Earthworks	Low
Construction	Low
Track-out	Low

[5] In the IAQM guidance this value is 24 µg/m^3. For the purpose of this assessment it has been scaled down according to the ratio Australian and UK annual mean standards for PM_{10} (25 µg/m^3 and 40 µg/m^3 respectively).

iii Ecological impacts

For ecological impacts, the sensitivity of the local area is defined based on the sensitivity of locations and their distance from the construction activity (see Table A.4 of Appendix A).

The Department of Education advised EMM that, although the land within 50 m of the project does contain an endangered ecological community, the species present are not considered to be particularly sensitive to dust. In addition, no threatened flora or fauna species have been identified on-site. Consequently, it was assumed that, for all relevant construction activities, the sensitivity of the local area to ecological impacts was 'low' (Table 2.8). This is the lowest available rating in the guidance.

Table 2.8 Summary of sensitivity of area to ecological impacts

Activity	Sensitivity of local area to ecological impacts
Demolition	Not applicable
Earthworks	Low
Construction	Low
Track-out	Low

2.5.3 Step 2C – Definition of risk of impacts

To determine the risk of impacts with no mitigation applied, the IAQM guidance requires that the dust magnitude rating is combined with the sensitivity of the local area for each of the activity categories (ie demolition, earthworks, construction and track-out). Using the lookup tables in the guidance (see Table A.5 of Appendix A), risk ratings for each type of activity were allocated and are presented in Table 2.9.

For dust soiling impacts, the risk associated with track-out was determined to be high, and that associated with earthworks was determined to be medium. Construction was determined to be low-risk.

For human health and ecological impacts the risks were determined to be either negligible or low.

The risk ratings in Table 2.9 are useful to help focus and target mitigation measures (Step 3 below), such that all risks are not significant.

Table 2.9 Summary of risk assessment

Activity	Step 2A: Potential for dust emissions	Step 2B: Sensitivity of area			Step 2C: Risk of dust impacts		
		Dust soiling	Human health	Ecological	Dust soiling	Human health	Ecological
Demolition	Not applicable						
Earthworks	Large	Medium	Low	Low	Medium Risk	Low Risk	Low risk
Construction	Small	Medium	Low	Low	Low Risk	Negligible	Negligible
Track-out	Large	High	Low	Low	High Risk	Low Risk	Low risk

2.5.4 Step 3: Recommended mitigation measures

The dust impact risk allocations in Step 2C relate to unmitigated construction dust emissions. Based on the risk of dust impacts identified in Table 2.9, Step 3 involved identifying mitigation measures for each of the four potential activities in Step 2 to further reduce the residual risk for impacts on the surrounding area. The project would be constructed according to conventional methods and would be guided by a Construction Environmental Management Plan (CEMP) to effectively manage site environmental impacts. The measures recommended for inclusion in the CEMP are summarised in Section 3.

2.5.5 Step 4: Significance of risks

Once the appropriate dust mitigation measures have been identified in Step 3, the next step in the IAQM procedure is to determine whether there are residual significant effects arising from the construction phase of a proposed development. For almost all construction activities the aim should be to prevent significant effects on receptors through effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant' (IAQM 2014).

Construction dust is unlikely to represent a serious problem at the project site, assuming the recommended mitigation measures in Section 3 are implemented. Therefore, the residual risk for impacts on the surrounding area following mitigation will be 'not significant'.

2.6 Operational impacts and odour

It is considered that following the completion of proposed construction activities, there would be negligible potential for the generation of air pollutant emissions or associated impacts from the operation of the project. Air quality impacts during operation are expected to be limited to emissions from infrequent vehicle movements associated with staff and contractors entering and exiting the site. It is likely that the operational emissions will be comparable to those at the former site.

Furthermore, there will not be any significant sources of odorous air pollutants associated with the construction or operation of the project.

Consequently, operational phase air quality and odour-related impacts from the project have not been included in this assessment.

3 Mitigation and monitoring

The project would be constructed according to conventional methods and would be guided by a CEMP to effectively manage off-site environmental impacts. The CEMP may include (but will not be limited to) the recommended mitigation measures listed below. These measures are routinely employed as 'good practice' on construction sites.

As track-out was determined to be high-risk activity for dust soiling impacts, the CEMP should pay particular attention to the dust generated from this activity.

The following general mitigation measures are recommended:

- prior to commencement of construction activities, develop appropriate communications to notify the potentially impacted residences of the project (duration, types of works, etc), relevant contact details for environmental complaints reporting;
- a complaints logbook will be maintained throughout the construction phase which should include any complaints related to dust; where a dust complaint is received, the response actions should be detailed in the logbook;
- 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 logbook;
- carry out regular site inspections, record inspection results, and make the logbook available for review as requested;
- erect shade cloth barriers to site fences around potentially dusty activities such as trench excavations and material stockpiles where practicable;
- keep site fencing and barriers clean using wet methods;
- impose a maximum-speed-limit of 20 km/h on all internal roads and work areas during construction;
- ensure proper maintenance and tuning of all equipment engines;
- deploy water carts to ensure that exposed areas and topsoils/subsoil are kept moist;
- provide an adequate water supply on the construction site for effective dust/particulate matter suppression/mitigation;
- modify working practices by limiting activity during periods of adverse weather (hot, dry and windy conditions) and when dust is seen leaving the site;
- limit the extent of clearing of vegetation and topsoil to the designated footprint required for construction and appropriate staging of any clearing;
- minimise drop heights from loading or handling equipment; and
- re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.

With respect to managing track-out, the following measures are recommended:

- access gates to be located at least 10 m from receptors where possible;

- use water-assisted dust sweeper(s), to remove, as necessary, any material tracked out of the site onto public roads;
- avoid dry sweeping of large areas;
- ensure vehicle loads entering and leaving sites are covered to prevent escape of materials during transport; and
- trips and trip distances should be controlled and reduced where possible, for example by coordinating delivery and removal of materials to avoid unnecessary trips.

Visual monitoring by construction personnel will represent an effective means of dust monitoring during construction. Visual monitoring should comprise of the following:

- Undertaking daily on-site and off-site inspections, where receptors are nearby, to monitor dust. The inspection results should be recorded in a specific log. Inspection should include regular dust soiling checks of surfaces such as street furniture and cars.
- At the commencement of each day's activities, the local meteorological forecast should be reviewed, including the timing of notable increases in wind speed and/or temperature. Appropriate increased intensity or additional mitigation measures should be planned for the day based on this forecast review. The likely meteorological conditions and implications for dust emissions and impacts should be discussed at the morning toolbox meeting.
- Increasing the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. Should notable visual dust emissions be observed leaving the site boundary, increased intensity or additional mitigation measures should be deployed.

4 Summary and conclusions

The construction dust assessment followed the *Guidance on the Assessment of Dust from Demolition and Construction* published by the IAQM. A risk-based methodology was used to consider amenity impacts due to dust soiling, health effects due to an increase in exposure to PM_{10}, and harm to ecological receptors.

It was assumed that odour impacts and operational impacts on air quality will be negligible.

In relation to dust soiling impacts, the risk associated with track-out was determined to be high, and that associated with earthworks was determined to be medium. Construction was determined to be low-risk. For human health and ecological impacts the risks were determined to be either negligible or low.

The CEMP will include measures to manage dust. As track-out was determined to be high-risk activity for dust soiling impacts, the CEMP should pay particular attention to the dust generated from this activity.

Recommended mitigation measures include logging dust complaints, carrying out regular inspections and recording results, providing adequate water supply for dust suppression, ensuring that vehicles entering and leaving sites are covered to prevent escape of materials during transport, and avoiding unnecessary trips.

The proposed mitigation measures are considered sufficient to ensure off-site impacts from the project are effectively managed.

5 References

IAQM 2014, Guidance on the assessment of dust from demolition and construction, Version 1.1, Institute of Air Quality Management, London, www.iaqm.co.uk/ text/guidance/construction-dust-2014.pdf.

NSW EPA 2017, Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, NSW Environment Protection Authority, Sydney.

Appendix A

IAQM criteria

The assessment criteria in the IAQM guidance are summarised in the following tables.

Table A.1 Site categories (scale of works)

Type of activity	Site category definitions		
	Large	**Medium**	**Small**
Demolition	Building volume >50,000 m^3, potentially dusty construction material (eg concrete), on-site crushing and screening, demolition activities >20 m above ground level.	Building volume 20,000–50,000m^3, potentially dusty construction material, demolition activities 10-20 m above ground level.	Building volume <20,000 m^3, construction material with low potential for dust release (eg metal cladding, timber), demolition activities <10 m above ground and during wetter months.
Earthworks	Site area >10,000 m^2, potentially dusty soil type (eg clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth-moving vehicles active at any one time, formation of bunds>8 m in height, total material moved >100,000 tonnes.	Site area 2,500-10,000 m^2, moderately dusty soil type (eg silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4-8 m in height, total material moved 20,000-100,000 tonnes.	Site area <2,500 m^2, soil type with large grain size (eg sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months.
Construction	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting	Building volume 25,000-100,000 m^3, potentially dusty construction material (eg concrete), piling, on site concrete batching.	Total building volume <25,000 m^3, construction material with low potential for dust release (eg metal cladding or timber).
Track-out	>50 HDV (>3.5t) OUTWARD movements in any one day, potentially dusty surface material (eg high clay content), unpaved road length >100 m.	10-50 HDV (>3.5t) OUTWARD movements in any one day, moderately dusty surface material (eg high clay content), unpaved road length 50–100 m.	<10 HDV (>3.5t) OUTWARD movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.

Table A.2 Sensitivity of area to dust soiling impacts

Receptor sensitivity	Number of receptors	Distance from source (m)			
		<20	**<50**	**<100**	**<350**
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table A.3 Sensitivity of area to human health impacts

Receptor sensitivity	Annual mean PM_{10} concentration	Number of receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	>20 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	17.5 - 20 µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	15 – 17.5 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<15 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>20 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	17.5 - 20 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	15 – 17.5 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<15 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A.4 Sensitivity of area to ecological impacts

Receptor sensitivity	Distance from source (m)	
	<20	20-50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table A.5 Risk of dust impacts

Type of activity	Sensitivity of area	Dust emission potential		
		Large	**Medium**	**Small**
Demolition	High	High Risk	Medium Risk	Medium Risk
	Medium	High Risk	Medium Risk	Low Risk
	Low	Medium Risk	Low Risk	Negligible
Earthworks	High	High Risk	Medium Risk	Low Risk
	Medium	Medium Risk	Medium Risk	Low Risk
	Low	Low Risk	Low Risk	Negligible
Construction	High	High Risk	Medium Risk	Low Risk
	Medium	Medium Risk	Medium Risk	Low Risk
	Low	Low Risk	Low Risk	Negligible
Track-out	High	High Risk	Medium Risk	Low Risk
	Medium	Medium Risk	Low Risk	Negligible
	Low	Low Risk	Low Risk	Negligible