APPENDIX I

Air Quality Impact Assessment

AIR QUALITY IMPACT ASSESSMENT
Proposed Expansion to Operations
Concrush Pty Ltd
Teralba NSW

Prepared for Umwelt

On behalf of Concrush Pty Ltd

Prepared by RCA Australia

RCA ref 13149-701/5

November 2018

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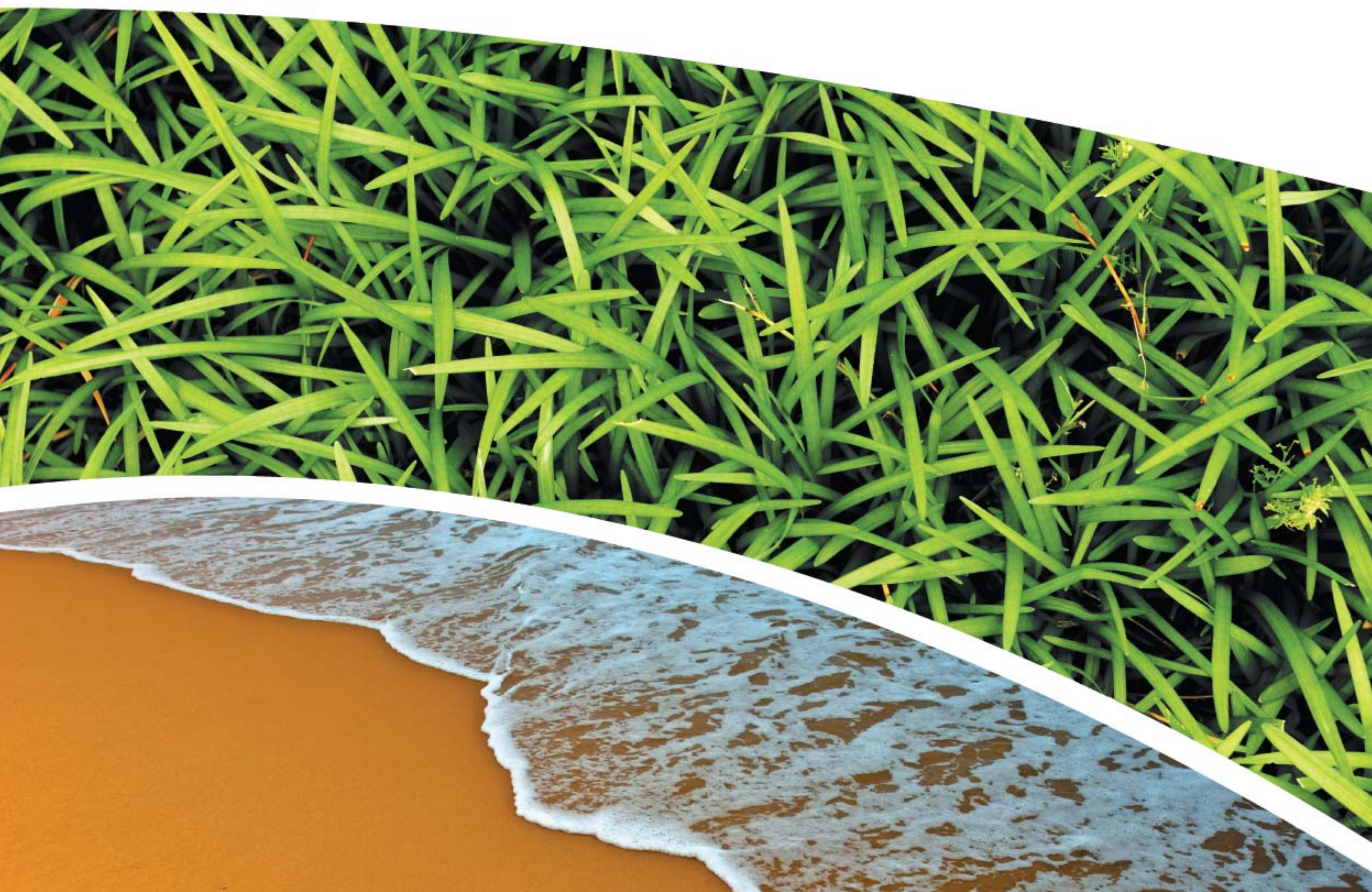

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DOCUMENT STATUS						
Rev No	Comment	Author	Reviewer	Approved for Issue (Project Manager)		
				Name	Signature	Date
/0	Draft	M Belk	D Mauldin	M Belk		31.01.18
/1	Revised Draft	M Belk	D Mauldin	M Belk		26.06.18
/2	Revised Draft	M Belk		M Belk		13.08.18
/3	Revised Draft	M Belk	F. Brooker	M Belk		20.08.18
/4	Final	M Belk	F Brooker	M Belk		29.08.18
/5	Revised for Amended Development Design	M Belk	F Brooker	M Belk	Matt Belk.	08.11.18

DOCUMENT DISTRIBUTION				
Rev No	Copies	Format	Issued to	Date
/0	1	Electronic (email)	Lachlan Sweeney – Umwelt. lsweeney@umwelt.com.au	31.01.18
/0	1	Electronic report	RCA – job archive	31.01.18
/1	1	Electronic (email)	Lachlan Sweeney – Umwelt. lsweeney@umwelt.com.au	26.06.18
/1	1	Electronic report	RCA – job archive	26.06.18
/2	1	Electronic (email)	Lachlan Sweeney – Umwelt. lsweeney@umwelt.com.au	13.08.18
/2	1	Electronic report	RCA – job archive	13.08.18
/3	1	Electronic (email)	Lachlan Sweeney – Umwelt. lsweeney@umwelt.com.au	20.08.18
/3	1	Electronic report	RCA – job archive	20.08.18
/4	1	Electronic (email)	Lachlan Sweeney – Umwelt. lsweeney@umwelt.com.au	29.08.18
/4	1	Electronic report	RCA – job archive	29.08.18
/5	1	Electronic (email)	Tim Browne – Unwelt. tbrowne@umwelt.com.au	08.11.18
/5	1	Electronic (email)	Lachlan Sweeney – Umwelt. lsweeney@umwelt.com.au	08.11.18
/5	1	Electronic report	RCA – job archive	08.11.18

RCA ref 13149-701/5

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8 November 2018

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AIR QUALITY IMPACT ASSESSMENT
PROPOSED EXPANSION TO OPERATIONS
CONCRUSH PTY LTD, TERALBA NSW

EXECUTIVE SUMMARY

Concrush Pty Ltd (Concrush) is seeking development consent to increase the processing and storage capacity of the existing resource recovery facility located on part of Lot 2 DP 220347 at 21 Racecourse Road, Teralba, NSW. The Concrush increase to capacity project (the Project) will involve alterations and additions to the existing facility in order to provide greater on-site storage capacity that is sufficient for the increased level of throughput. As part of this process, Concrush require an Air Quality Impact Assessment (AQIA) for inclusion in the Environmental Impact Statement for the proposed expanded operations.

This AQIA has been undertaken in accordance with the Secretary's Environmental Assessment Requirements (SEARs) and the NSW EPA's "Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW", January 2016. The assessment includes a contemporaneous analysis for the dust (particulate) components PM_{10} and $PM_{2.5}$ by using ambient background quality data. The assessment also included the particulate components TSP and deposited dust; and odour emissions from the proposed operations.

The results of the odour assessment showed that the proposed operations will not adversely impact odour levels at receptors. The compliance level of 2 odour units will be achieved at all those locations. This outcome applies to both the proposed operations and the construction stage of the project.

Odour management and mitigation measures as outlined in the Concrush *Air Quality Management Plan* will be incorporated and extended to both the proposed operations and the construction stage of the project.

The results of the air quality assessment for dust particulates for the *proposed operations* meet the relevant NSW EPA impact criteria (24-hour and annual averaging) for all applicable components (TSP, PM_{10} and $PM_{2.5\ are}$ and deposition) at receptors with the implementation of the following measures to control dust:

- All haul roads are sealed, and watering for dust control at most activities wherever practical.
- Use of water sprays on all stockpiles.
- Use of a water spraying on all “open” areas.
- Water sprays are used on conveyor units, screens and crushing units.
- Water sprays are used on any new crushing / screening units and the “pug mill”.

These will be incorporated into the Concrush *Air Quality Management Plan*.

The results of the analysis for the construction stage show that the 24 hour impact assessment criteria of 50 $\mu g/m^3$ will be met (including background levels) for all six (6) receptors. The following dust mitigation measures are to be implemented during the construction stage:

- The use of water sprays on all stockpiled materials.
- The use of water carts on all access roads.

Contents

1 INTRODUCTION AND BACKGROUND

Concrush Pty Ltd (Concrush) is seeking development consent to increase the processing and storage capacity of the existing resource recovery facility located on part of Lot 2 DP 220347 at 21 Racecourse Road, Teralba, NSW. The Concrush increase to capacity project (the Project) will involve alterations and additions to the existing facility in order to provide greater on-site storage capacity that is sufficient for the increased level of throughput. As part of this process, Concrush Pty Ltd requires an Air Quality Impact Assessment (AQIA) for inclusion in the Environmental Impact Statement for the proposed expanded operations.

The relevant air quality Secretary's Environmental Assessment Requirements (SEARs) for this proposed development are:

"Air Quality and Odour – *including:*

(a) a quantitative assessment of the potential air quality, dust and odour impacts of the development in accordance with relevant Environment Protection Authority guidelines. This is to include the identification of existing and potential future sensitive receivers and consideration of approved and/or proposed developments in the vicinity; and

(d) details of proposed mitigation, management and monitoring measures. "

RCA's Air Quality Assessment addresses the SEARs outlined above. The following sections outline the methodology used in this assessment, the findings, discussion of results, conclusions and recommendations. The recommendations made in this report are consistent with Concrush's existing management plans relevant to dust and odour, namely:

- Air Quality Management Plan.
- Pasteurised Garden Organic Materials Management Plan.

The management measures within these plans will continue to be implemented by Concrush to mitigate the air emissions in order to achieve the environmental outcomes identified in this assessment.

2 PROJECT DESCRIPTION

Concrush Pty Ltd (Concrush) is seeking development consent to increase the processing and storage capacity of the existing resource recovery facility located on part of Lot 2 DP 220347 at 21 Racecourse Road, Teralba, NSW. The Concrush increase to capacity project (the Project) will involve alterations and additions to the existing facility in order to provide greater on-site storage capacity that is sufficient for the increased level of throughput.

The Project is a State Significant Development (SSD) and requires approval under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), for which the Minister for Planning is the consent authority.

2.1 THE PROPONENT

The proponent for the Project is Concrush. Concrush was established in 2002 after recognising the need for a construction and demolition recycling facility in the Lake Macquarie region. Concrush is a locally owned and operated business based at Teralba.

The Concrush facility provides cost effective options for recycling of concrete, asphalt, bricks, pavers, roof tiles, wall and floor tiles, rock, sand, plasterboard and green waste for domestic households and commercial industry. These materials are then recycled into specification and non-specification quality products such as: roadbase, drainage aggregates, pipe bedding and haunch, packing fines, decorative aggregates and mulches. These products are used within the civil and construction industries or for commercial, domestic and household applications.

2.2 DESCRIPTION OF THE PROJECT

- Following strong demand for their recycling service, Concrush is seeking an increase to the processing and storage capacity of the existing facility. Concrush currently recycles approximately 108,000 tonnes of waste material per annum. Concrush is seeking approval for an increase in throughput capacity to up to 250,000 tonnes of waste material recycled per annum, including both construction and demolition waste and green waste. Concrush will require a waste storage capacity on-site that is sufficient for this level of throughput.

- The Project will be constructed over two stages to allow for the proposed Project elements to come online as required in line with increasing production.

A description of the individual elements of the proposed Project including additional plant and equipment are summarised below.

Table 1 *Proposed Project Components*

Component	Description
Hardstand areas	Hardstands will be constructed in material processing areas and stockpile areas (will require some site levelling). Hardstands will consist of 200 mm thick recycled roadbase). Internal access roads will have a two (2) coat seal.
Material Processing areas	Processing areas for the crushers and screens.
Waste and Product Stockpile areas	Waste and product stockpiles will be established with a stockpile height of up to ten (10) metres (m). It is anticipated that up to 150,000 tonnes of material will be stored onsite.
Upgrade of Existing Facilities	The existing weighbridge and office will be upgraded, and the existing lunch room and maintenance shed will be relocated to facilitate the new site layout.
Waste Tracking System	The existing Wasteman software will be used to track the details of all inbound and outbound loads
Production Compound	The relocated lunch room, toilet and maintenance shed will be grouped together to form a compound for production staff.
Retail Area	This area will be restricted to light vehicles and small trucks and will include an area for tipping and an area containing concrete bays of products for sale.
Storage Bays	Concrete storage bays will be constructed using 1m^3 concrete blocks.
Concrete Walls	A two (2) metre high concrete wall will be constructed close to the southern Project site boundary using 1m^3 concrete blocks. The wall will prevent stockpiled material encroaching on swale drains and moving offsite. Concrete walls may also be used to delineate other areas of the site.
Green Waste Pasteurisation	An aeration system using four electronically driven and computer controlled fans to push air through movable perforated pipes underneath the pasteurisation piles will be implemented in the green waste area. This system allows more control of oxygen levels in the pasteurisation process compared to the tradition turnover process.
Wheel Wash	A vehicle wheel wash bay will be constructed immediately after the exit weighbridge to reduce tracking of material onto public roads.
Concrete Washout Bay	A wet concrete washout bay will be constructed consisting of a bunded, impermeable area with an isolated catchment. Wet concrete and agitator washout will be captured in the concrete washout bay.
Water Management System	The existing Water Management System (WMS) will be upgraded involving resizing of existing sediment basins, new sediment basins, swale drains and a leachate dam and artificial wetland to treat nutrient runoff. Water tanks and associated poly pipe and pumps will be installed to allow collection and re-use of stormwater for dust suppression.
Trommel Screening Machine	Addition of a Trommel screening machine for sorting of green waste.
Primary Jaw Crusher	The primary jaw crusher will be replaced on a like for like basis as part of future operations.
Perimeter Landscaping - Mounds, Fencing and Lighting	Landscape mounds will be established on the perimeter to limit visibility. 1.8 m high security fencing and security lighting are also to be installed.
Utilities	The existing Ausgrid connection is via a power pole in the north east corner of the site. The power supply will be extended to the south west corner of the site via an underground connection.
Pug mill	A pug mill may be installed in the future to allow fast mixing of materials to produce products such as road base.
Ballast wash facility	A processing area may be dedicated to a ballast wash facility to allow for processing of rail ballast.

2.3 PROJECT STAGING

It is anticipated that the volume of materials recycled and products sold will increase over a period of time up to the maximum production level of 250,000 tpa. To most efficiently meet the increase in demand for recycling of materials and Concrush products, it is proposed to stage the Project by undertaking some elements of the site upgrade early and implementing other elements of the Project as required when a certain production level is reached. Two Project stages and the associated approximate production level have been identified as follows:

- Stage 1 – upon receipt of all approvals required for the Project
- Stage 2 – at approximately 200,000 tpa up to 250,000 tpa.

The key components of the two Project stages are described below.

Stage 1

Stage 1 would be implemented once all approvals have been granted. The key elements of Stage 1 are:

- Construction of all hardstand areas (processing areas and waste and product stockpiles)
- Creation of the retail area
- Widen site access and install sliding gate
- Re-configuration of existing exit only weighbridge to allow for vehicle exit and entry to facilitate entry to the site
- Construct production compound by relocating maintenance shed and lunch room and toilet
- Augment the existing water management system to incorporate the leachate dam, constructed wetland, additional sediment basins, drainage swales, flood mitigation bund, water storage tanks and sprinkler systems
- Establish wheel wash, landscaping mounds, fencing, power line extension and lighting
- Two (2) coat seal of internal access roads
- Replace primary jaw crusher.

Stage 2

Stage 2 would be implemented when production reaches approximately 200,000 tpa up to the Project limit of 250,000 tpa. The key elements of Stage 2 are:

- Relocation of the existing exit weighbridge, construction of a new entry weighbridge and establishment of the new weighbridge office
- The existing entry weighbridge becomes the retail area weighbridge and the existing weighbridge office becomes the retail area weighbridge office
- Construction of a new exit onto Racecourse Road from the retail area for light vehicles (less than 2 tonnes) only
- Establish pug mill

- Establish ballast wash facility
- Establish trommel screening machine for green waste
- Establish aeration system for green waste pasteurisation.

3 EXISTING AIR ENVIRONMENT

3.1 SITE DESCRIPTION

The current site is located at 21 Racecourse Rd, Teralba NSW and approximately 2 km to the north east of the Teralba township (refer to **Drawing 1**, **Appendix A**). The proposed expansion including the construction stage of the project are to be located immediately to the south of the current operations (also refer to **Drawing 1**, **Appendix A**).

Various sensitive receptors were identified in the vicinity of the proposed development, however for the purposes of air emissions modelling, the 'nearest' sensitive receptors are:

- Existing residences located 350 m to the south east of the south eastern corner of the proposed operations (Receptors "A", "B" and "C" on **Drawing 1**, **Appendix A**).
- Future residential locations 200m to the east of the south eastern corner of the proposed operations (Receptors "D", "E" and "F" on **Drawing 1**, **Appendix A**). RCA included these in order to take into account the *potential future sensitive receivers and consideration of approved and/or proposed developments in the vicinity*.

Throughout this report, these locations are also referred to as the "receptors". More detail regarding these receptors is shown in **Table 2** below.

Table 2 *Sensitive Receptors in AQIA – Proposed Concrush Operations including Construction Stage*

Receptor	Easting (MGA56 m system)	Northing (MGA56 m system)
A	370867	6353387
B	370994	6353484
C	371300	6353473
D	371072	6353675
E	371122	6353740
F	371188	6353817

Note that other residences are located to the north of the site, however these were not included as the main receptors in this assessment for the following reasons:

- The residences to the north of the site are located at distances from the site, that are greater than the distances between Receptors A, B, and C; and the site.
- The residences located to the south east of the proposed operations (Receptors "A", "B" and "C") are more likely to be impacted by the site air emissions than the residences located to the north of the site due to the predominant wind directions in the area, refer to the annual and seasonal windrows shown in **Appendix B**.

Nonetheless, it is noted that ground level modelling predictions at these (north) residences are shown in the modelling contours.

3.2 CLIMATE

Atmospheric stability substantially affects the capacity of a pollutant such as particulate matter, to disperse into the surrounding atmosphere. For the proposed Concrush operations, *particulate* emissions will have greatest impact downwind during stable conditions, reducing to a minimum impact during unstable conditions. The highest wind speeds have the potential to create wind erosion but this also results in greater dispersion of air emissions.

There are six (6) Pasquill–Gifford classes (A-F) used to describe atmospheric stability and these classes are grouped into three (3) general stability categories; stable (classes E-F), neutral (class D) and unstable (classes A-C). The climate parameters of wind speed, cloud cover and solar insolation are used to define the stability category and as these parameters vary diurnally, there is a corresponding variation in the occurrence of each stability category. Stability is most readily displayed by means of a stability rose plot (also referred to as a wind rose) given the frequency of winds from different directions for various stability classes A to F. This assessment includes all wind stability classes for incorporation in the dispersion modelling – and for all air emissions assessed in this study.

Annual and seasonal wind roses for the Nobbys Signal station are shown in **Appendix B** and **Section 6.4** provides an explanation of the meteorological data used in air quality modelling for the project, including the use of The Air Quality Model (TAQM) software. The weather station information was obtained primarily for the purposes of modelling in accordance with NSW EPA methods (Ref [1]). In addition, Concrush currently obtain some weather data on site, from a basic weather station set up near the weighbridge, including:

- Wind speed and direction.
- Rainfall.
- Temperature.

Although this on-site information is considered very useful in taking action for reducing dust on a daily basis it was not suitable for dispersion modelling as it does not meet the requirements for modelling as defined in the NSW EPA approved methods (Ref [1]). Data for dispersion modelling was generated in accordance with the NSW EPA Approved methods (Ref [1]) and is presented in **Appendix B**.

3.3 AMBIENT AIR QUALITY

The following discussion refers to the existing ambient air quality in the vicinity of Concrush. For the "background" concentrations that need to be taken into account for the dispersion modelling and in accordance with the requirements shown in the NSW EPA Approved methods (Ref [1]), refer to **Section 6.5** of this report.

Other operations in the vicinity of the Concrush Teralba site may affect the local ambient air quality, for example the Macquarie Coal Preparation Plant located to the west and south west of the Teralba operations and the Metromix Quarry located approximately 3km to the south west. There are other industries in the local area that may also affect the local ambient air quality for example Newstan Colliery located further to the southwest, but for this assessment, these industries are considered to be outside the zone of influence. RCA have therefore carefully considered which *background* levels for dust should be applied in this assessment, particularly for dust deposition and given the requirements for a level 2 c*ontemporaneous* assessment for dust modelling predictions as shown in the NSW EPA approved methods (Ref [1]).

3.3.1 DEPOSITIONAL DUST

Monthly ambient air quality monitoring for deposited dust (including insoluble solids, ash content and combustible matter) has been carried out at Concrush since December 2015, following the installation of depositional gauges in the same month. The location of the depositional gauges used for this monitoring are shown in **Drawing 2**, **Appendix C**. It is be noted that monitoring has not been conducted for every month and therefore a full 12 months of data is not available for some calendar years (e.g. in 2016).

4 POTENTIAL AIR EMISSIONS – PROPOSED OPERATIONS

The air emissions for the proposed *operations* that are assessed within this study are:

- Odour.
- Dust (particulates).

A visual site inspection was carried out on Thursday, 26 October 2017. The purpose of the site inspection was to observe potential air emissions for the current operations; controls and mitigation measures; and other features that needed to be recorded for the purposes of air modelling e.g. realistic stockpile heights.

The following activities within the proposed operations may generate air emissions (odour and dust):

- Light and heavy vehicle arrivals carrying materials to be recycled. Wheel generated dust may be generated.
- Crushers and screens to reduce materials to finer aggregate; and other processes associated with these activities for example conveyors, bins, hoppers, impactors.
- Shredding and screening of green waste.
- Excavator / loader actions to feed screens and crushers.
- Front end loaders to maintain stockpiles.
- Loading of product materials onto trucks and light vehicles.
- Wind generated dust from areas that are not sealed (note: as distinct from wheel generated dust).
- Wind erosion from stockpiles.

Other air emissions were not considered significant for inclusion in this assessment. Given the nature of the existing operations and the proposed project, the generation of air emissions other than odour and dust is either: (a) very unlikely to occur; or (b) if the emission does occur, it will be discharged to the external air environment at very low to negligible levels. For example, the generation of hydrogen sulphide in the green waste piles is likely to be present at negligible levels at the source. Further, gaseous emissions from the exhausts of mobile plant and vehicles will be present but these are intermittent in nature and of a low enough initial concentration so as to be negligible close to the sources.

Throughout this assessment RCA uses terminology that is consistent with other information that is used to describe aspects at the Teralba site, such as:

- “GW” means Green Waste.

- “NGW” means non Green Waste e.g. stone and demolition materials.
- “Milling and Processing” means crushing, screening, conveying activities (or a combination of these activities).
- “Sealing” or “sealed” refers to the two (2) coat seal of internal access roads for the purposes of minimising dust generation.

Note: in this AQIA, the following dust (particulates) components are assessed and modelled:

- Total Suspended Particulates (TSP).
- The sub - 10 micron fraction of particulate matter (PM_{10}).
- The sub – 2.5 micron fraction of particulate matter ($PM_{2.5}$).
- Deposited dust.

For potential air emissions during the *construction* stage of this project, please refer to **Section 13** of this report.

5 SOURCE CHARACTERISATION AND EMISSIONS INVENTORY

The following section outlines the air emission sources and their emission rates for the purposes of air dispersion modelling. Odour and dust air emissions were considered for the future operations (and excluded the construction stage).

RCA calculated all of the emission rates for the modelling on the basis of the maximum production rates; and vehicle movement rates within the site for the proposed operations. A conservative approach of worst case conditions was used in this assessment.

5.1 SOURCE TYPES

For the purposes of dispersion modelling, the emission sources can be categorised into three (3) ‘source’ groups: stack, area and volume sources. RCA adopted area sources for the odour and dust assessed in this AQIA. This approach is consistent with the definition of an area source as shown in the NSW EPA approved methods (Ref [1]) and from RCA’s site inspection and other information obtained.

5.2 EMISSIONS INVENTORY – ODOUR

The odour emission rates used for the modelling of the sources for proposed operations and the source of information used to derive the rates are shown in **Table 3** below.

Table 3 *Odour Emission Rates for Proposed Concrush operations*

Odour Source	**Specific Odour Emission Rate (SOER) adopted for source ($OU/m^2/s$)**	**Adjustment in odour rate due to operations**	**Final Odour emission rates ($OU/m^2/s$) used in dispersion modelling (including peak to mean ratios of 2.5 & 2.3 for modelling, note 2)**
Material stockpiling – front end loader, GW piles only (4 locations)	1.00[1]	Reduced due to number of operating hours in year; and stockpiling occurring for 50% (maximum) of operating hours available	0.43 & 0.39
Odour from GW stockpiles (3 locations)	0.23[2]	(no adjustment)	0.58 & 0.53
Shredding of GW	5.9[5]	Adjusted for highest proposed production rate; and shredding only occurring for 20% of operating hours available (conservative maximum)	2.95 & 2.71
Screening of GW	5.9[5]	Adjusted for highest proposed production rate; and screening only occurring for 20% of operating hours available (conservative maximum)	2.95 & 2.71
Pasteurisation activities	5.9 & 1.0[3,4]	See notes 3 and 4	3.00[3] & 2.50[4]

1 Conservative rate from Ref [2]; and for raw materials – green waste

2 Best practice rate from Ref [2]; and for raw materials, green waste

3 Adjusted rate, refer to **Appendix D**

4 For raw materials: “green waste” as shown in Ref [2], to reflect the months (9/12 per year) that the pasteurisation pile is *not* being turned over.

5 Conservative maximum from Ref [2].

5.3 EMISSIONS INVENTORY – DUST

The dust mass emission rates used for the modelling of the area sources for proposed operations, together with the dust controls considered and the source of information used to derive the rates are shown in **Table 4**.

Table 4 *Dust Emission Rates for Proposed Concrush Operations*

Source description	Total number of sources for proposed operations	Dust controls used in modelling; (and reduction factor if applicable)	TSP emission rate ($g/m^2/s$)	PM_{10} emission rate ($g/m^2/s$, unless specified)	$PM_{2.5}$ emission rate ($g/m^2/s$)[6]
NGW crushing and screening units (including conveyors and loading by front end loader)[1]	3	Water sprays[7]	2.7×10^{-4}	6.7×10^{-5}	1.7×10^{-5}
Shredding and Crushing GW[2]	1	(Not applicable)	5.6×10^{-4}	1.4×10^{-4}	3.5×10^{-4}
Open areas (wind generated – not from wheel generated or stockpiles)[3]	1	Water carts and wheel wash station (75%)	2.6×10^{-6}	1.3×10^{-6}	3.3×10^{-7}
Stockpile wind generated dust (NGW and GW)[5]	10	Water sprays (75%)	2.6×10^{-6}	1.3×10^{-6}	3.3×10^{-7}
Pug mill [4]	1	Water sprays (75%)	8.8×10^{-5}	2.3×10^{-5}	5.5×10^{-6}

1. NPI Emission factors from Ref [3] were applied to individual operations to give a conservative overall rate for the source.

2. The two sources were combined into one source, and NPI Emission factors were combined to give a conservative and overall rate for this source.

3. *Not* wheel generated dust, refer to **Appendix D** for details.

4. Impactor and crusher combined source, and overall NPI Emission factor based on tertiary crusher (Ref [3]).

5. Worst case rates used for this source to be conservative. The rate includes maintenance of stockpiles by front end loader.

6. A PM_{10} to $PM_{2.5}$ ratio of 4 was applied to each area source emission rate of PM_{10} (Ref [4]); and as a worst case factor.

7. Reduction is incorporated in emission factor (Ref [3])

8. Wheel generated dust not included in the dust model, due to (a) 2 coat seal of all internal roads, and (b) water carts used on access road. Overall, wheel generated dust considered negligible

6 MODELLING OF AIR EMISSIONS.

The aim of the air dispersion modelling for the site is to predict odour and dust concentrations at ground level at the sensitive receptors nominated (including maximum concentrations under worst case conditions) to compare the results to the appropriate criteria.

The following sections outline background on air dispersion modelling, the methodologies used in this assessment and results.

6.1 METHODOLOGY

RCA's methodology involved:

- The use of site information including heavy vehicle movements and proposed operational details (ref to **Appendix C**).
- Research into odour dust emission rates for the site activities for use in the air dispersion modelling.
- Dispersion modelling using a NSW EPA approved methodology.

Dispersion modelling details are shown in the following sections.

6.2 DISPERSION MODELS

Dispersion models can simulate atmospheric conditions and behaviour based on mathematical calculations. Dispersion models are used to calculate spatial and temporal fields of concentrations and particle deposition due to emissions from various sources. The results from the modelling can be compared against impact assessment criteria such as dust (particulates) performance criteria or ground-level concentration (glc).

Air dispersion modelling is a useful tool in assessing the air quality impacts associated with existing and proposed air emission sources. Dispersion modelling can be used to develop control strategies to estimate the cumulative effect on various industries that are located close to one another. Dispersion models are widely used in Australia, New Zealand, the USA and Europe.

Modelling was undertaken using Ausplume Dispersion Model Version 6.0. Ausplume is a commercially available air modelling package whose mathematical basis derives from the Victorian Environment Protection Authority's "Plume Calculation Procedure" (EPAV 1985). Ausplume is recognised by the NSW EPA as a model suitable for use in undertaking air quality impact assessments in NSW.

6.3 IMPACT ASSESSMENTS

The dispersion model used in this assessment (Ausplume Dispersion Model Version 6.0) was based on a 100th percentile average predictions for dust (particulates) performance criteria; and on a 99th percentile nose time average predictions for odour performance criteria.

This is in accordance with the NSW EPA's requirement (Ref [1]) for Level 2 impact assessments. According to this reference, a Level 2 assessment is '*a refined dispersion modelling technique using site-specific input data'*. A Level 2 assessment was considered the most appropriate for this assessment.

Further, the NSW EPA reference (Ref [1]) states in section 6.2 that "*AUSPLUME v. 6.0 or later is the approved dispersion model for use in most simple, near field applications in NSW, where coastal effects and complex terrain are of no concern*". The site is not considered to be influenced by coastal effects or terrain as the site is located approximately 12 km inland of Australia's east coast and there is only a gentle slope at the site and surrounding areas.

All site specific input data was included within the model including the positioning of all of the air emission sources modelled (Refer to **Drawing 2**, **Appendix C**)

6.3.1 DETERMINATION OF APPROPRIATE ENVIRONMENTAL OUTCOMES

The environmental outcomes apply to the six (6) sensitive receptors as shown in this report, refer to **Drawing 1**, **Appendix A**. The relevant impact assessment criteria identified by the NSW EPA (Ref [1]) are presented in Sections 7 and 8 along with the results for all dust components and odour.

It is noted that Section 7.4.2 of Ref [1] states that the assessment criteria applies "*at the nearest existing or likely future off site sensitive receptor*". Therefore an assessment of modelling results at the receptors (and therefore not the plant boundaries) is required for this assessment.

6.3.2 DETERMINATION OF THE LOCATIONS OF NEARBY RECEPTORS

The site's nearest receptors are those shown in **Drawing 1**, **Appendix A**, including three (3) existing residences and three (3) locations of future residences.

6.3.3 INCORPORATION OF OTHER DISPERSION MODELLING PARAMETERS

Receptor grid information was included with the location using the grid reference "MGA 94" and a Cartesian grid.

A site-specific meteorological data file was developed. The data file includes hourly average values for a period of one (1) year. The data includes:

- Wind speed.
- Wind direction.
- Ambient temperature.
- Atmospheric stability class.
- Mixing height.

6.4 METEOROLOGICAL DATA AND MINIMUM DATA REQUIREMENTS

The data was provided by a sub-consultant using TAPM (The Air Pollution Model) software, refer to **Appendix B**. The meteorological data is over 90% complete and is therefore acceptable for use in Level 2 impact assessments as shown in (Ref [1]).

Further detail supporting the selection of weather stations for the data generation is:

- The Nobbys BoM station (within 17km of the site) was used to analyse the *long term data* and to assist in selecting the most representative and recent year (2015, refer to note below). Other publicly available weather stations in the area did not have sufficient data for selecting the most representative and recent year.
- Data from other weather stations (Nobbys, Cooranbong, Wallsend OEH) was not assimilated in the TAPM simulation for Teralba; as wind data from these stations was not considered representative of Teralba. For example the Wallsend OEH station is the closest to Teralba, however the Wallsend station is influenced by the terrain immediately surrounding the monitoring station, which results in a relatively high proportion of low wind speed drainage flows from the south-southwest.

Overall, the files used for generating the TAPM meteorological data and for use in the modelling are for the *Teralba location*, even though **Appendix B** references the Nobbys Newcastle location for *reviewing* the long term climate data.

Note: As shown in **Appendix B**, three (3) years of data were provided (2014, 2015 and 2016). The 2015 year was chosen as the most representative data set in the longer term and for modelling purposes because the weather patterns in the other years available (2014 and 2016) were less stable than the weather patterns in 2015.

6.5 BACKGROUND AIR QUALITY DATA

For the assessment of the dust (TSP, PM_{10} and $PM_{2.5}$) modelling results including the contemporaneous analysis, RCA used the information contained within the Office of Environment and Heritage (OEH) air quality data base (Ref [5]), which consisted of:

- The Wallsend monitoring site. RCA aimed to obtain data from a monitoring site that was nearest to the proposed Teralba site and the nearest residences.
- The same time period as used in the meteorological data file for modelling i.e. 1 January 2015 to 31 December 2015 inclusive.

Background emission concentrations were obtained for both PM_{10} and $PM_{2.5}$ for maximum 24 hour and annual averages in accordance with the NSW EPA protocol and methodology for Air Quality Assessments (Ref [1]). The background data is provided as relevant in the following sections.

Only incremental depositional dust needs to be assessed and therefore a background concentration for depositional dust was not required for modelling purposes.

The relevant background air quality data is presented in Section 8 along with the modelling results for the dust components.

6.6 MODELLING ASSUMPTIONS AND CONSIDERATIONS

A number of assumptions and considerations were used in the air dispersion modelling for this assessment. Most of these assumptions were based on a conservative approach to represent ‘worst case’ outcomes and to be consistent with the aims of this assessment for odour and dust emissions:

- Emission rates for some machinery e.g. shredding and screening of GW were based on overall proposed plant operating hours, then by adjusting the hours based on the utilisation at the existing operations (refer to **Appendix D**).
- The locations of key odour and dust sources for the proposed operations are located on **Drawing 2**, **Appendix C**. In some cases the sources were placed as close to the eastern boundary as possible, to reflect ‘worst case’ impacts on the receptors.
- The proposed NGW crushing and screening plants (3 in total) were modelled to operate continually in a year to model emissions that reflect a worst case outcome for dust emissions.
- The proposed pug mill was assumed to be operating in the proposed operations. This was modelled as a combined crusher and impactor unit for dust emissions for conservative purposes, i.e. this source was a single source for dust modelling. This approach was considered the most appropriate for the mechanical actions within the pug mill, and to also yield conservative emission rates from the pug mill unit.

- The proposed pasteurisation system includes features that will most likely result in odour levels that are *lower* than the current practice of “turning” the material piles. For example, the aeration system incorporating mechanical fans will distribute the odours more evenly across the material piles therefore assisting in the dispersion and dilution of odours from those piles. However, odour rates for modelling the pasteurisation activities were based on the current pasteurisation practice in order to reproduce worst case odour rates for modelling. This is also consistent with the conservative approach of this assessment. On this basis, the modelled pasteurisation turning activities were based on a cycle of 4 times every year (i.e once every 3 months), and three (3) turning activities within those times, i.e. 12 “turning” events every year (refer to **Appendix D** for further details). The odour dispersion model was modelled accordingly.
- RCA included dust emissions from the unloading action into crushing and screening units within the (single) crushing/ screening source. The overall dust emission rate was conservative as a result.
- Some mobile machinery activities e.g loaders were modelled to operate continually in a year to model emissions that reflect a worst case outcome for dust emissions.
- For the modelling of wind erosion from stockpiles, RCA combined some of the processed and raw stockpiles, to reflect worst case conditions for conservative purposes. Refer to **Drawing 2**, **Appendix C**.
- All stockpiles were assumed to be of 10m height.
- The maximum area available within the site for stockpiling was modelled, representing the worst case scenario for wind erosion.
- No additional emission factors were included for the maintenance of stockpiles by front end loaders as it is considered that the NPI factors for deriving wind erosion from stockpiles is conservative.
- Dust controls were applied for operations in the model. These dust controls were
    - Water sprays on conveyor units, screens and crushing units (existing and new).
    - Water spays within the pug mill.
    - Water carts for access roads and other open areas.
    - Watering of stockpiles.
    - Sealing of access roads.

7 ODOUR MODELLING RESULTS AND DISCUSSION

Table 5 shows the odour modelling results at the ground level receptors for the proposed operations at the Concrush site.

Table 5 *99^{th} Percentile Model Results, Ground Level Odour Concentrations*

Receptor location	99th percentile Peak to Mean Ground level odour concentration incremental modelling for *proposed* operations - *project specific contribution and worst case prediction*	Impact assessment criteria[1],
A	0.7	2.0
B	0.7	2.0
C	0.6	2.0
D	1.5	2.0
E	1.6	2.0
F	1.6	2.0

1 The criteria (Ref [1]) applies at the nearest sensitive receptors, and is based on the population of the community (more than 2,000 people in the Teralba Area).

The modelling results indicate that for the proposed operations, the ground level odour concentrations are predicted to be below the odour impact criteria of 2.0 odour units for the six (6) receptors nominated. This includes “worst case” future operations of a total maximum capacity of 250,000 tonnes per year. The results shown in **Table 5** therefore represent ‘worst case’ predictions for ground level odour and at all of the receptors.

Drawing 3, **Appendix E** illustrates the odour incremental modelling results as a contour plot.

8 DUST (PM_{10}) MODELLING RESULTS AND DISCUSSION

A Level 2 *contemporaneous* assessment for PM_{10} 24-hour modelling predictions was carried out in accordance with the requirements of the NSW EPA approved methods (Ref [1]). This included background concentrations at the nominated receptors. RCA added the individual model prediction to the corresponding background concentration obtained from the NSW EPA (Ref [5]).

Table 6 shows the PM_{10} 24-hour modelling results for the *highest predicted incremental* ground level concentrations.

Table 6 *Summary of contemporaneous PM_{10} Modelling Results – **24-hour** Averaging Period - Incremental results are 100th percentile in µg/m³*

Receptor Location (Drawing 1, Appendix A)	Background[1]	Date	Maximum Predicted Increment – *project specific contribution*	Total	Impact Assessment Criteria (Ref [1])
A	27.3	28/11/15	8.6	35.9	50.0
B	17.2	6/12/15	11.5	28.7	50.0
C	18.1	14/6/15	7.8	25.9	50.0
D	15.0	25/1/15	19.0	34.0	50.0
E	19.4	27/6/15	21.2	41.6	50.0
F	17.3	29/12/15	17.6	34.9	50.0

1: Recorded result and obtained from Ref [5]

The results of this contemporaneous analysis show that, for the six (6) receptors nominated, 24-hour impact assessment criteria of 50 µg/m³ is predicted to be met (total including background levels) for the future operations at maximum capacity of 250,000tpa with dust controls in place, including:

- Water sprays on conveyor units, screens and crushing units (existing and new).
- Sealed internal access roads.
- Watering of stockpiles.
- Use of water carts on the access roads, and other open areas.
- Water sprays on the pug mill.

Drawing 4, **Appendix E** illustrates the PM_{10} 24-hour incremental modelling results as a contour plot.

Table 7 shows the PM_{10} Annual modelling result for the *highest predicted incremental* ground level concentrations.

Table 7 *Contemporaneous PM_{10} Modelling Results – **Annual** averaging period Results are the 100th percentile modelling results in µg/m³*

Receptor Location (Drawing 1, Appendix A)	Background[1] (see note)	Maximum Predicted Increment - *project specific contribution*	Total	Impact Assessment Criteria (Ref [1])
A	17.0	0.2	17.2	25.0
B	17.0	0.2	17.2	25.0
C	17.0	0.2	17.2	25.0
D	17.0	0.5	17.5	25.0
E	17.0	0.7	17.7	25.0
F	17.0	0.7	17.7	25.0

1 Recorded result and obtained from Ref [5].

The results of this contemporaneous analysis show that, for the six (6) receptors nominated, annual impact assessment criteria of 25µg/m^3 is predicted to be met (total including background levels) for the future operations at maximum capacity of 250,000tpa with the proposed dust controls in place, including those previously shown in Section 8.

9 DUST ($PM_{2.5}$) MODELLING RESULTS AND DISCUSSION

A Level 2 c*ontemporaneous* assessment for 24-hour modelling predictions was carried out. This included background concentrations at the nominated receptors. RCA added the individual model prediction to the corresponding background concentration obtained from the NSW EPA (Ref [5]).

Table 8 shows the $PM_{2.5}$ 24 hour modelling results for the *highest* predicted incremental ground level concentrations.

Table 8 *Contemporaneous $PM_{2.5}$ Modelling Results – **24 hour** Averaging Period Incremental results are 100th percentile in µg/m^3*

Receptor Location (Drawing 1, Appendix A)	Background[1]	Date	Maximum Predicted Increment - *project specific contribution*	Total	Impact Assessment Criteria (Ref [1])
A	3.8	18/11/15	2.4	6.2	25.0
B	5.9	6/12/15	3.3	9.2	25.0
C	16.2	14/6/15	2.2	18.4	25.0
D	5.9	15/1/15	5.4	11.3	25.0
E	17.2	27/6/15	6.1	23.3	25.0
F	4.0	29/12/15	5.1	9.1	25.0

1 Recorded result and obtained from Ref [5].

The results of this contemporaneous analysis show that, for the six (6) receptors nominated, 24 hour impact assessment criteria of 25µg/m^3 is predicted to be met (total including background levels) for the future operations at maximum capacity of 250,000tpa with the proposed dust controls in place, including those previously shown in Section 8.

Drawing 5, **Appendix E** illustrates the $PM_{2.5}$ 24 hour incremental modelling results as a contour plot.

Table 9 shows the $PM_{2.5}$ Annual modelling results for the highest predicted incremental ground level concentrations.

Table 9 *Contemporaneous $PM_{2.5}$ Modelling Results – **Annual** averaging period Incremental results are 100th percentile in µg/m^3*

Receptor Location (Drawing1, Appendix A)	Background[1]	Maximum Predicted Increment - *project specific contribution*	Total	Impact Assessment Criteria (Ref [1])
A	7.30	0.06	7.36	8.00
B	7.30	0.06	7.36	8.00
C	7.30	0.05	7.35	8.00
D	7.30	0.15	7.45	8.00
E	7.30	0.20	7.50	8.00
F	7.30	0.17	7.47	8.00

1 Recorded result and obtained from Ref [5].

The results of this contemporaneous analysis show that, for the six (6) receptors nominated, the annual impact assessment criteria of 8 µg/m^3 is predicted to be met (total including background levels) for the future operations at maximum capacity of 250,000 tonnes per year with the proposed dust controls in place, including those previously shown in Section 8.

10 DUST (TSP) MODELLING RESULTS AND DISCUSSION

Table 10 shows the TSP annual modelling results for the highest predicted incremental ground level concentrations. It is noted there is no TSP impact assessment criteria for 24hour averaging and therefore only the *annual* TSP modelling was conducted in this assessment. Further, background emission concentrations for TSP were not available at any of the Lower Hunter sites and by using the information source (Ref [5]), or via other sources.

In the absence of information, RCA adopted a background TSP level based on a worst case conversion factor from PM_{10} (background) to TSP (background) of 2 (Ref [6]). Given that the annual background level for PM_{10} for this assessment is 17.0 µg/m^3 the estimated and adopted TSP (annual) background level was 34.0 µg/m^3.

Table 10 *TSP Modelling Results – **Annual** Averaging Period - Results are the 100th percentile modelling results in µg/m³*

Receptor Location (Drawing 1, Appendix A)	Estimated Background	Maximum Predicted Increment - *project specific contribution*	Total	Impact Assessment Criteria (Ref [1])
A	34.0	0.7	34.7	90
B	34.0	0.8	34.8	90
C	34.0	0.6	34.6	90
D	34.0	1.8	35.8	90
E	34.0	2.4	36.4	90
F	34.0	2.0	36	90

The results of this incremental analysis show that for the six (6) receptors nominated, the annual impact assessment criteria of 90µg/m^3 can be met for the future operations at maximum capacity of 250,000tpa and considering dust controls in place, including those previously shown in Section 8.

11 DUST DEPOSITION MODELLING RESULTS AND DISCUSSION

Table 11 shows the depositional dust annual modelling results for the highest predicted incremental ground level concentrations. Please note there is no depositional dust impact assessment criteria for 24 hour averaging and therefore only the *annual* depositional dust modelling was conducted in this assessment.

Table 11 *Depositional Dust Modelling Results – **Annual** Averaging Period (note: results are the 100th percentile modelling results in g/m²/month in accordance with Ref [1])*

Receptor Location (Drawing 1, Appendix A)	Maximum Predicted Increase - *project specific contribution*	Impact Assessment Criteria (Ref [1])
A	0.1	Maximum increase above background: 2.0[1]
B	0.1	"
C	0.2	"
D	0.5	"
E	0.7	"
F	0.6	"

[1] The NSW EPA Approved Methods (Ref [1]) require deposited dust not exceed 2 g/m^2 /month above the background level, so this limit has been applied and only the *incremental* dust load is assessed.

The results of this analysis show that, for the six (6) receptors nominated, annual impact assessment criteria of 2g/m^2/month is predicted to be met for the future operations at maximum capacity of 250,000tpa with dust controls in place as previously shown in Section 8.

12 ASSESSMENT OF AIR QUALITY IMPACTS DURING CONSTRUCTION STAGE

For this part of the assessment, RCA only considered dust emissions. Other emissions such as odour are considered to be negligible. For example, gaseous emissions from the exhausts of vehicles will be present but these are dispersed, intermittent and of a low enough initial concentration so as to be negligible close to the sources.

In summary, the proposed construction activities that may generate dust emissions and have been included in this AQIA are:

- Heavy vehicles and machinery moving along the access roads, and creating wheel generated dust.
- Front end loaders to maintain stockpiles.
- Machinery (e.g. front end loaders and excavators) developing and establishing the project e.g. ‘cut and fill’.
- Wind erosion from stockpiles.

For the modelling of dust during the construction stage of the project, the same modelling methods and assumptions for dust were used as shown in previous sections of this report, refer to **Appendix D**. The additional assumptions were:

- The construction “area” is the section of the site immediately to the south of the current operations at Teralba (refer to **Drawing 1, Appendix A**).
- The access roads within the construction area assumed to be unsealed (due to temporary nature of the roads) however water carts will be used every day to suppress dust from wheel movements. A 75% reduction factor was therefore applied to the emission rate for wheel generated dust, and for all vehicles required to access that area.
- RCA assumed that two (2) stockpiles of soil would be created within the construction area, each of 50m x 50m, and 10m high for conservative purposes. In reality the location of these stockpiles may change, however RCA positioned these stockpiles within the model as close as practicable to the eastern boundary and to reflect potential worst case conditions.
- For the calculation of wheel generated dust, RCA estimated a maximum distance of 4,320km for the vehicles within the construction area and for the 12 week period. This includes a number of conservative considerations including vehicles being used for 12 weeks and a maximum of 6 days per week for those 12 weeks, and the vehicles being used for this task for 75% of the time i.e. a maximum of 6 hours in an ‘8 hour’ day.
- For the estimation of the dust emission rate from the machinery (e.g. front end loaders and excavators) during construction, RCA assumed a maximum size and depth to derive the volume, and calculated the mass of material from a soil density of 1,700 kg/m^3.
- All stockpiles would be watered.
- Heavy vehicles and machinery moving along the access roads restricted to a speed limit of 10km/h (as per site *management* measures).

12.1 EMISSIONS INVENTORY

The dust mass emission rates used for the modelling of the area sources for the construction stage of the proposed operations, together with the dust controls considered and the source of information used to derive the rates are shown in **Table 12** following. Also refer to **Appendix D**.

Table 12 *Dust Emission Rates for Construction Stage*

Source description	Total number of sources for proposed operations	Dust controls used in modelling; (and reduction factor)	PM_{10} emission rate ($g/m^2/s$)
Machinery (e.g. front end loaders and excavators) developing and establishing the site[1 5]	2	(None)	9.4×10^{-5}
Wind generated dust from stockpiles [2]	2	Water Sprays (75%)	1.3×10^{-6}
Wheel generated dust – access roads	5	Water carts (75%) [4]	2.2×10^{-5} [3]

1 NPI Emission factors (Ref [3]) were applied to individual operations to give a conservative overall rate for the source.

2 Worst case rates used. Includes maintenance of stockpiles by front end loader.

3 The overall rate was based on assumed operating hours, haul road distance within the construction area, and emission rates allocated within 5 area sources along the proposed access for construction, Refer to **Appendix D**.

4 For modelling of the construction stage and its temporary nature, controls for wheel generated dust were assumed to be limited to the use of water carts on the access roads (within this area); and these access roads are assumed to be unsealed during the construction period

5 RCA allowed for a maximum of 2 excavators operating at certain times and for the scenario of both an excavator and traxcavator clearing land (or digging for the excavator), therefore the total emission rate was allocated across 2 sources.

12.2 DUST MODELLING RESULTS AND DISCUSSION

Table 13 shows the PM_{10} 24 hour modelling results for the highest predicted incremental ground level concentrations – and for the *construction stage* in the proposed site (and modelled as one operation, i.e. construction on its own).

Table 13 *Contemporaneous PM_{10} Modelling Results – **24 hour** Averaging Period Results are the 100^{th} percentile modelling results in $\mu g/m^3$*

Receptor Location (Drawing 1, Appendix A)	Date	Maximum Predicted Increment - construction	Background (for that date)[2]	Total	Impact Assessment Criteria (Ref [1])
A	3/12/15	5.8	17.0	22.8	50.0
B	8/3/15	8.5	27.9	36.4	50.0
C	29/3/15	8.0	20.4	28.4	50.0
D	13/01/15	17.0	14.3	31.3	50.0
E	27/2/15	19.9	13.4	33.3	50.0
F	27/315	17.5	26.7	44.2	50.0

1. The maximum background concentrations (Ref [5]).

2. Note that the background levels for PM_{10} shown in Table 6 are for the proposed operations (not construction) and therefore a different analysis is required.

The results of this contemporaneous analysis show that, for all of the six (6) receptors nominated, 24 hour impact assessment criteria of $50\mu g/m^3$ are predicted to be met (including background levels) for the construction stage of the operations. It is noted that the PM_{10} results for most of the receptors are higher than those for the future operations (and at the corresponding receptors), refer to **Table 6**. However the modelling results for construction are based the assumption that the access roads *cannot be sealed* in the construction areas due to practical limitations - whereas the results for future operations incorporate the sealing of access roads.

Given that Dispersion modelling for PM_{10} 24 hour was completed, modelling for PM_{10} - *annual* was also carried out to compare the results against the annual criteria for PM_{10}. **Table 14** shows the PM_{10} Annual modelling result for the highest predicted incremental ground level concentrations - and for the *construction stage* in the proposed site. Although construction activities will take place over three (3) months (maximum) and not over a full twelve (12) months, the modelling results can still be compared to the annual impact criteria in accordance with NSW EPA approved methods (Ref [1]).

Table 14 *Contemporaneous PM_{10} Modelling Results – **Annual** averaging period Results are the 100^{th} percentile modelling results in $\mu g/m^3$*

Receptor Location (Drawing 1, Appendix A)	Background (Note 1)	Maximum Predicted Increment - *construction*	Total	Impact Assessment Criteria (Ref [1])
A	17.00	0.02	17.02	25.00
B	17.00	0.05	17.05	25.00
C	17.00	0.05	17.05	25.00
D	17.00	0.05	17.05	25.00
E	17.00	0.03	17.03	25.00
F	17.00	0.02	17.02	25.00

1. Recorded result obtained from Ref [5].

The results of this contemporaneous analysis show that, for the six (6) receptors nominated, annual impact assessment criteria of 25µg/m^3 are predicted to be met (total including background levels) for the construction stage of the operations.

Given these outcomes from the PM_{10} modelling (24 hour and annual), modelling for the following parameters was considered unnecessary as exceedances of the relevant criteria are unlikely:

- PM2.5 (24 hour and annual).
- TSP (annual).
- Depositional dust.

13 AIR QUALITY MANAGEMENT AND RECOMMENDATIONS

13.1 ODOUR

Concrush has an active Air Quality Management Plan (AQMP) for allocating the responsibilities and obligations of Concrush to enable odour emissions to be controlled, minimising the impact to the local community and environment. This plan also includes weather monitoring. It is expected that this plan will be reviewed and updated to reflect the proposed operations. This plan already includes the following measures, and RCA recommends that the following are applied to the future operations:

- Monitor Weather Conditions – to aid in the dispersion and dilution of odour emissions away from residential areas:
  - Avoid conducting potential odour generating activities when the wind direction is blowing towards nearby residential areas (normally south westerly or westerly).
  - Avoid conducting potential odour generating activities during early morning periods under low wind speed conditions.
- Use of covers or tarps – to aid in the fugitive emission of odours during transport of potential odour generating products:
  - Cover transported loads leaving site.

Further, the *Air Quality Management Plan* outlines odour monitoring measures and these will be extended to include the future operations:

- Odour monitoring.
- Odour complaint investigation.
- Investigative odour monitoring.

For future pasteurisation activities, and so that odours from this activity will be minimised, Concrush will continue to manage odour in accordance with current management practices and as shown in Concrush document: "*Pasteurised Garden Organic Materials Management Plan for Concrush Pty Ltd Teralba Facility*". Concrush currently uses odour management such as turning of the windrows during pasteurisation.

13.2 DUST

The AQMP allocates the responsibilities and obligations of Concrush to enable dust emissions to be controlled, minimising the impact to the local community and environment. It is expected that this plan will be and updated to reflect the future operations. This plan already includes the following measures, and RCA recommends that the following are applied to the future operations:

- The use of atomising water sprays on crushing equipment. These shall be attached to the crushing point and conveyor belt discharge point to control point source dust emissions.
- Minimisation of the drop heights between the excavator or loader bucket and trailers/truck during loading to reduce dust generation.
- Dust suppression of stockpiles by water spraying on an as needed basis or when the following meteorological conditions occur:
  - An average wind speed greater than 18km/h is recorded continuously over a 15 minute period from a north or north westerly direction.
- Maintenance of clean entry drive as required to minimise dry dust on road.
- The use of a water cart to water roads and hardstand areas to assist in the control of fugitive dust emissions on an as needed basis, or when meteorological conditions occur as shown in the most recent AQMP (for example an average wind speed greater than 10km/h).
- Cessation of dust emitting activities shall occur during the following conditions:
  - An average wind speed greater than 36km/h is recorded continuously over a 15 minute period from a north or north westerly direction; or
  - Dust suppression measures appear visually ineffective.

In the AQMP a dust monitoring programme for deposited dust and PM_{10} emissions is outlined. These actions will be extended to the proposed operations and RCA also recommends that additional PM_{10} monitoring be carried out to monitor ongoing operations and as an ongoing management tool. RCA recommends that Concrush implements PM_{10} 'dustrak' (low volume) monitors (minimum of three (3)) at a number of strategic and representative locations; and for at least a period of twelve (12) months following the commencement of expansion. In this way, the following can be achieved:

- The results can be compared with compliance levels and the dust modelling predictions; and
- The effectiveness of the mitigation measures can be determined for minimising the dust impacts at the receptors.

For the dust impacts outlined in this report, the results of the modelling dust assessment showed that the proposed operations will not impact dust levels above relevant criteria for all of the dust components assessed and in accordance with NSW EPA methodology.

However it is noted that these outcomes were achieved on the basis that Concrush have stated a commitment to implementation of dust controls, that all haul roads would be sealed, and watering for dust control at the following activities:

- Use of water sprays on all stockpiles.

- Use of a water sprays on all “open” areas.
- Water sprays on conveyor units, screens and crushing units.
- Water sprays on any new crushing / screening units and the “pug mill”.

These dust mitigation measures will be adopted to minimise dust generation from the future operations and during maximum production outputs. This approach will minimise the dust impact at the nearest receptors.

Further, the dust mitigation strategy should include the sealing of haul roads at the commencement of the expansion (and not when full production is achieved). This “seal” will be the “two coat seal” as previously described in this report.

For the *construction* stage of the operations, dust mitigation measures must also be implemented to minimise the dust impact at the nearest receptors. These will be similar to the controls for minimising dust generation from the future operations but adjusted for the temporary nature of the construction stage, i.e:

- The use of water sprays on all stockpiled materials; and
- The use of water carts on all access roads.

Further dust mitigation measures outlined in Concrush’s AQMP will be adopted for the construction stage, for example minimisation of the drop heights between the excavator and the stockpiles to reduce dust generation.

Table 15 below shows the Dust Management and Mitigation Measures that will be implemented by Concrush, for both the construction stage and proposed operations. The measures will be included in the Concrush *Air Quality Management Plan* and for the relevant operational stages shown below.

Table 15 *Dust Management and Mitigation Measures – Construction stage and Proposed Operations*

Stage of project	Dust Management and Mitigation Measures
Construction Stage	• Use of water sprays on all stockpiles • The use of water carts on all access roads • Minimisation of the drop heights between the excavator or loader bucket and trailers/truck during loading to reduce dust generation
Proposed Operations	• All haul roads are sealed, and watering for dust control at most activities wherever practical • Use of water sprays on all stockpiles • Use of a water sprays on all “open” areas • Use of water sprays on conveyor units, screens and crushing units; and water sprays are used on any new crushing / screening units and the pug mill • Minimisation of the drop heights between the excavator or loader bucket and trailers/truck during loading to reduce dust generation • Maintenance of clean entry drive as required to minimise dry dust on road • Cessation of dust emitting activities shall occur during the following conditions: average wind speed greater than 36km/h is recorded continuously over a 15 minute period from a north or north westerly direction; or dust suppression measures appear visually ineffective • A dust monitoring program for deposited dust and PM_{10} emissions Concrush to implement PM_{10} monitors (low flow and portable ‘dustrak’ type) at a number of strategic and representative locations (a minimum of three (3) locations); and for at least a period of 12 months following the commencement of expansion.

14 CONCLUSIONS

Concrush Pty Ltd (Concrush) is seeking development consent to increase the processing and storage capacity of the existing resource recovery facility located on part of Lot 2 DP 220347 at 21 Racecourse Road, Teralba, NSW. The Project will involve alterations and additions to the existing facility in order to provide greater on-site storage capacity that is sufficient for the increased level of throughput.

This air quality impact assessment has been undertaken in accordance with the NSW EPA approved methods (Ref [1]). The assessment included a contemporaneous analysis for the particulate components PM_{10} and $PM_{2.5}$ by using ambient background air quality data and assumptions that were conservative (worst case). The assessment also included the particulate components TSP and deposited dust by using assumptions that were conservative (worst case). The assessment also included odour emissions from the proposed operations.

The results of the odour assessment indicate the proposed operations will not adversely impact odour levels at existing receptors, and a possible future development location to the east of the project area; and the compliance level of two (2) odour units will be achieved at all those locations. This outcome applies to both the proposed operations and the construction stage of the project.

RCA have outlined recommended odour mitigation measures which are consistent with the Concrush *Air Quality Management Plan* and these should be incorporated and applied to both the proposed operations and the construction stage of the project.

The results of the air quality assessment for dust particulates for the *proposed operations* are predicted to meet the relevant NSW EPA impact criteria (24-hour and annual averaging) for all applicable components (TSP, PM_{10} and $PM_{2.5}$ and deposition) at all of the receptors; with the implementation of the following mitigation measures:

- All haul roads are sealed, and watering for dust control at most activities wherever practical.
- Use of water sprays on all stockpiles.
- Use of a water spraying on all “open” areas.
- Water sprays are used on screens and crushing units (including conveyor sections within these units).
- Water sprays are used on any new crushing / screening units and the “pug mill”.

These proposed controls are generally consistent with the Concrush *Air Quality Management Plan* and should be incorporated and applied to the future operations.

The results of the air quality assessment for dust particulates for the *construction* stage of the operations are predicted to meet the relevant NSW EPA impact criteria (24-hour and annual averaging) for the PM_{10} component of dust and at all of the receptors; providing mitigation measures are implemented to control dust during construction. If the mitigation measures are implemented, exceedances of other dust impact assessment criteria at residences (e.g. $PM_{2.5}$) are unlikely.

The dust mitigation measures that must be implemented during the construction stage are:

- The use of water sprays on all stockpiled materials.
- The use of water carts on all access roads.

15 LIMITATIONS

This report has been prepared for Umwelt and Concrush in accordance with the agreement between RCA and Concrush. The services performed by RCA have been conducted in a manner consistent with that generally exercised by members of its profession and consulting practice.

This report has been prepared for the use of Umwelt and Concrush. The report may not contain sufficient information for purposes of other uses or for parties other than Umwelt and Concrush. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without permission. The information in this report is considered accurate at the date of issue with regard to the current conditions of the site, including normal, full operating conditions at the future Teralba site.

Environmental conditions including dust concentrations and can change in a limited period of time. This should be considered if the report is used following a significant period of time after the date of issue. The air dispersion modelling was carried out in accordance with a model and methodology presented in NSW EPA guidelines (Ref [1]) using professional standards and judgement.

Yours faithfully
RCA AUSTRALIA

Mart. Belk.

F J Brooke

Martin Belk
Associate Environmental Engineer

Fiona Brooker
Environmental Services Manager

REFERENCES

[1] NSW EPA Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, January 2016.

[2] Odour Impact Assessment of Proposed Woorollo Farm Composting facility, The Odour Unit (WA) Pty Limited

[3] NPI Emission Estimation Technique Manual for Mining and Processing of Non-Metallic Minerals, 1999.

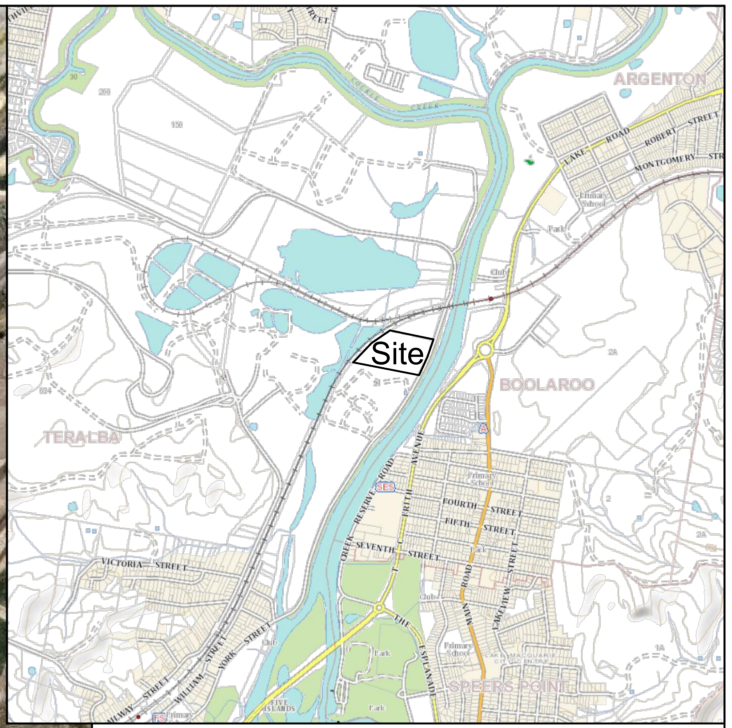
[4] Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors, Midwest Research Institute, November 2006.

[5] NSW EPA website: http://www.environment.nsw.gov.au/AQMS/search.htm.

[6] Ramboll Environ, *A review of cumulative air impact assessment methodologies for NSW*, *Final Report*, 2015.

Appendix A

Drawing showing Site Location and Receptors



Locality Plan
N.T.S.

LEGEND

- Approximate location of receptors
- Approximate location of proposed expansion
- Approximate location of existing site (current 2018 operations)

Aerial image taken from Nearmap, September 26 2017
(used in accordance with commercial licence)

0 50 100 150 200 250
metres

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SITE AND RECEPTORS LOCATION PLAN
AIR QUALITY IMPACT ASSESSMENT
21 RACECOURSE ROAD
TERALBA

CLIENT	Concrush Pty Ltd			RCA Ref	13149-701/5
DRAWN BY	MB	SCALE	1 : 5000 (A3)	DRAWING No 1	REV 0
APPROVED BY	FB	DATE	7/11/2018	OFFICE	NEWCASTLE

CDT-DWG-A3H-001/1

Appendix B

Details of Meteorological File for Air Dispersion Modelling

TODOROSKI
AIR SCIENCES

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31 October 2017

Martin Belk
Associate Environmental Engineer
RCA Australia
Via email: martinb@rca.com.au

RE: AUSPLUME meteorological data file – Teralba, NSW

Dear Martin,

As per your request we have processed an AUSPLUME meteorological data file for Teralba, NSW. The 2014, 2015 and 2016 simulation years were selected after review of the long term climate data at the nearest Bureau of Meteorology (BOM) at Newcastle Nobbys Signal Station AWS.

The generation of the AUSPLUME meteorological data file utilised the TAPM model.

A summary of the modelling and outputs is provided below:

TAPM (V4.0.4) simulation	Teralba, NSW
Date	27 October 2017
Client	Martin Belk, RCA Australia
Year of simulation	January – December 2014
	January – December 2015
	January – December 2016
Number of grid points	25 x 25 x 25
Number of grids	4 grids
Grid spacing	30km, 10km, 3km, 1km
Post-processing output	AUSPLUME meteorological data file (1km grid)
	Name: 2014_t010a_m01301401.apl
	2015_t010a_m01301401.apl
	2016_t010a_m01301401.apl
	Location: 370680 mE, 6354610 mS
Model setup by	KT

Yours faithfully,

Todoroski Air Sciences

Dan Kjellberg

Figure 1: Location of site

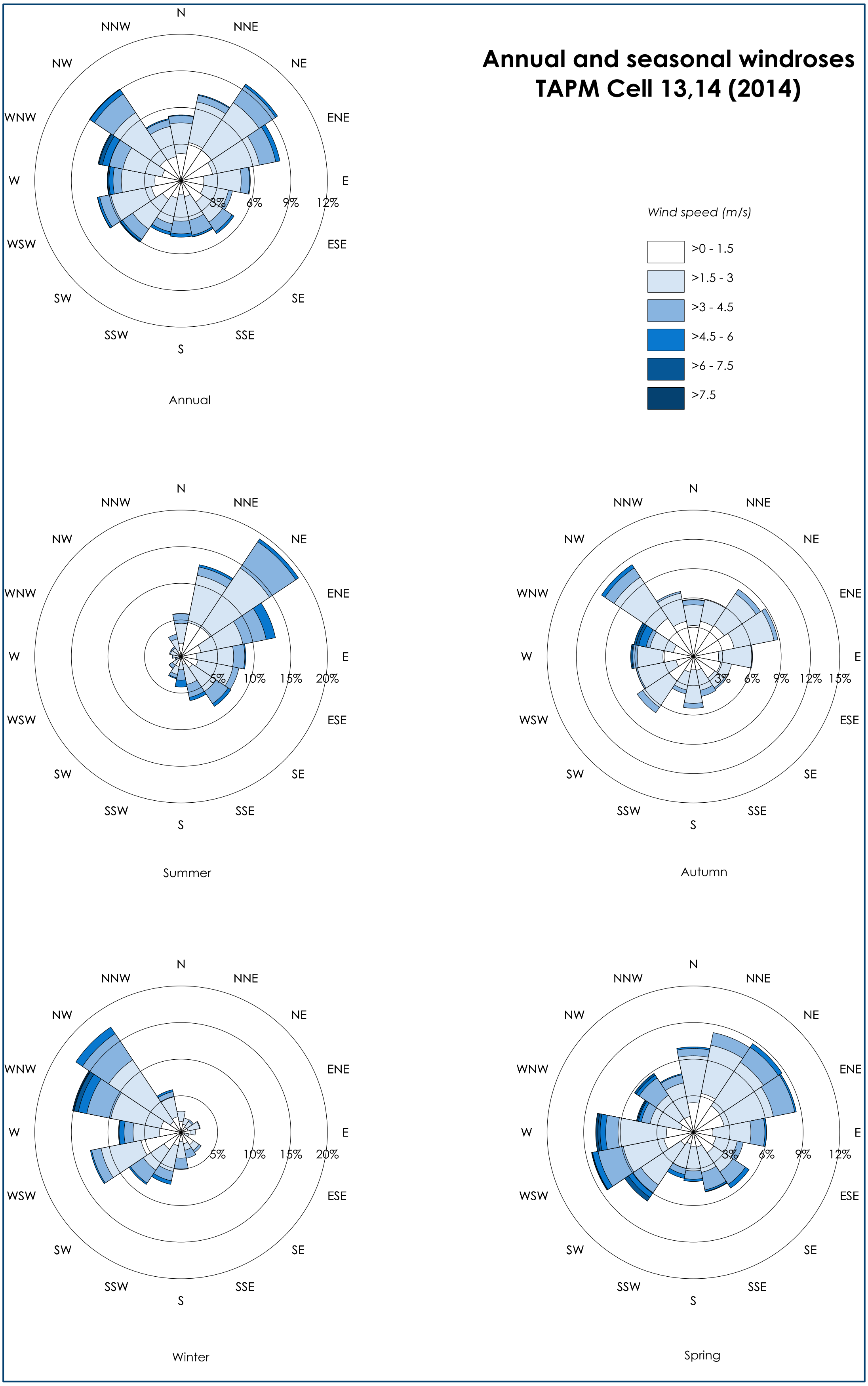

Figure 2: Annual and seasonal windrose (2014)

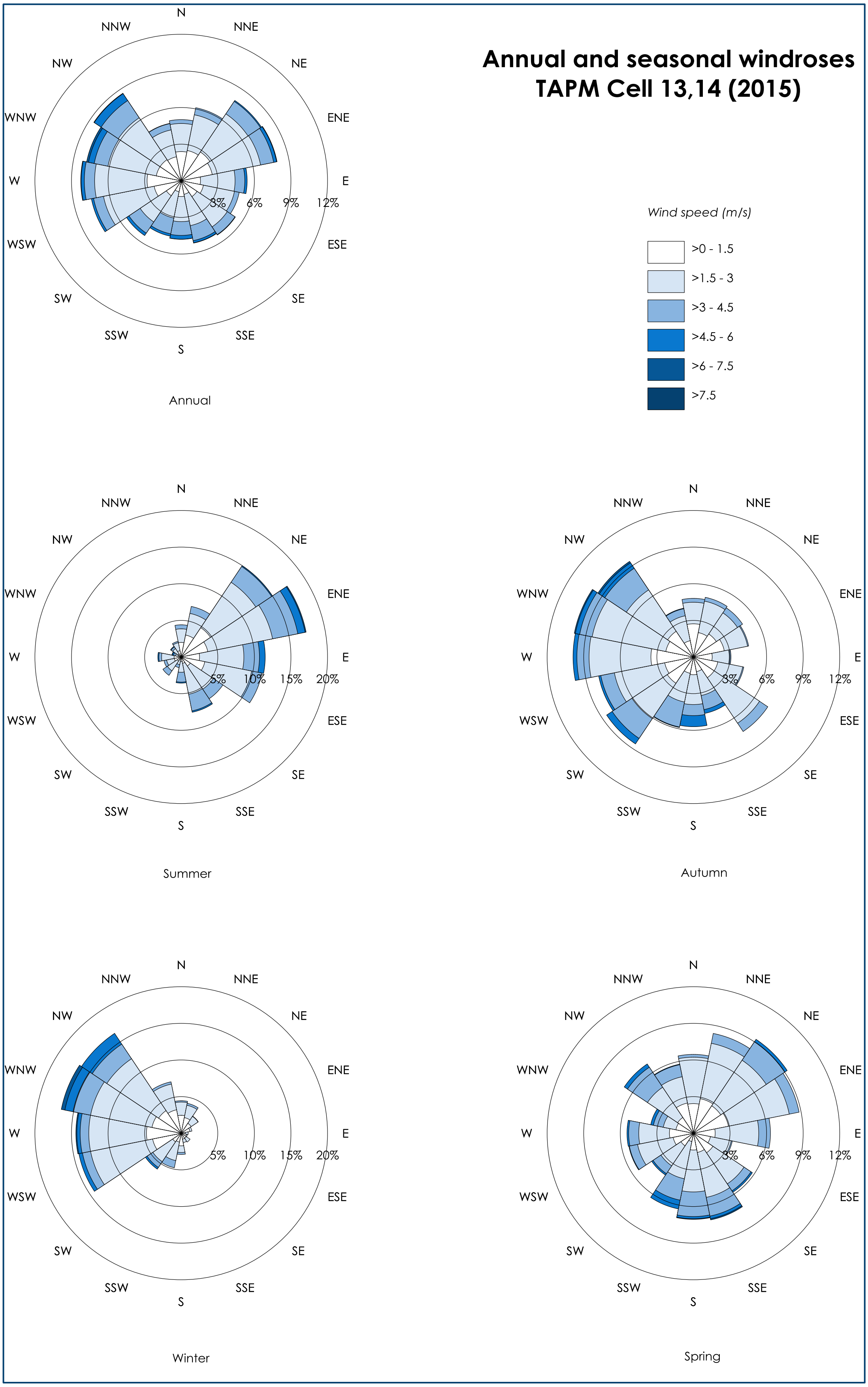

Figure 3: Annual and seasonal windrose (2015)

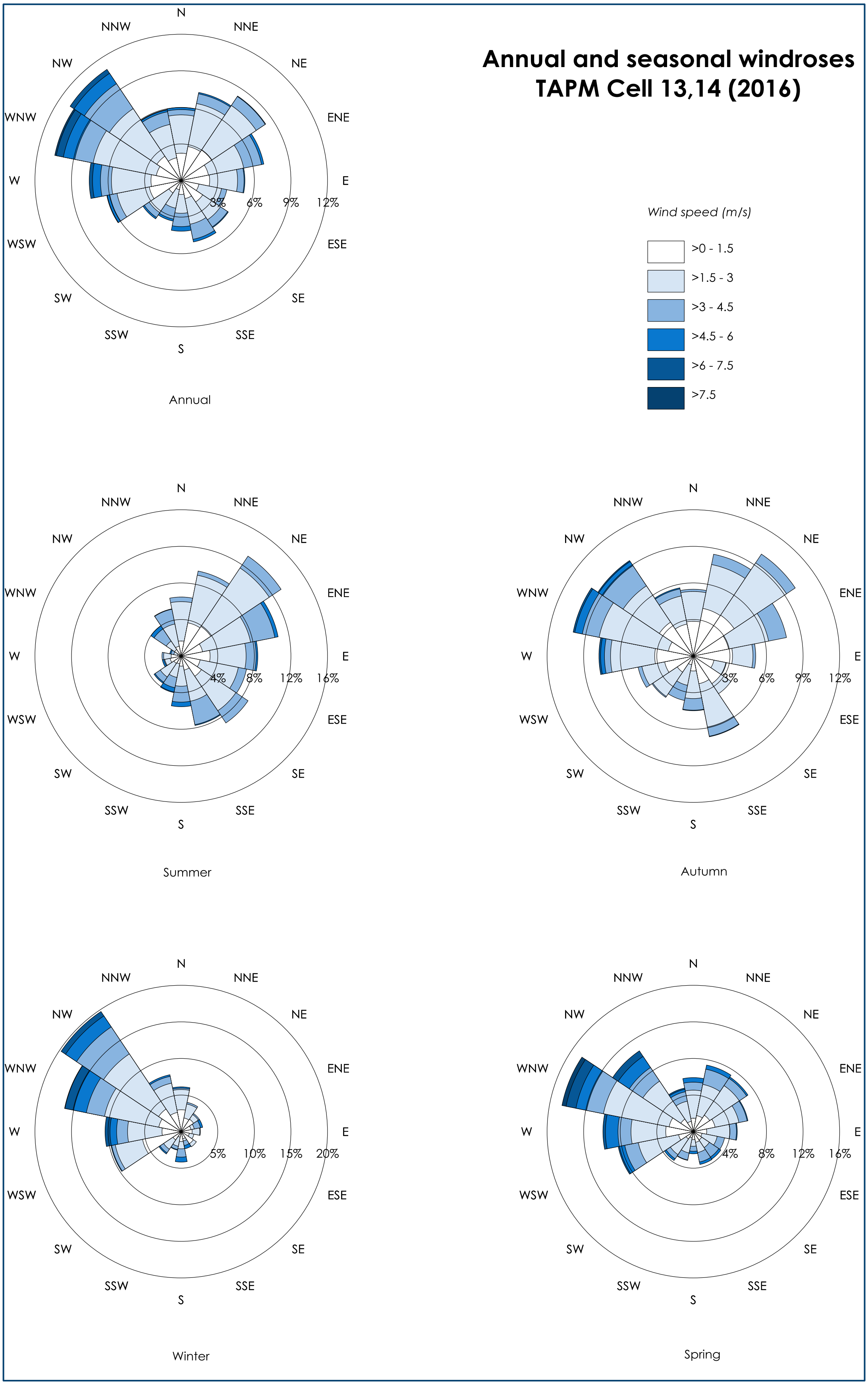

Figure 4: Annual and seasonal windrose (2016)

Appendix C

Drawing showing Location of Odour and Dust Sources for Air Modelling

LEGEND

(red hatched box)	Assumed location of source for modelling and to be conservative
(yellow dot)	Emission type (odour, dust or both)
(blue dot)	Approximate location of dust gauge

(1) Dust from wind erosion
(2) Odour from stockpile
(3) Odour from activities/operations
(4) Dust from unloading/loading
(5) Odour from unloading/loading
(6) Dust from unit operating
(7) Odour from unit operating
(8) Wind generated dust from open areas (other than stockpiles)

NOTE:
Aerial image taken from Nearmap, April 7 2018 (used in accordance with commercial licence)
Drawing adapted from plan supplied by Unwelt
Stage 1 Works MGA56 Rev 1 Simple

0 10 20 30 40 50
metres

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LOCATION OF ODOUR AND DUST SOURCES FOR MODELLING - PROJECT SPECIFIC CONTRIBUTION AIR QUALITY IMPACT ASSESSMENT
21 RACECOURSE ROAD
TERALBA

CLIENT	Concrush Pty Ltd			RCA Ref	13149-701/5
DRAWN BY	MB	SCALE	1 : 1000 (A3)	DRAWING No	2 REV 1
APPROVED BY	FB	DATE	7/11/2018	OFFICE	NEWCASTLE

CDT-DWG-A3H-001/1

Appendix D

Calculations

Calculations for Modelled Air Emissions

1. Future Operations

a) Odour Rates

The odour rates (SOER) were obtained from references were adjusted by considering the amount of total hours to be worked, and/or assuming the % utilization of the machines or units as shown below. In all cases, the aim was to produce conservative odour rates for modelling.

Material stockpiling – front end loader, GW piles only for odour (4 locations):

Firstly, no. of hours in a (365) day calendar year = 365 x 24 = 8,760 hours

For future operations, maximum number of total hours to be worked for whole site will be based on 52 weeks per year; 48.75 hours in a 5 day week (Monday to Friday) and 8.75 hours on a Saturday. Therefore, maximum number of total hours to be worked = 52 x (48.75 + 8.75) = 2,990 hours.

Maximum % utilization of front end loader in any day = 50% (assumed, and also based on RCA's site observations).

Adjusted odour rate = 1.0 OU/m^2/s x (2,990/8760) x 0.5 = 0.17

Applying the correct peak to mean ratios for modelling of 2.5 and 2.3 (Ref [3]), the odour rates for this source are 0.43 and 0.39.

Odour from GW stockpiles (3 locations):

No adjustment to the base rate was required, as RCA assumed that the stockpiles were exposed to the air at all times and over a full calendar year, for conservative purposes.

Shredding of GW:

Maximum % utilization of unit over a year = 20% (assumed, and also based on RCA's site observations).

Adjusted odour rate = 5.9 OU/m^2/s x 0.2 = 1.18

Applying the correct peak to mean ratios for modelling of 2.5 and 2.3 (Ref [3]), the odour rates for this source are 2.95 and 2.71.

(Screening of GW: same assumptions as per Shredding of GW calculation)

Pasteurisation activities:

The proposed pasteurisation system includes features that will most likely result in odour levels that are *lower* than the current practice of "turning" the material piles. For example, the aeration system incorporating mechanical fans will distribute the odours more evenly across the material piles therefore assisting in the dispersion and dilution of odours from those piles. However, odour rates for modelling the pasteurization activities were based on the current pasteurisation practice in order to reproduce worst case odour rates for modelling. This is also consistent with the conservative approach of this assessment.

For the current pasteurisation system RCA were advised that in a 12 month period:

- The pasteurisation turning activities occur on a cycle of 4 times every year (i.e once every 3 months)
- three turning activities within those cycles , i.e. a total of 12 “turning” events ever year

RCA assumed that for the day that the turning event occurs, the turning activity occurs for one hour (in a 24 hour period), and in the warmer periods of the day (e.g. close to 12 noon) for best practice.

The odour emission rate was adjusted in the model configuration to accommodate the “monthly” changes (3 out of 12 months: pasteurization turning activities occur; and 9 out 12 months: pasteurization turning activities *do not* occur):

- For months that pasteurization turning activities will occur, the overall odour rate was calculated on a 24 hour basis and weighted for 1 hour at the maximum rate of 5.9 OU/m^2/s; and the remaining 23 hours weighted for the Specific Odour Emission Rate (SOER) of 1.0 OU/m^2/s; and the maximum peak to mean ratio of 2.5 was applied. The adjusted (weighted) odour rate was = ((23x2.5 x1) +(1x2.5x5.9) / 24 = 3.00
- For months that pasteurization turning activities will not occur, the SOER of 1.0 OU/m^2/s was adjusted for the maximum peak to mean ratio of 2.5 (to be conservative) to yield a modelling emission rate for 2.5 OU/m^2/s, and for those months.

(b) Particulates (Dust) Mass Emission Rates

All “particulates” modelling from the sources is represented by PM_{10} ,$PM_{2.5}$ and Total Suspended Particulates (TSP).

The plant capacity for the proposed operations used in the calculations (unless otherwise specified, for example wheel generated dust) is 250,000 tonnes of waste recycled per annum. Depending on the material type at the source (either NGW or GW) this amount was then adjusted for the proportions, namely:

- 90% construction and demolition waste; and
- 10% green waste (maximum and to be conservative).

(i) PM_{10}

<u>NGW crushing and screening units (including conveyors and loading by front end loader into these units), 3 in total</u>

Emission factors obtained from Table 21 of Ref [1]:

Operation	PM_{10} factor, kg/tonne *
Crushing	0.00029
Screening	0.0011

Conveyor transfer point (including loading and unloading)	2.4×10^{-5}
Total for combined source	0.0014

*for controlled source, i.e assuming water sprays used on the units

Now, material rate per unit = (250,000 tonnes/year x 0.9) / 3 =75,000 tonnes/year

PM_{10} emission rate per unit = 75,000 tonnes/year x 0.0014 kg/tonne x (1000g/kg) x (year/365 days) x (day /24 hours) x (hour/3600s) = 0.003 g/s

Now, assumed area of combined unit = $50m^2$ (from estimated dimensions of 10m x 5m overall)

Therefore **PM_{10}** emission rate for modelling = 0.033 g/s / $50m^2$ = $6.7 \times 10^{-5} g/m^2/s$

<u>Shredding and Crushing GW (1 unit)</u>

Emission factors obtained from Table 21 of Ref [1]:

Operation	PM_{10} factor, kg/tonne
Crushing (tertiary)	0.0012
Screening	0.0076
Total for combined source	0.0088

Now, material rate for GW= 250,000 tonnes/year x 0.1 =25,000 tonnes/year

PM_{10} emission rate = 25,000 tonnes/year x 0.0088 kg/tonne x (1000g/kg) x (year/365 days) x (day /24 hours) x (hour/3600s) = 0.007 g/s

Now, assumed area of combined unit = $50m^2$ (from estimated dimensions of 10m x 5m overall)

Therefore **PM_{10}** emission rate for modelling = 0.007 g/s / $50m^2$ = $1.4 \times 10^{-4} g/m^2/s$

<u>Open areas (wind generated – not wheel generated from vehicles or wind erosion from stockpiles)</u>

RCA over-estimated this area from supplied drawings as a total of 5,600 m^2 . This includes the sealed section near the weighbridge to take into account any dust that may be deposited on that section, then be emitted to air by wind action (to be conservative).

<u>Stockpile wind generated dust (NGW and GW)</u>

The NPI ‘default’ factor for wind erosion is 0.2 kg/h/ha for PM_{10} (Ref [1]).

The factor was then applied to each stockpile; and by assuming a size and calculating the dust emission rate over a full year and then a 75% dust reduction factor on each pile (assuming water sprays are used). The estimated stockpile sizes

ranged between 25m x 15m (= 375 m^2) and 100m x 25m (= 2,500 m^2) for the pile designated for pasteurisation.
Example : for a 25m x 15m stockpile, **PM_{10}** emission rate for full year = 375 m^2 x (1 ha / 10,000 m^2) x 0.2 kg/h/ha x (hour/3600s) x 0.25 x (1000g/kg) = 0.0005 g/s

PM_{10} emission rate for modelling = 0.0005 g/s / 375m^2 = 1.3 x 10^{-6} g/m^2/s

<u>Open areas (wind generated – not wheel generated from vehicles or wind erosion from stockpiles)</u>

RCA over-estimated this area from supplied drawings as a total of 5,600 m^2 . This includes the sealed section near the weighbridge to take into account any dust that may be deposited on that section, then be emitted to air by wind action (to be conservative).

To be conservative, the NPI 'default' factor for wind erosion was taken 0.2 kg/h/ha for PM_{10} (Ref [1]); and then a 75% dust reduction factor was applied, assuming water sprays are used.

PM_{10} emission rate for full year = 5,600 m^2 x (1 ha / 10,000 m^2) x 0.2 kg/h/ha x (hour/3600s) x 0.25 x (1000g/kg) = 0.007 g/s

PM_{10} emission rate for modelling = 0.007 g/s / 5,600 m^2 = 1.3 x 10^{-6} g/m^2/s

<u>Pug mill</u>

RCA assumed that a maximum of 50% materials arriving on site would be sent to the pug mill for the production of road based materials, to be very conservative.

Now, material rate to pug mill (worst case) = 250,000 tonnes/year x 0.5 = 125,000 tonnes/year

PM_{10} Emission factor obtained from Table 21 of Ref [1]: 0.00029 kg/tonne for controlled source, i.e assuming water sprays used on the unit; and one unit overall modelled to be conservative.

PM_{10} emission rate per unit = 125,000 tonnes/year x 0.00029 kg/tonne x (1000g/kg) x (year/365 days) x (day /24 hours) x (hour/3600s) = 0.0011 g/s

Now, assumed area of combined unit = 50m^2 (from estimated dimensions of 10m x 5m overall)

Therefore **PM_{10}** emission rate for modelling = 0.0011 g/s / 50m^2 = 2.3 x 10^{-5} g/m^2/s

(i) PM2.5

A $PM_{2.5}$ to PM_{10} ratio of 25% was applied to each area source emission rate of PM_{10} (Ref [5]), and as a worst case factor.

(ii) TSP

For most of the dust sources, TSP to PM_{10} ratio of 4 was applied and as a worst case factor (Ref [5]).

For the source type: *stockpile wind generated dust* (both NGW and GW); TSP to PM_{10} ratio of 2 was applied as a worst case as the NPI 'default' factor for wind erosion is 0.4 kg/h/ha for TSP and 0.2 kg/h/ha for PM_{10} (Ref [1]).

2. Construction stage of the project

As mentioned in the report, only dust was modelled and the PM_{10} component. The PM_{10} emission rate was derived on the basis of a number of assumptions as shown in the report, and further detail is shown below.

Machinery (e.g. front end loaders and excavators) developing and establishing the site

The appropriate emission factor for this operation is 8.0×10^{-6} kg/tonne (Table 21 of Ref [1]).

Emission rates available from Ref 1 are expressed in kg/tonne.

Further assumptions and considerations:

- Area and depth to be 'worked" in a month *: 100m x 80m (from drawings supplied to RCA) and to a maximum depth of 0.5m, yields a volume of = 4,000 m^3
- Soil density (conservative maximum) = 1,700 kg/m^3 , obtained from Table D1 in Reference

Tonnes moved by excavators in construction = 4,000 m^3 x 1,700 kg/m^3 x tonne/1000 kg = 6,800 tonnes

PM10 rate for this operation = 6,800 tonnes x 8.0×10^{-6} kg/tonne x (1000 kg/tonne) (1000g/kg) x (year/365 days) x (day /24 hours) x (hour/3600s) = 0.0017 g/s

Assumed excavator bucket size: 4m x 4m (Surface area = $16m^2$)

Therefore (total) $\mathbf{PM_{10}}$ emission rate for modelling = 0.0017 g/s / $16m^2$ = 1.1×10^{-4} $g/m^2/s$

Now, RCA applied a ratio for the number of days worked per week (maximum) of 6 days per week, instead of a 7 day (continuous) basis (and for a 3 month overall working period set up in the model. The 'final' PM10 rate for this operation and used in the model = 1.1×10^{-4} $g/m^2/s$ x 6/7 = 9.4×10^{-5} $g/m^2/s$

Note: RCA allowed for 2 machines to be involved in this process (excavator and traxcavator) therefore the total emission rate was allocated across 2 sources.

**i.e every month out of 3 total, a section of 100m x 80m is worked, and based on the practical limitation that the complete 300m x 80m section cannot be worked and completed in just one month.*

Wind generated dust (including stockpiles and open areas except for access roads)

The NPI 'default' factor for wind erosion is 0.2 kg/h/ha for PM_{10} (Ref [1]).

The factor was then applied to each stockpile (2 assumed); and by assuming a size (50m x 50m) and calculating the dust emission rate then a 75% dust reduction factor on each pile (assuming water sprays are used). Example : for a 50m x 50 m stockpile, **PM_{10}** emission rate for full year = 2,500 m^2 x (1 ha / 10,000 m^2) x 0.2 kg/h/ha x (hour/3600s) x 0.25 x (1000g/kg) = 0.0033 g/s

PM_{10} emission rate for modelling = 0.0033 g/s / 2,500 m^2 = 1.3 x 10^{-6} g/m^2/s

Wheel generated dust

- RCA assumed that for the construction period, vehicles within the area would be travelling at a maximum speed of 10km/h (from site management measure) and for a maximum of 6 hours in any day. Based on 1 vehicle causing wheel generated dust, the distance per day is 6 hours x 10km/h = 60km
- For air dispersion modelling of wheel generated dust; the vehicle movements were allocated into five area sources positioned along a 250m internal road within the construction area, and based on drawings suppled to RCA.
- The total distance associated with heavy vehicles along the unsealed road and within the construction period of 12 weeks (6 days maximum per week) is 60km/day x 72 days = 4,320 km
- The PM_{10} emission factor for wheels generating dust was obtained from Ref [1]: 0.96 kg/km as a very conservative factor.
- RCA assumed a “Level 2” water spraying of the roads, which yields an emission reduction factor of 75% (Ref [1]).
- Now, PM_{10} mass emission rate for total of five area sources (and based over a year for modelling input) = 4,320 km km/year x 0.96 kg/km = 4,147.2 **kg/year**.
- **= 4,147.2 kg/year** x (year/365 days) x (day /24 hours) x (hour/3600s) x 1000g/kg x 0.25
- = **0.033 g/s**.
- For the allocation of this mass emission rate into the five area sources (each of 250m^2), **the PM_{10} emission rate per area source is** = ((0.033 g/s)/250m^2)/5 = 2.6 x 10^{-5} **g/m^2/s**.

Now, RCA applied a ratio for the number of days worked per week (maximum) of 6 days per week, instead of a 7 day (continuous) basis (and for a 3 month overall working period set up in the model. The ‘final’ PM10 rate for this operation and used in the model = 2.6 x 10^{-5} **g/m^2/s** x 6/7 = 2.2 x 10^{-5} g/m^2/s

Appendix E

Drawings showing Modelling Contours for Odour, PM_{10} and $PM_{2.5}$

LEGEND

- ● Approximate location of receptors
- Approximate location of proposed expansion
- Approximate location of existing site (current 2018 operations)
- Odour concentrations expressed in odour units (OU) at ground level, odour impact assessment criteria is 2.0 odour units

Aerial image taken from Nearmap, September 26 2017 (used in accordance with commercial licence)

0 50 100 150 200 250
metres

RCA AUSTRALIA
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INCREMENTAL ODOUR MODELLING RESULTS
PROJECT SPECIFIC CONTRIBUTION
AIR QUALITY IMPACT ASSESSMENT
21 RACECOURSE ROAD
TERALBA

CLIENT	Concrush Pty Ltd			RCA Ref	13149-701/5		
DRAWN BY	MB	SCALE	1 : 5000 (A3)	DRAWING No	3	REV	1
APPROVED BY	FB	DATE	7/11/2018	OFFICE	NEWCASTLE		

CDT-DWG-A3H-001/1

LEGEND

- Approximate location of receptors
- Approximate location of proposed expansion
- Approximate location of existing site (current 2018 operations)
- Units of micrograms per cubic metre
- 50 Represents the impact assessment criteria for PM_{10}, cumulative

Aerial image taken from Nearmap, September 26 2017
(used in accordance with commercial licence)

0 50 100 150 200 250
metres

RCA AUSTRALIA
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INCREMENTAL PM10 24 HOUR MODELLING RESULTS
PROJECT SPECIFIC CONTRIBUTION
AIR QUALITY IMPACT ASSESSMENT
21 RACECOURSE ROAD
TERALBA

CLIENT	Concrush Pty Ltd			RCA Ref	13149-701/5
DRAWN BY	MB	SCALE	1 : 5000 (A3)	DRAWING No	4	REV 1
APPROVED BY	FB	DATE	7/11/2018	OFFICE	NEWCASTLE

CDT-DWG-A3H-001/1

LEGEND

- Approximate location of receptors
- Approximate location of proposed expansion
- Approximate location of existing site (current 2018 operations)
- Units of micrograms per cubic metre, the impact assessment criteria for $PM_{2.5}$ is 25

Aerial image taken from Nearmap, September 26 2017 (used in accordance with commercial licence)

0 50 100 150 200 250
metres

RCA AUSTRALIA
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INCREMENTAL PM2.5 24 HOUR MODELLING RESULTS
PROJECT SPECIFIC CONTRIBUTION
AIR QUALITY IMPACT ASSESSMENT
21 RACECOURSE ROAD
TERALBA

CLIENT	Concrush Pty Ltd			RCA Ref	13149-701/5
DRAWN BY	MB	SCALE	1 : 5000 (A3)	DRAWING No	5 REV 1
APPROVED BY	FB	DATE	7/11/2018	OFFICE	NEWCASTLE

CDT-DWG-A3H-001/1