221 Luddenham Rd, Orchard Hills

Construction Air Quality Impact Assessment

Prepared for HB+B Property Pty Ltd

July 2023

221 Luddenham Rd, Orchard Hills

Construction Air Quality Impact Assessment

HB+B Property Pty Ltd

E230606 RP1

July 2023

Version	Date	Prepared by	Approved by	Comments
V1	4 July 2023	Amie Gilbert	Scott Fishwick	Draft for Client review
V2	6 July 2023	Amie Gilbert	Scott Fishwick	Final

Approved by

Scott Fishwick
National technical lead – air quality
6 July 2023

Ground floor 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

Executive Summary

HB+B Property Pty Ltd (HB+B) proposes to rezone land and develop an industrial park (the project) located at 221 Luddenham Road, Orchard Hills in New South Whales (NSW), known as Alspec Industrial Business Park (the site). The project will include the subdivision of the allotments to individual warehouse lots with associated office space, hardstands and loading docks.

This air quality impact assessment (AQIA) for the earthworks and construction of the project was prepared to support the development application (DA) to the Penrith City Council. The AQIA followed the Guidance of 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 airborne particulate matter, and harm to ecological receptors.

For dust soiling impacts, the risk was determined to be medium for earthworks and construction, and low for track-out. For human health impacts, the risk was determined to be low for earthworks, construction and track-out. For ecological impacts, the risk was also determined to be low for earthworks, construction and track-out.

The Construction Environmental Management Plan (CEMP) for the project will include measures to manage dust. As earthworks and construction were determined to be medium-risk activities, the CEMP should pay particular attention to the dust generated from these activities.

Recommended mitigation measures include logging dust complaints, carrying out regular inspections and recording results, ensuring that exposed areas are kept moist, and ensuring that vehicles entering and leaving the site are covered to prevent escape of materials during transport.

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

TABLE OF CONTENTS

Appendices

Tables

Figures

1 Introduction

1.1 Overview

HB+B Property Pty Ltd (HB+B) is proposing to rezone land and develop an industrial park (the project) located at 221 Luddenham Road, Orchard Hills in New South Whales (NSW), known as Alspec Industrial Business Park (the site) within the City of Penrith local government area (LGA).

The site, shown in Figure 1.1, covers a land area of approximately 125 hectares (ha) and is proposed to be rezoned from RU2 Rural landscape to IN1 General Industrial. The site is largely undeveloped and proposed to be a mixed commercial and industrial premises, including warehousing lots with associated office space, hardstands and loading docks.

HB+B has engaged EMM Consulting Pty Ltd (EMM) to prepare an air quality impact assessment (AQIA) for the construction phase of the project to support the development application (DA) to the Penrith City Council.

1.2 Project description

The project would occur over three stages, with the bulk earthworks and construction to include the following activities:

- clearing of vegetation and bulk earthworks within the project footprint
- construction of internal roads, footpaths, cycleways and street landscaping
- new services reticulation within the road reserve including water, sewer, electrical and telecommunications
- proposed flood storage basins, water quality (bioretention) basins, on-site basins and water storage basins.

While warehouse and office spaces are proposed to be developed, each instance of the individual warehouses will be assessed under separate approvals and do not form part of the project.

1.3 Assessment approach and requirements

This 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 (IAQM) in the United Kingdom (IAQM 2014).

This report comprises of the following sections:

- Section2: the assessment methodology and results
- Section 3: an overview of mitigation measures and monitoring requirements for the project
- Section 4: the summary and conclusion for the work.

KEY

- Project site

Existing environment

- Major road
- Minor road
- Named watercourse

INSET KEY

- Major road
- NPWS reserve
- State forest

Source: EMM (2023); ABS (2021); DCSSS (2023); GA (2009); MetroMap (2023)

0 1 2 km

GDA2020 MGA Zone 56

N

\\emmsvr1\EMM2\2023\E230606 - 221 Luddenham Rd Orchard Hills - construction dust\GIS\02 Maps\AQIA001 LocalContext 20230704 02.mxd 4/07/2023

Local context

221 Luddenham Rd Orchard Hills
Construction Air Quality Impact Assessment
Figure 1.1

EMM
creating opportunities

2 Construction dust risk assessment

2.1 Overview

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
- 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 (e.g. 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 quantitively assessed (IAQM 2014).

2.2 Details of construction

2.2.1 Construction footprint

The construction footprint (or maximum extent of works) for the project (as shown in Figure 2.2) covers an area approximately 125 ha.

2.2.2 Activities

The works for the project include the establishment of the following:

- clearing of vegetation within the development footprint
- bulk earthworks for the entire estate
- construction of the main internal estate road, including footpaths, cycleways and street landscaping
- proposed flood storage basins in the northwest corner of the site
- proposed water quality (bioretention) basins, on-site detention basins and water storage basins
- new services reticulation within the road reserve including water, sewer, electrical and telecommunications.

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 leveling, excavation and landscaping. Earthworks will primarily involve excavating material, haulage, tipping and stockpiling.
3. Construction, which is any activity that involved 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 sperate dust impacts:

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

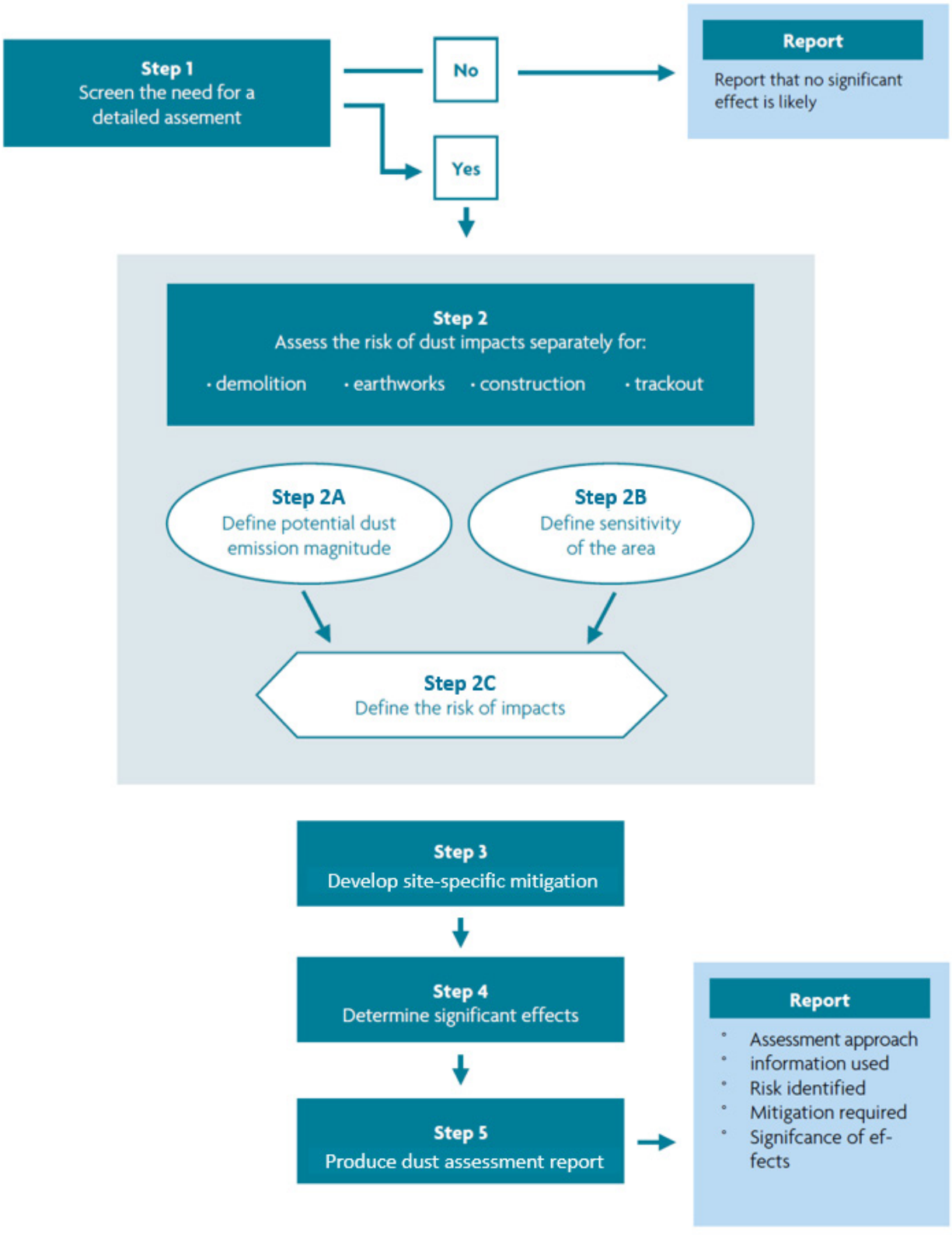

Figure 2.1 **Procedure for the assessment of construction dust**

The key steps in the procedure are as follows:

- Step 1 – a screening requirement for a details 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 and significance
- 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.

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 works boundary
- an ecological receptor[4] is located within 50 m of the works boundary
- 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 2.1.

The results of Step 1 are summarised in Table 2.1. As there were human receptors within the distances from the works boundary specified above, 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 the 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	Yes	Yes

[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).

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)
- 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 and allocated as a potential dust emission magnitude, in accordance with the guidance as far as possible, and the findings are summarised in Table 2.2.

Table 2.2 Dust emission potential

Activity	Project details (proposed activities)	Potential dust emission magnitude
Demolition	No demolition included.	Not applicable
Earthworks	• Extent of works = approximately 125 ha • Imported material fill = 415,000 m^3 of soil (equating to around ~664,00 t). • Soil type = clay and silt	Large
Construction	• Construction of water basins, internal roads, car parking and footpaths. • Total construction area = approximately 15 ha.	Large
Track-out	• Two potential routes for track-out. • Average day 60-80 light vehicles on site. • Estimate peak 400 trucks (in & out) per day during bulk earthworks.	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 and receptors. The numbers of buildings in each distance band were counted, with receptor types being identified from Google Earth.

KEY

- Project site

Receptor type

- Residential (home)
- Recreational
- Commercial (medium)

Buffer zone for impact assessment

- 20 m
- 50 m
- 100 m
- 200 m
- 350 m

Haul route buffer

- 20 m
- 50 m

Existing environment

- Minor road
- Vehicular track
- Watercourse/drainage line

\\emmsvr1\EMM2\2023\E230606 - 221 Luddenham Rd Orchard Hills - construction dust\GIS\02 Maps\AQIA002 ConstructionBufferZones 20230704 02.mxd 4/07/2023

Source: EMM (2023); DCSSS (2023); Metromap (2023)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

Construction footprint
for the project and buffer zones
for impact assessment

221 Luddenham Rd Orchard Hills
Construction Air Quality Impact Assessment
Figure 2.2

EMM
creating opportunities

The exact counting of the number of human receptors is not required by the IAQM 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 within each building. For this assessment, the following numbers of human receptors per building were assumed:

- residential (home) = 1 (by convention in the IAQM guidance)
- commercial (medium) = 10
- recreation = 5

The resulting numbers of human receptors for each IAQM distance band are shown in Table 2.3

Table 2.3 Number of human receptors for dust soiling impacts

Activity	Number of human receptors by distance from construction footprint boundary			
	<20 m	20-50 m	50-100 m	100-350 m
Demolition	Not applicable			
Earthworks, construction	2	7	3	19
Track-out	0	4	-	-

Based on the receptor sensitivity and the numbers of receptors within the stated distances from the footprint, the sensitivity of dust soiling effects for earthworks and construction was determined to be 'medium' and track-out to be 'low' (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	Low

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 for each IAQM distance band are shown in Table 2.5.

Table 2.5 Number of human receptors for human health impacts

Activity	Number of human receptors by distance from construction footprint boundary				
	<20 m	20-50 m	50-100 m	100-200 m	200-350 m
Demolition	Not applicable				
Earthworks, construction	2	7	3	2	17
Track-out	0	4	-	-	-

In the absence of long-term PM_{10} monitoring within the project area, annual mean PM_{10} concentrations between 2018 and 2022 were obtained from the air quality monitoring stations at St Marys, Bringelly and Penrith, operated by the NSW Department of Planning and Environment (DPE).

The annual mean concentrations are summarised in Table 2.6. PM_{10} concentrations were relatively high in the years between 2018 and 2020 due to extensive bushfires and drought conditions in Eastern Australia, and are not representative of historical levels. On balance, it was determined that the concentrations at the project site would correspond to the lowest concentration band (<15 µg/m^3)[5] in the IAQM guidance.

Table 2.6 Annual mean PM_{10} concentrations

Year	Annual mean PM_{10} concentration (µg/m^3)		
	St Marys	Bringelly	Penrith
2018	21.3	-	-
2019	23.6	24.6	-
2020	18.3	18.9	-
2021	15.3	16.2	16.7
2022	12.1	12	13.8

Based on these assumptions, the sensitivity of the local area to human health impacts was determined to be 'low' for earthworks and construction (Table 2.7). This is the lowest available rating in the guidance.

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).

Ecoplanning (2022) identified potentially vulnerable ecological receptors outside of the works boundary and within the distances in the IAQM guidance. Elevated levels of dust may be deposited onto the foliage of vegetation adjacent to the works area. This has the potential to reduce photosynthesis and transportation and cause abrasion and heating of leaves. Dust deposition is likely to be greatest during periods of earthworks and vegetation clearing activities and during adverse weather conditions. However, deposition of dust on foliage is likely to be highly localised, temporary and relatively short-lived. In addition, the species present are not known to be particularly sensitive to dust. Based on this information, and the timeframe of exposure to dust, ecological receptors were allocated a 'low' sensitivity rating.

The resulting sensitivity of the local area to ecological impacts was determined to be 'low' for earthworks, construction and track-out 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 the local area to ecological impacts
Demolition	Not applicable
Earthworks	Low
Construction	Low
Track-out	Low

2.5.3 Step 2C – Definition of risk 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.

To summarise:

- For dust soiling impacts, the risk was determined to be medium for earthworks and construction, and low for track-out.
- For human health impacts, the risk was determined to be low for earthworks, construction and track-out.
- For ecological impacts, the risk was determined to be low for earthworks, construction and track-out

None of the activities were found to be high-risk.

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	-	-	-	-	-	-	-
Earthworks	Large	Medium	Low	Low	Medium risk	Low risk	Low risk
Construction	Large	Medium	Low	Low	Medium risk	Low risk	Low risk
Track-out	Large	Low	Low	Low	Low risk	Low risk	Low risk

Note: '-' = not applicable.

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 three relevant activities 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 risk

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 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'.

3 Mitigation

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.

None of the construction activities were found to be high-risk. Earthworks and construction were determined to be medium-risk for dust soiling impacts and low-risk for human health impacts. The CEMP should therefore pay particular attention to these activities.

The following general mitigation measures are recommended:

- prior to commencement of construction and earthwork 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 should be maintained through the construction and earthworks 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 daily site inspections, including local meteorological forecast, record inspection results in a logbook
- erect shade cloth barriers to site fences around potentially dusty activities such as excavation and material stockpiles where practicable
- keep site fencing and barriers clean using wet methods
- ensure proper maintenance of all equipment engines
- avoid leaving engines running at idle where possible
- deploy a water cart to ensure that exposed areas and topsoils/subsoil are kept moist, where necessary
- 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.

With respect to managing **earthworks**, the following measures are recommended:

- re-vegetate earthworks and exposed areas to stabilise surfaces as soon as practicable.

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

- ensure vehicle loads entering and leaving the site are covered to prevent escapes of materials during transport

- use water-assisted dust sweeper(s), to remove, as necessary, any material tracked out of the site onto public roads.

4 Summary and conclusion

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.

For dust soiling impacts, the risk was determined to be medium for earthworks and construction, and low for track-out. For human health impacts, the risk was determined to be low for earthworks, construction and track-out. For ecological impacts, the risk was also determined to be low for earthworks, construction and track-out.

The CEMP will include measures to manage dust. As earthworks and construction was determined to be medium-risk activities, the CEMP should pay particular attention to the dust generated from these activities. Recommended mitigation measures including logging dust complaints, carrying out regular inspections and recording results, ensuring that exposed areas are kept moist, and ensuring that vehicles entering and leaving the site are covered to prevent escape of materials during transport. The proposed mitigation measures are considered sufficient to ensure off-site impacts from the project are effectively managed.

Abbreviations

AQIA	Air Quality Impact Assessment
CEMP	Construction Environmental Management Plan
DA	Development application
DPE	Department of Planning and Environment
EMM	EMM Consulting Pty Limited
ha	hectares
IAQM	(UK) Institute of Air Quality Management
LGA	Local government area
m	metres
NSW	New South Whales
PM_{10}	Particulate matter less than 10 microns in aerodynamic diameter

References

Ecoplanning (2022) Ecological Constraints Assessment - Draft Masterplan – Alspec Industrial Business Park, Ecoplanning Pty Ltd. March 2022.

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.

Appendix A
IAQM criteria

EMM
creating opportunities

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 m3, potentially dusty construction material (eg concrete), on-site crushing and screening, demolition activities >20 m above ground level.	Building volume 20,000–50,000m3, potentially dusty construction material, demolition activities 10-20 m above ground level.	Building volume <20,000 m3, 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 m2, 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 m2, 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 m2, 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 m3, piling, on site concrete batching; sandblasting	Building volume 25,000-100,000 m3, potentially dusty construction material (eg concrete), piling, on site concrete batching.	Total building volume <25,000 m3, 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

Australia

SYDNEY
Ground floor, 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE
Level 3, 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 1, 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

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

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

MELBOURNE
188 Normanby Road
Southbank VIC 3006

PERTH
Level 9, Suite 9.02
109 St Georges Terrace
Perth WA 6831

Canada

TORONTO
2345 Yonge Street, Suite 300
Toronto ON M4P 2E5

VANCOUVER
60 W 6th Ave Suite 200
Vancouver BC V5Y 1K1

linkedin.com/company/emm-consulting-pty-limited

emmconsulting.com.au