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**Coal & Allied Industries
Limited**

Report for Lower Hunter Lands
Project

Minmi Link Road and Stockrington: Air
Quality Assessment

January 2011



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1. Introduction

1.1 Background

It is proposed that the entire Coal & Allied Industries Limited (Coal & Allied) owned Minmi Link Road and Stockrington sites be rezoned/listed as a 'State Significant Site' (SSS) in Schedule 3 of State Environmental Planning Policy (Major Development). A draft Schedule 3 listing will be prepared with the Concept Plan Application.

The Concept Plan for a residential subdivision of the Minmi Link Road site will apply to the 520ha Minmi Link Road site, 17ha of the minmi Link Rd site and 1544ha of the Stockrington site. The key parameters for the proposed development of the site are as follows:

- » Dedication of 1561ha of conservation land to the New South Wales Government (NSWG) that is identified in the Lower Hunter Regional Strategy and Lower Hunter Regional Conservation Plan, comprising 1544ha of the Stockrington site and approximately 17ha of the Minmi Link Rd site;
- » Maximum dwelling yield of 3,300 dwellings over 520ha.
- » Indicative development staging. The number of lots and extent of staging for release areas will be largely dictated by the service infrastructure requirements as well as responding to market forces.
- » The provision of associated infrastructure.
- » Torrens title subdivision of the Minmi Link Road site;.

Approval will not be sought under the Concept Plan for a specific lot and road layout. An indicative lot layout will indicate how the maximum dwelling yield of 3,300 dwellings could be achieved on the site.

Similarly, approval will not be sought under the Concept Plan for subdivision or construction of individual houses. However, the desired future character of the proposed concept plan will be included in Urban Design Guidelines. Urban Design Guidelines will be prepared to inform the Concept Plan in respect of urban form, built form, open space and landscape, access and movement and visual impact for the site.

It is proposed to dedicate land for conservation purposes as part of the Major Project Application via a Voluntary Planning Agreement (VPA) between Coal & Allied and the NSWG in accordance with s.93F of the Environmental Planning & Assessment Act, 1979 (EP&A Act).

GHD has been engaged to provide an assessment of air quality impact upon the proposed residential development on the Minmi Link Road site..

The Director General's Requirements (DGR) for the air quality component of the environmental assessment of the sites is as follows (subject to review on issue of new DGR's):

“Assess the odour and air quality impacts of the nearby existing development and any proposed any proposed development including sewage treatment plants on the site and in light of potential coal mining and coal-bed methane extraction on the subject land.”



There is no sewage treatment plant proposed for the Minmi Link Road site. Therefore, the scope of work of the air quality assessment was to:

- » Characterise the local meteorology and ambient air quality at the site;
- » Assess the potential air quality impact to the site from adjacent industrial/commercial facilities, including, in particular, the Summerhill Waste Management Facility (WMF); and
- » Assess air quality impacts from potential coal mining and coal-bed methane extraction on the Minmi Link Road site.

The scope of work was conducted with consideration to the Department of Environment, Climate Change and Water (DECCW) *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2005) and *Assessment and Management of Odour from Stationary Sources in NSW* (2006), as appropriate.



2. Local Environment

2.1 Site Description

The Minmi Link Road site comprises five precincts:

- » Minmi Extension;
- » Minmi East;
- » Village Centre;
- » Link Road North; and
- » Link Road South.

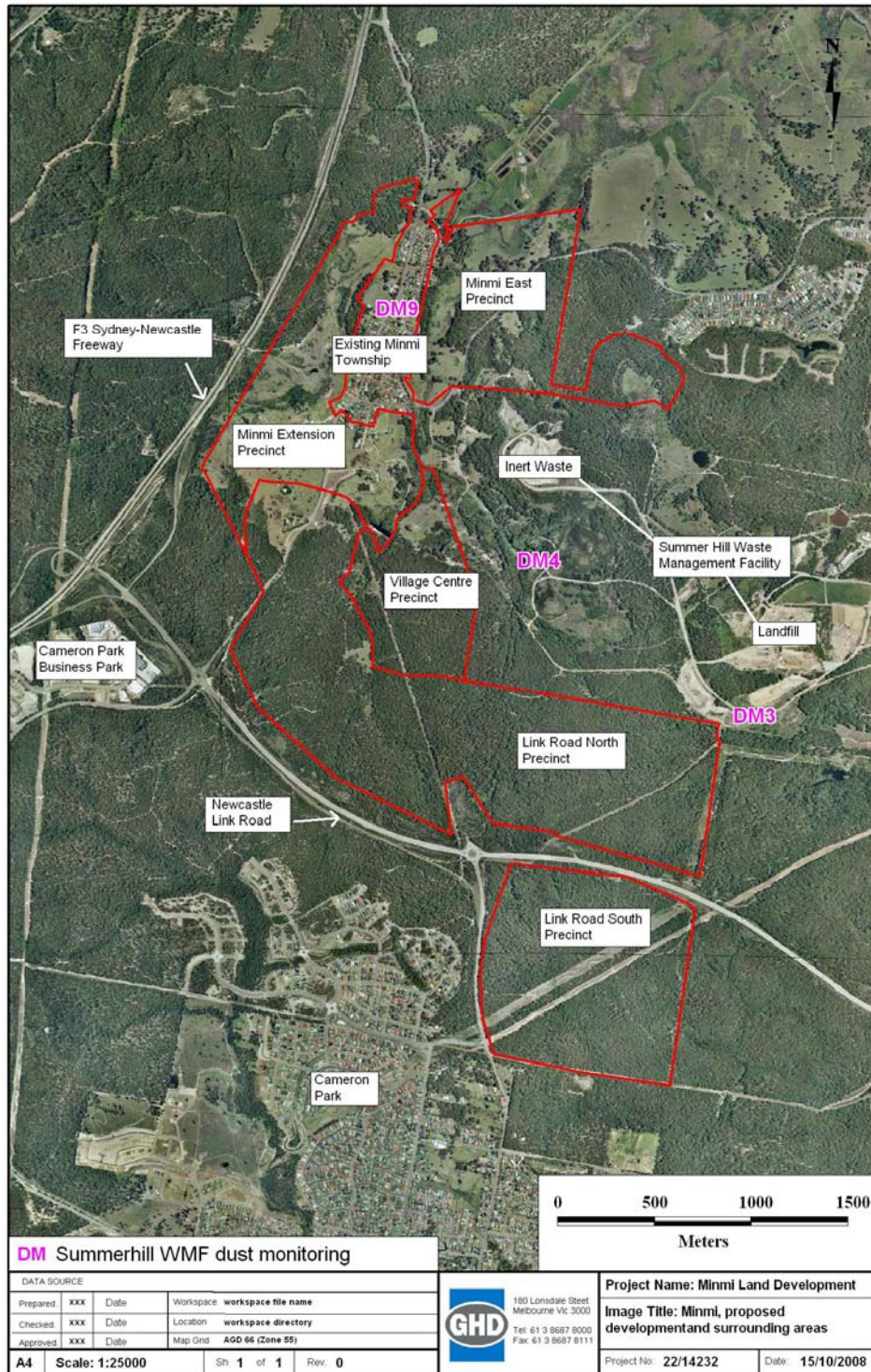
The Minmi Extension, Minmi East and Village Centre precincts surround the existing township of Minmi. The Link Road North and Link Road South precincts are situated south of the Minmi precinct and are divided by the Newcastle Link Road.

The Summerhill Waste Management Facility (WMF) is located east of the site and the Cameron Park Business Park is located to the south-west the site.

Figure 2-1 shows the key features of the study area.



Figure 2-1 Minmi Link Road and Stockrington Study Area





2.2 Ambient Air Quality

Ambient air quality data was obtained for the years 2002 -2006 from the Wallsend air quality monitoring station operated by the DECCW which is the closest monitoring station to the site. Located approximately 5 km to the southeast of the site, this monitoring location is considered to be a good representation of the ambient air quality data for the sites.

Table 2-1 presents a summary of the ambient air quality at Wallsend from 2002 to 2006.

The highest 1-hour average value of nitrogen dioxide (NO₂) was 0.05 parts-per-million (ppm), which is less than half of the 0.12 ppm criterion. The highest annual average was 0.009 ppm, which is less than a third of the 0.03 ppm annual average criterion.

The highest 1-hour average value of sulphur dioxide (SO₂) was 0.067 ppm, which is a third of the 0.2 ppm criterion. The highest 24-hour average was 0.014 ppm, which is well below the criterion of 0.08 ppm. The highest annual average was 0.002 ppm, which is an order of magnitude below the 0.02 ppm annual average criterion.

The highest 24-hour average fine particulate matter (referred to as PM₁₀)¹ concentration was 48 µg/m³ in 2002, which is 96% of the 50 micrograms per cubic metre (µg/m³) criterion. The highest annual average PM₁₀ value was 21µg/m³ in 2002, which is below the 30 µg/m³ criterion. The elevated PM₁₀ concentrations were influenced by bushfire smoke and drought conditions.

Table 2-1 Ambient Air Quality – Wallsend, NSW for years 2002 - 2006

Pollutant	NO ₂ (ppm)		SO ₂ (ppm)			PM ₁₀ (µg/m ³)		
	Averaging Period	Maximum 1-Hour Average	Annual Average	Maximum 1-Hour Average	Maximum 24-Hour Average	Annual Average	Maximum 24-Hour Average	Annual Average
2002		0.043	0.009	0.045	0.011	0.002	48	21
2003		0.050	0.008	0.047	0.010	0.002	42	18
2004		0.041	0.008	0.067	0.014	0.002	34	19
2005		0.038	0.008	0.048	0.007	0.001	31	18
2006		0.037	0.009	0.058	0.009	0.001	39	19
DECCW Criteria		0.12	0.03	0.2	0.08	0.02	50	30

¹ PM₁₀ – particulate matter less than 10 microns in equivalent aerodynamic diameter.



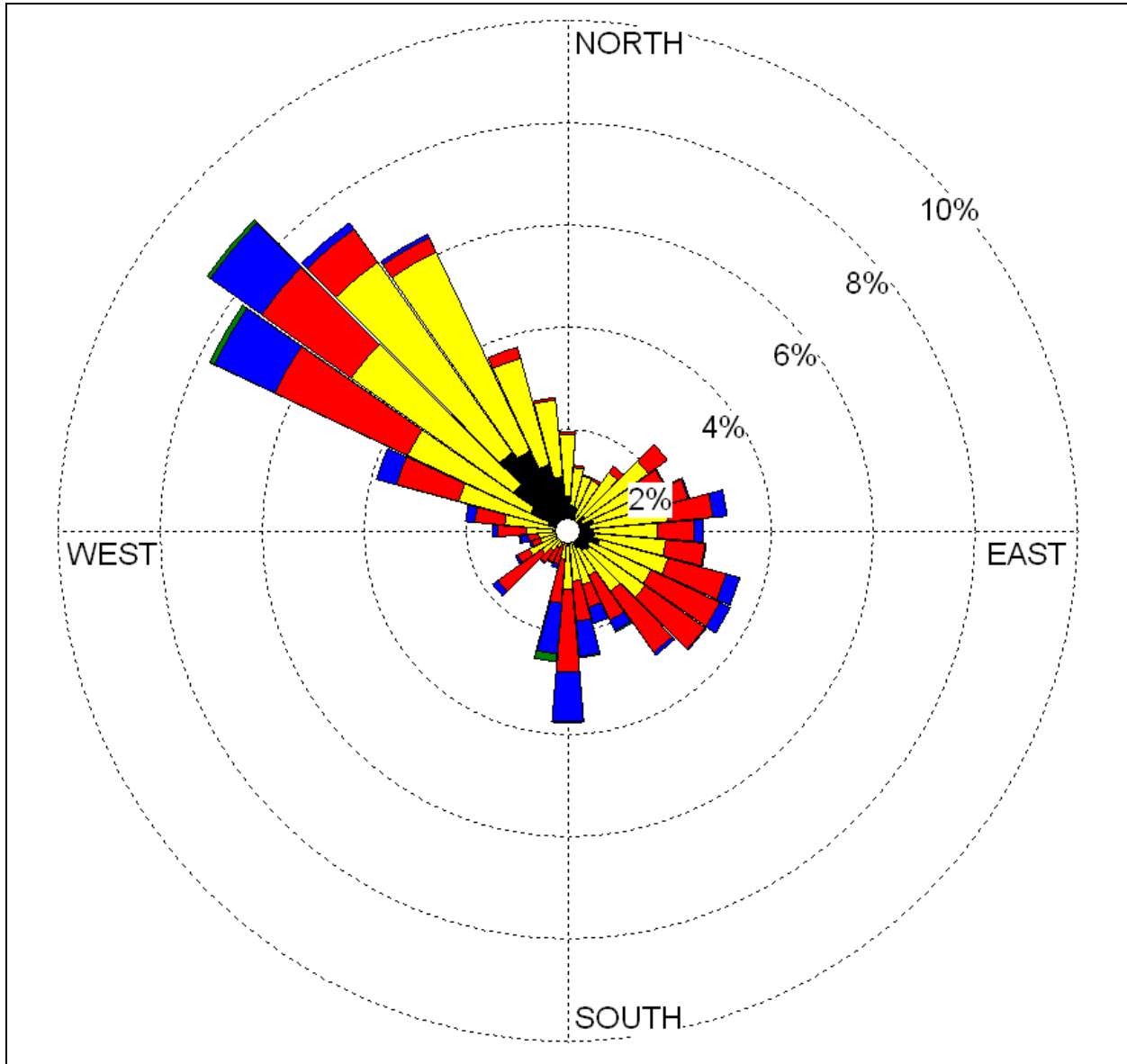
2.3 Local Meteorology

The transport and dispersion of the air emissions from the construction of the proposed development could be influenced by prevailing synoptic flows, local sea breezes, and vertical temperature profiles that will alter both diurnally and with wind direction, depending on whether flows are coming off the land or water.

GHD holds meteorological data from a previous air quality assessment at Tomago (located approximately 10 km to the north-east of the site), which is considered to be representative of the wind climate at Minmi. GHD note that wind patterns are likely to be slightly different at Minimi because the site is in a more sheltered location than the Tomago location but the prevailing wind pattern and is considered to be sufficiently representative for the purposes of this assessment.

Figure 2-2 shows a wind rose that illustrates the distribution of wind speed and direction at Tomago. On an annual basis the prevailing winds are from the north-west and to a lesser extent from the south-east. Higher speed winds are associated with north-westerly winds. The highest frequency of light winds also occurs from the north-west, which corresponds with the regional scale cool air drainage flows down the Hunter Valley from the north-west under stable atmospheric conditions. At the site, to a lesser extent, local air drainage flows from the elevated terrain to the north and west of the site would also be prevalent.

Figure 2-3 shows the seasonal variation in wind climate, and it can be seen that south-easterly winds occur more frequently during summer (sea-breeze), while a north-westerly dominates during the other seasons, in particular during winter.



Legend

WIND SPEED
(m/s)

- >= 10.0
- 8.0 - 10.0
- 5.0 - 8.0
- 3.0 - 5.0
- 1.0 - 3.0
- 0.5 - 1.0

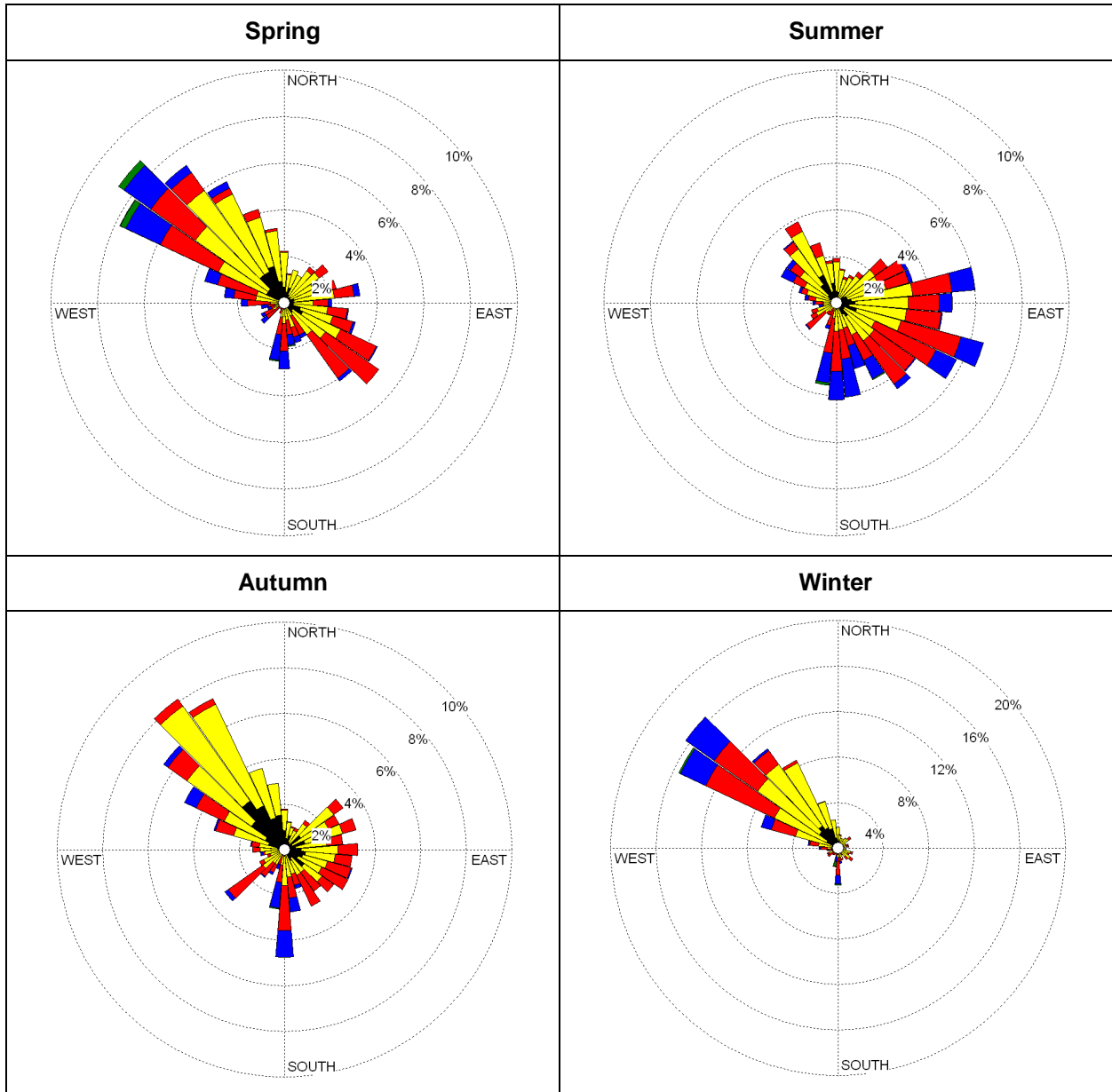
Calms: 0.00%

Figure 2-2 Tomago – Annual Wind Rose

Project No.:

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Legend

WIND SPEED
(m/s)

- >= 10.0
- 8.0 - 10.0
- 5.0 - 8.0
- 3.0 - 5.0
- 1.0 - 3.0
- 0.5 - 1.0

Calms: 0.00 %

Figure 2-3 Tomago – Seasonal Wind Roses

Project No.:

22/14232





3. Air Quality Assessment

A desktop review of aerial photography, the National Pollutant Inventory (NPI) database and information provided via the client lead to the following significant sources being identified as contributing to the air emissions inventory:

- » Odour and dust emissions from landfill activities at the Summerhill Waste Management Facility (WMF) and proposed Regional Waste Facility (RWF), to be built within the existing WMF site;
- » Industrial/commercial air emissions from the nearby Cameron Park business park; and
- » Fugitive dust and methane emissions from Coal-bed methane extraction at existing bore sites on the land.

The client has advised GHD that there will not be any sewage treatment works within the subject site.

The following sub-sections discuss the air emission inventory and provide a screening assessment to gauge the potential for air quality impacts on the proposed Minmi Link Road site.

3.1 Existing Summerhill Waste Management Facility (WMF)

The existing WMF operates on approximately 220,000 tonnes per year of municipal waste of which approximately 70,000 tonnes is inert waste. Putrescible solid waste is placed in the active cells centrally located within the WMF. Inert waste is disposed at the open-cut disposal site to the north west of the facility, adjacent the site boundary.

GHD is not aware of previous off-site odour impact assessments using atmospheric dispersion modelling to determine the impact of odorous emissions from the WMF during its operation.

The Site Manager for the WMF has advised GHD that the existing landfill is licensed to operate until the year 2015, however, the operators will be seeking Development Approval for a 30 year extension to their license. As part of that approval process, it is considered likely that the proponent will be required undertake a detailed air quality impact assessment (including odour and dust dispersion modelling) to determine the impact of the proposed WMF at the nearest existing or likely future off-site sensitive receptors.



Insufficient information is available to GHD at present with which to characterise odour emissions from the WMF (existing or future scenarios) to undertake odour impact modelling, and it possible that the life spans of both of these activities (approximately 15 years) may finish prior to the opening of the nearest (and likely most potentially exposed) precinct of Link Road North. Hence, it was considered reasonable at this time to undertake a screening level (semi-quantitative) assessment to gauge the potential for air quality impacts under existing conditions. More detailed air quality assessments would need to be undertaken in the future by proponents of the WMF extension.

This screening level assessment gauges the potential for air quality impacts by examining the following aspects:

- » Emission inventory;
- » Local wind climate patterns;
- » Dust monitoring;
- » Odour complaint history; and
- » Available separation distances.

3.1.1 Emission Inventory

Typical sources of odour with the potential to affect air quality at the development site include:

- » Putrescible waste landfill cells;
- » Landfill leachate pond; and
- » Garden organic stockpiles.

Typical sources of dust include:

- » Earthworks and waste handling at the tipping face and within the landfill cells;
- » Processing of stockpiled garden organics and timber;
- » Vehicle movements on unsealed roads about the site and on the landfill cells; and
- » Wind erosion from disturbed/unconsolidated areas on the site.

For the purposes of this assessment GHD assumes that the WMF operators apply normal dust and odour mitigation measures, which minimises the potential for dust and odour emissions generation from these sources.



3.1.2 Wind Climate

The local wind climate indicates a higher occurrence of wind from the north-west, which means sensitive receptors at the sites will have a lower than average frequency of exposure to dust and odour potentially emitted from the WMF.

Atmospheric stability is an important factor in the dispersion of emissions to air, and the incidence of stable conditions coupled with light wind will define the direction of maximum impact. The dominant direction of poor dispersion will be in alignment with the drainage flow (stable light winds) from the northwest, that is, the direction of poor dispersion from the WMF is towards the southeast away from the proposed site.

Furthermore, wind erosion or dust lift-off from unconsolidated surfaces within the WMF site can become significant under strong winds (greater than 5 m/s). These stronger prevailing winds predominantly occur from the north-west. Figure 2-1 shows that winds from the east (in the direction of the landfill to the proposed development) infrequently occur and when they do occur, these winds are typically less than 5 m/s, thus reducing the potential for dust lift-off.

3.1.3 Dust Monitoring

Environmental effects of airborne particulate matter (dust) are generally related to the size of the particle size range of the dust. Health effects are often associated with fine particles less than 10 micrometres in equivalent aerodynamic diameter (PM_{10}), whereas coarser particles (generally 10 to say 100 micrometres) are associated with effects on amenity (e.g. visible dust plumes or deposition on surfaces). As a dust plume is transported downwind from a source, the coarser particulates progressively drop-out of the air column to deposit on surfaces (land, water, cars etc) downwind of the source, while the finer particulate fractions will be retained in the air column longer by turbulent mixing. Typically, a high proportion of the coarse particulate matter emissions are likely to be deposited within 500 metres of the dust source.

The Summerhill WMF undertakes dust deposition monitoring at locations on and off the WMF site as part of its licence requirements. The dust deposition rates measured over a 12-month period (2006/2007) at monitoring stations located between the proposed Estate and the WMF are shown in Table 3-1. The locations of each dust monitoring location are shown in Figure 2-1 (denoted as DM3, DM4 and DM9).

Table 3-1 Dust Deposition Results for Summerhill WMF

Period	Dust Deposition ($g/m^2/month$)		
	DM2	DM3	DM9
Year 2007 – 2008	1.0	0.8	1.2

Source: Data from draft 2007/2008 Annual Environmental Report for Summerhill WMF

The DECCW impact assessment criterion to prevent dust nuisance is 4 $g/m^2/month$ of total deposited dust over an annual average period. The dust monitoring results presented in Table 3-1 indicate that this dust impact criterion is readily achieved at the designated monitoring stations. Based on this information, it is unlikely that dust levels within the proposed sites would exceed nuisance dust levels as a result of the existing WMF activities.



GHD is not aware of any monitoring of fine particulate matter at the Summerhill WMF. GHD has measured the increment in fine particulate matter (PM₁₀) concentrations at a monitoring station 300 metres downwind of an active landfill cell, of a landfill operating on municipal waste at 275,000 tonne per year, to be less than 1 microgram per cubic metre. The Summerhill WMF at 220,000 tonne per year would likely give rise to similar increments in PM₁₀ levels and is therefore unlikely to cause a significant increase in ambient fine particulate levels at the location of the proposed Minmi Link Road site.

3.1.4 Odour Complaint History

The WMF site manager has advised GHD that the odour complaints against the WMF are infrequent, and when complaints do occur, they are typically confined to two residential premises located north of the WMF. The source-attribution made in the odour complaints has not yet been verified and the WMF is currently undertaking investigations to resolve the complaints².

3.1.5 Separation Distance

Odour and dust are acknowledged emissions from landfills that, on occasion, can give rise to odour and/or dust impact outside the site boundaries. It is in recognition of this that separation (or buffer) distances are commonly used as a planning tool to ensure that there is adequate separation between the pollution source and sensitive uses in the vicinity – where typically the sensitive use is a residence. The separation distance is taken as the distance between the activity boundary within a facility and the property boundary of a sensitive land use nearest to the emission source.

The DECCW Technical Framework for *Assessment and Management of odour from stationary sources in NSW* (DECCW, 2006) provides separation distance guidelines for a range of intensive agricultural activities, however, it does not specify a separation distance for landfills. Therefore, GHD has relied on the use of separation distance guidelines from other regulatory jurisdictions for this assessment. The separation distance guidelines for Western Australia, Victoria and South Australia are summarised in Table 3-2 below.

Table 3-2 Separation Distances – Landfills

State	Industry Description	Separation Distance
South Australia ¹	Putrescible landfill	500m
Western Australia ²	Putrescible landfill	500m
Western Australia ²	Inert landfill	150m
Victoria ³	Putrescible landfill	500m

1. EPA South Australia: Guidelines for Separation Distances, December 2007;

2. EPA Western Australia: Guidance for the Assessment of Environmental Factors – Separation distances between industrial and sensitive land uses, No. 3, June 2005; and

3. EPA Victoria: AQ 2/86 : Recommended Buffer Distances for Industrial Residual Air Emissions

² Personal communication with the Summerhill WMF site Manager (Mr Mark Johnson) on 1st October 2008.



GHD was advised that the development site boundary is a minimum range of approximately 600 metres from the existing putrescible solid waste landfill (existing and future cells) and is 250 metres from the inert open cut disposal site³. Each separation readily meets the buffer distance guidelines of 500 metres and 150 metres, respectively.

Furthermore, established stands of trees are situated within the buffer area, in particular to the west of the WMF at the Blue Gum Hills Regional Park, which can aid dispersion and potentially remove dust particles through impingement on the foliage.

3.2 Summerhill Stage 2 EIS

The Summerhill site was purchased by Newcastle City Council in the early 1990s. It has been zoned for its current use since this time, and has been an operational landfill since 1995. The site was selected as the most appropriate site due to a number of factors including past land uses, surrounding landuses and the distances to surrounding sensitive land uses such as residential development. The then EPA in its submission to a public inquiry conducted by Commissioner Cleland with respect to the Summerhill Waste Management Facility submitted that a 400m buffer zone between the landfill site and residential development was considered adequate.

An EIS for Summerhill Stage 2 was completed in September 2010. The EIS took into consideration the successful environmental management procedures in place at the existing facility. The EIS considered surrounding landuses, both current and proposed and examined the potential for environmental impacts to be imposed on surrounding land uses and it determined that the potential for significant impacts was low.

The issue of potential odour impacts from the Summerhill Facility in relation to planned development to the south-west of the Summerhill site could only be determined when staging of both developments is known. Generally, buffer distances of 400m would be required between an active working landfill cell and residential development. Active cells are worked for a finite period and are mobile across the broader site.

The issue is thus the timing of the landfill in relation to the timing of development. Given the timeframes involved in the development of both projects and the fact that the staging plans for the both projects is unclear, it cannot be determined if this will be a future issue at this stage. However, if it was determined that there was a potential future issue with buffer distances in the north-eastern section of the Minmi Estate development, Council and the developer would need to negotiate.

3.3 Cameron Park Business Park

A search of the National Pollutant Inventory database (NPI) for existing facilities in the Cameron Park business park revealed no significant industrial or commercial sources of air emissions⁴, therefore, it is not further addressed in this report. Furthermore, future development within this business park has not considered in this report.

³ Lower Hunter Lands Development Minmi – Phase 2 Acoustic Study draft report, Renzo Tonin & Associates, 26 March 2008.

⁴ www.npi.gov.au (accessed on 30/09/2008).



3.4 Coal-Bed Methane Extraction

At this stage, Coal & Allied has advised GHD that coal mining and coal-bed methane extraction will not occur on the subject land.

3.5 Proposed Boral Asphalt Plant

Boral have submitted a DA to Lake Macquarie City Council for a proposed asphalt plant located in the industrial area off Cameron Drive between George Booth Dr and Link Road adjacent the F3. From a brief review of the documentation, it appears that the air quality assessment report does not nominate sensitive receptors at the location of the proposed development at Minmi. However, it does specify the Lake Macquarie Development Plan for residential development at Cameron Park.

Isopleths of predicted air quality impacts are provided for a limited number of pollutants. Based on these plots, predicted impacts to air quality at the location of the Minmi development would appear to comply with DECCW criteria.

Based on the figure provided in the report there appears to be a buffer (separation) distance between the asphalt site boundary and Minimi development boundary (Newcastle Link Road) proposed, of approximately 1000m. The default buffer distance (Victoria) for asphalt plants is 500m. From previous experience with asphalt plants a separation distance of 1000m should be adequate to protect against potential odour impacts.



4. Conclusions

The key findings of the air quality assessment for the proposed Minmi Link Road site are:

- » Odour and dust emissions from the Summerhill Waste Management Facility (WMF) are not expected to impact on the sites based on its current configuration and hours of operation for the following reasons:
 - Standard mitigations measures are applied to key odour and dust sources;
 - Prevailing winds predominantly transport odour and dust emissions towards the south-east, away from the sites;
 - Total deposited dust levels around the WMF are likely below the DECCW criteria for nuisance dust⁵;
 - Odour and dust complaints made by existing residents living near the WMF are at a low base;
 - In principle, adequate separation distance (> 500 metres) exists between the WMF putrescible landfill and the proposed sites.
- » Coal mining and coal-bed methane extraction is not expected to occur within the boundary of the proposed Minmi Link Road site.

The conclusions given above are subject to the limitations described in Section 5.

⁵ This statement needs to be confirmed upon receipt of dust deposition data from the Summerhill WMF



5. Limitations

This report has been prepared for Coal & Allied in order to comply with regulatory requirements. The purpose of the report is to provide an independent review of the Project and assess the potential impact of local air quality on the Project.

It is not the intention of the assessment to cover every element of the ambient environment, but rather to conduct the assessment with consideration to the prescribed work scope.

The findings of the air quality assessment represent the findings apparent at the date and time of the monitoring and the conditions of the area at that time. It is the nature of environmental monitoring that not all variations in environmental conditions can be accessed and all uncertainty concerning the conditions of the ambient air environment cannot be eliminated. Professional judgement must be exercised in the investigation and interpretation of observations.

The air quality mitigation measures recommended in this report are in-principle only. The assistance of an air quality consultant is recommended at the detailed design phase of the project or when there is more detailed information available to provide more accurate recommendations.

In conducting this assessment and preparing the report, current guidelines for air quality were referred to. This work has been conducted in good faith with GHD's understanding of the client's brief and the generally accepted consulting practice.

No other warranty, expressed or implied, is made as to the information and professional advice included in this report. It is not intended for other parties or other uses.



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Document Status

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