4 Potential impacts – construction

4.1 Step 1: Screening

Step 1 is a screening assessment. A construction dust assessment is normally required where:

- There are human receptors within 350 metres of the boundary of the site and/or within 50 metres of the route(s) used by construction vehicles on the public highway, up to 500 metres from the site entrance(s)
- There are ecological receptors within 50 metres of the boundary of the site and/or within 50 metres of the route(s) used by construction vehicles on the public highway, up to 500 metres from the site entrance(s).

In this screening stage the assessment area was assumed to be limited to the construction footprint boundary around Haberfield and Ashfield and includes the proposed change to construction activities at construction ancillary facilities set out in **section 2**. **Figure 4-1** shows that there are sensitive receptors within 350 metres of the boundaries of the construction footprint boundary at this location. A construction dust assessment is therefore required. There are no ecological receptors to consider.

A screening assessment was also carried out to assess whether the proposed changes at the Campbell Road motorway operations complex would change the construction dust risk assessment presented in Appendix I of the M4-M5 Link EIS (Technical working paper: Air quality) (see **Annexure A**). The screening assessment identified negligible change would be expected having regard to the assessment in the M4-M5 Link EIS and therefore no further assessment of this location has been carried out.

4.2 Step 2: Risk assessment

In Step 2, the risk of dust arising in sufficient quantities to cause annoyance and/or health effects has been determined for each of the four activities (demolition, earthworks, construction, and track-out). Risk categories were assigned to the site based on two factors:

- The scale and nature of the works, which determines the magnitude of potential dust emissions. This is assessed in Step 2A
- The sensitivity of the area. The proximity of sensitive receptors (ie the potential for effects). This is assessed in Step 2B.

These factors are combined in Step 2C to determine the risk of dust impacts. Risks are described in terms of there being a low, medium or high risk of dust impacts for each of the four separate potential activities. Where there is risk of an impact, then site-specific mitigation would be required in proportion to the level of risk.

Figure 4-1 Screening assessment – sensitive receptors near the Haberfield and Ashfield construction ancillary facilities

4.2.1 Step 2A: Potential for dust emissions

The criteria for assessing the potential scale of emissions based on the scale and nature of the works are shown in **Table 4-1**. Based on these criteria, the appropriate categories for the project are shaded in grey.

Table 4-1 Site categories (scale of works)

Type of activity	Site category Large	Medium	Small
Demolition	Building volume >50,000 m3, potentially dusty construction material (e.g. 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 (e.g. metal cladding, timber), demolition activities <10 m above ground and during wetter months.
Earthworks	Site area >10,000 m2, potentially dusty soil type (e.g. 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 (e.g. 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 (e.g. 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 (e.g. concrete), piling, on site concrete batching.	Total building volume <25,000 m3, construction material with low potential for dust release (e.g. metal cladding or timber).
Track-out	>50 HDV (>3.5t) OUTWARD movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.	10-50 HDV (>3.5t) OUTWARD movements in any one day, moderately dusty surface material (e.g. 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.

4.2.2 Step 2B: Sensitivity of area

The sensitivity of the area takes account of the specific sensitivities of local receptors, the proximity and number of the receptors, and the local background PM_{10} concentration. Dust soiling and health impacts are treated separately.

Sensitivity of area to dust soiling effects on people and property

The criteria for determining the sensitivity of an area to dust soiling effects are shown in **Table 4-2**. Based on the IAQM guidance[4] the receptor sensitivity was assumed to be 'high'.

Table 4-2 Criteria for sensitivity of area to dust soiling effects

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

The number of receptors in each distance band was estimated from an aerial photograph of the construction footprint around Haberfield and Ashfield (see **Figure 4-1**). 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 receptors within each distance band. For receptors which are not dwellings, professional judgement should be used to determine the number of human receptors.

The estimated numbers of receptors for each scenario and activity, and the resulting outcomes are shown in **Table 4-3**.

Table 4-3 Results - sensitivity to dust soiling effects

Activity	Receptor sensitivity	Number of receptors by distance from source				Sensitivity of area
		<20 m	20-50 m	50-100 m	100-350 m	
Demolition	High	901	585	919	5,186	High
Earthwork	High	901	585	919	5,186	High
Constructi	High	901	585	919	5,186	High
Track-out	High	901	585	N/A	N/A	High

[4] Professional judgement is used to identify where on the spectrum between high and low sensitivity a receptor lies. High sensitivity receptors can reasonably expect enjoyment of a high level of amenity. The appearance, aesthetics or value of their properties would be diminished by soiling, and the people or properties would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.

Sensitivity of area to human health impacts

The criteria for determining the sensitivity of an area to human health impacts caused by construction dust are shown in **Table 4-4**. Based on the IAQM guidance[5] the receptor sensitivity was assumed to be 'high'. The estimated numbers of receptors for each scenario and activity, and the resulting outcomes are shown in **Table 4-5**.

Table 4-4 Criteria for sensitivity of area to health impacts

Receptor sensitivity	Annual mean PM_{10} conc. ($\mu g/m^3$)[(a)]	Number of receptors	Distance from source (m)				
			<20	<50	<100	<200	<350
High	>24	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	21-24	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	18-21	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<18	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

[5] The sensitivity of people to the health effects of PM_{10} is based on exposure to elevated concentrations over a 24-hour period. High sensitivity receptors relate to locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.

Table 4-5 Results - sensitivity to health impacts

Activity	Receptor sensitivity	Annual mean PM_{10} conc. ($\mu g/m^3$)	Number of receptors by distance from source (m)					Sensitivity of area
			<20	20-50	50-100	100-200	200-350	
Demolition	High	<18	901	585	919	2,144	3,042	Medium
Earthworks	High	<18	901	585	919	2,144	3,042	Medium
Constructio	High	<18	901	585	919	2,144	3,042	Medium
Track-out	High	<18	901	585	N/A	N/A	N/A	Medium

4.2.3 Step 2C: Risk of dust impact

The dust emission potential determined in Step 2A is combined with the sensitivity of the area determined in Step 2B to give the risk of impacts with no mitigation applied. The criteria are shown in **Table 4-6**.

Table 4-6 Criteria for sensitivity of area to health 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

The final results for the Step 2 risk assessment are provided in **Table 4-7**. All four activities were shown to be predominantly 'medium risk', similar to that noted in the M4-M5 Link EIS for the sites around Haberfield and Ashfield. High risk of dust impacts in relation to dust soiling are predicted during demolition and track out activities, and during demolition in relation to risk of dust impacts on human health.

The proposal as part of this modification to change the use of the Northcote Street site to a civil and tunnel site means that construction activities that were approved to occur at the Parramatta Road West site would move to the Northcote Street site. However, as both of these sites are part of the same construction footprint for both this study and the EIS, there is little change anticipated for the receptors outside the footprint. Much of the site preparation work at the Northcote Street civil and tunnel site will have already been carried out as part of the M4 East construction including the acoustic shed and initial stage of the construction access tunnel – this will lessen potential impacts from earthworks and construction activities. Demolition would still occur at the Parramatta Road East

and West civil sites as well as the construction of a temporary pedestrian overpass between these sites.

Table 4-7 Summary of risk assessment for the four activities

Type of Activity	Step 2A: Potential for dust emissions	Step 2B: Sensitivity of area		Step 2C: Risk of dust impacts	
		Dust soiling	Human health	Dust soiling	Human health
Demolition	Large	High	Medium	High	High
Earthworks	Medium	High	Medium	Medium	Medium
Construction	Medium	High	Medium	Medium	Medium
Track-out	Large	High	Medium	High	Medium

4.3 Step 3: Mitigation

Step 3 involved determining mitigation measures for each of the four potential activities in Step 2. This was based on the risk of dust impacts identified in Step 2C. For each activity, the highest risk category was used, which in this case is 'high risk' or 'medium risk'.

Mitigation measures are set out in detail in **section 5** and are consistent with those set out in the M4-M5 Link EIS, M4-M5 Link SPIR and the conditions of approval for the project. No additional mitigation measures are proposed as a result of the proposed modification.

4.4 Step 4: Significance of risks

Once the risk of dust impacts has been determined in Step 2C, and the appropriate dust mitigation measures identified in Step 3, the final step is to determine whether there are significant residual effects arising from the construction phase of a proposed development. For all activities, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience on projects of a similar scale and carried out in similar environments shows that this is normally possible. Hence the residual effect would normally be 'not significant' (IAQM, 2014).

However, even with a rigorous Dust Management Plan in place (see **section 5**), it is not possible to guarantee that the dust mitigation measures would be effective all the time. There is the risk that receptors in the immediate vicinity of the construction zones might experience some occasional impacts from dust emissions on site. This does not mean that impacts would be frequent or persistent.

Overall, construction dust is unlikely to represent a serious ongoing problem. Any effects would be relatively short in duration, and may only arise during dry weather with the wind blowing towards a receptor, at a time when dust is being generated and mitigation measures are not being fully effective. The likely scale of this would not normally be considered sufficient to change the conclusion that with mitigation the effects would be 'not significant'.

5 Mitigation measures

Step 3 of the construction assessment involved determining mitigation measures for each of the four potential activities in Step 2. This was based on the risk of dust impacts identified in Step 2C. For each activity, the highest risk category was used.

A Construction Air Quality Management Sub-Plan will be prepared as part of the project Construction Environmental Management Plan and will be implemented during the construction period. This will contain details of the site-specific mitigation measures to be applied.

The recommended mitigation measures are as detailed in the revised environmental management measures detailed in the M4-M5 Link SPIR and are summarised in **Table 5-1**. They are generally consistent with the standard measures used by Roads and Maritime on projects of a similar scale and nature. Additional guidance on the control of dust at construction sites in NSW is provided as part of the NSW EPA Local Government Air Quality Toolkit. Detailed guidance is also available from the UK (GLA, 2006) and the United States (Countess Environmental, 2006). Most of the recommended measures are routinely employed as 'good practice' on construction sites such as this one.

Table 5-1 Main recommended mitigation measures for construction

Aspect	Measure	Responsibility	Phase
Impacts on local air quality and human health from dust generation and plant	A construction Air Quality management Plan will be developed and implemented to monitor and manage potential air quality impacts associated with the construction for the project. The management plan will include controls required to reduce the emission of dust out of the door openings of acoustic sheds. The Plan will be implemented for the duration of construction.	Contractor	Pre-Construction
	Regular communication to be carried out with other WestConnex projects under construction in close proximity to ensure that measures are in place to manage cumulative impacts.	Contractor	Construction
	Regular site inspections will be conducted to monitor potential dust issues. The site inspections, required actions and ongoing issues arising, will be recorded and actioned appropriately within agreed timeframes by relevant project personnel.	Contractor	Construction
	Construction activities with the potential to generate dust will be modified or ceased during unfavourable weather conditions to reduce the potential for dust generation.	Contractor	Construction
	Measures to reduce potential dust generation, such as the use of water carts, sprinklers, dust screens and surface treatments, will be implemented within project sites as required.	Contractor	Construction
	Access roads within project sites will be maintained and managed to reduce dust generation.	Contractor	Construction
	Where reasonable and feasible, appropriate control methods will be implemented to minimise dust emissions from the project site.	Contractor	Construction
	Storage of materials that have the potential to result in dust generation will be minimised within project sites at all times.	Contractor	Construction

Aspect	Measure	Responsibility	Phase
	All construction vehicles and plant will be inspected regularly and maintained to ensure that they comply with relevant emission standards.	Contractor	Construction
	Engine idling will be minimised when plant is stationary, and plant will be switched off when not in use to reduce emissions.	Contractor	Construction
	The use of mains electricity will be favoured over diesel or petrol-powered generators where practicable to reduce site emissions.	Contractor	Construction
	Haul roads will be treated with water carts and monitored during earthworks operations, ceasing works if necessary during high winds where dust controls are not effective.	Contractor	Construction
	Suitable dust suppression and/or collection techniques will be used during cutting, grinding or sawing activities likely to generate dust in close proximity to sensitive receivers.	Contractor	Construction
	The potential for dust generation will be considered during the handling of loose materials. Equipment will be selected and handling protocols developed to minimise the potential for dust generation.	Contractor	Construction
	All loaded spoil haulage trucks and other project-related heavy vehicles carrying materials with the potential to result in dust generation will be covered to prevent dust emissions during transport in accordance with relevant road regulations.	Contractor	Construction
	Demolition activities will be planned and carried out to minimise the potential for dust generation.	Contractor	Construction
	Adequate dust suppression will be applied during all demolition works required to facilitate the project.	Contractor	Construction
	All potentially hazardous material will be identified and removed from buildings in an appropriate manner prior to the commencement of and/or progressively during demolition and in accordance with all relevant codes of practice demolition.	Contractor	Construction
	Areas of soil exposed during construction will be minimised at all times to reduce the potential for dust generation.	Contractor	Construction
	Exposed soils will be temporarily stabilised during weather conditions conducive to dust generation and prior to extended periods of inactivity to minimise dust generation.	Contractor	Construction
	Exposed soils will be permanently stabilised as soon as practicable following disturbance to minimise the potential for ongoing dust generation.	Contractor	Construction
	Ensure that stockpiles of materials with the potential to result in dust emissions are adequately protected and managed to reduce potential dust generation.	Contractor	Construction

Aspect	Measure	Responsibility	Phase
	Ensure fine materials are stored and handled to minimise dust.	Contractor	Construction
	All sealed surfaces within sites and site accesses will be managed to reduce dust generation and sediment tracking onto roads	Contractor	Construction
	At the commencement of establishment of project ancillary facilities, controls such as wheel washing systems and rumble grids will be installed at all site exits to prevent deposition of loose material on sealed surfaces outside project sites to reduce potential dust generation.	Contractor	Construction

6 References

Countess Environmental (2006). WRAP Fugitive Dust Handbook – Chapter 3 Construction & Demolition. Countess Environmental, Westlake Village, California.

GLA (2006).The control of dust and emissions from construction and demolition Best Practice Guidance. Greater London Authority.

IAQM (2014). Guidance on the assessment of dust from demolition and construction. Institute of Air Quality Management, London. http://iaqm.co.uk/guidance/

Pacific Environment (2017) M4-M5 Link Environmental Impact Statement. August 2017. Pacific Environment Limited, North Sydney, NSW.

Annexure A – Campbell Road civil and tunnel site

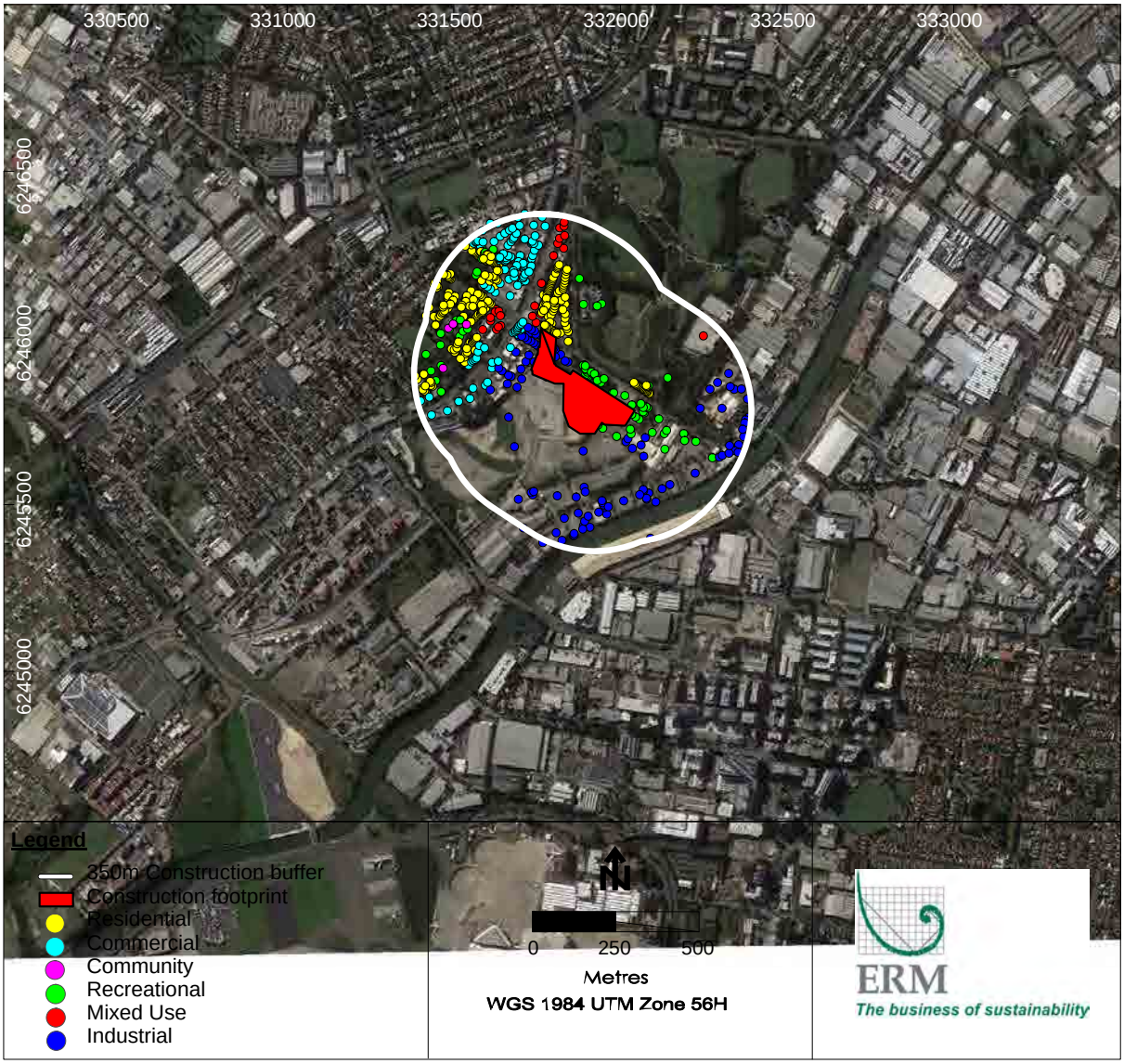

Figure A-1 Sensitive receptors near the Campbell Road construction site