Appendix R

Air Quality Assessment (GHD 2020b)

Simcoa Operations Pty Ltd

Simcoa s38 Environmental Approvals
Air Quality

August 2020

Executive summary

Simcoa Operations Pty Ltd (Simcoa) propose to develop a greenfield quartzite mine at North Kiaka (North Kiaka Mine), adjacent to their existing mine north of Moora Town (Moora Mine), Western Australia. Processing of ore extracted from the North Kiaka Mine will be undertaken at the existing processing facilities at Moora Mine (the Project). The proposed mine is expected to extend the life of the mine operation by approximately 18 years

GHD Pty Ltd undertook the air quality assessment (this report) in support of the environmental approvals for the proposed mine. This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.5 and the assumptions and qualifications contained throughout the Report.

This assessment references the following air quality criteria:

- *National Environment Protection (Ambient Air Quality) Measure*
- *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999*
- *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*
- Conditions set out in Licence L6149/1988/8

Dust from mining activities is generally associated with mechanical disturbance of rock and soil materials by drilling, blasting, dozing, excavation, loading and dumping, trucks on haul roads and wind erosion from open areas. A small amount of dust emissions can be associated with crushing and processing.

Dust emissions were estimated for operations associated with mining at the proposed North Kiaka Mine, and quartzite processing at the existing Moora Mine. Methods and emission factors from the *National Pollutant Inventory* (NPI) *Emission Estimation Technique Manual for Mining* were used as well as emission factors from United States Environmental Protection Agency AP-42, where site data was not available.

The air dispersion model AERMOD (v 9.5.0) was used to predict ground level concentrations of total suspended particulates (TSP), particulate matter with an aerodynamic diameter of 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$) and dust deposition at identified sensitive receptors for one operating scenario (mining activities at the proposed North Kiaka Mine and processing of ore at the existing Moora Mine).

Dust mitigation included the following:

- Pit retention as per the NPI for blasting, drilling, dozing and excavating activities in the pit.
- Watering was not included, as the minimum rate for watering (2 L/m^2/hr) set out in the NPI control efficiencies is greater than Simcoa's licence allows. Therefore, in order to demonstrate a worst case scenario, watering was excluded as a control in this modelling assessment.

Results from the dispersion modelling predicted that ground level concentrations of maximum 24-hour TSP exceeded the relevant air quality criteria at one of three sensitive receptors during operations for the highest predicted concentration only. Second highest and subsequent highest predicted concentrations complied with the relevant criteria for 24-hour TSP. Predicted concentrations for annual TSP and all other pollutants (PM_{10}, $PM_{2.5}$ and dust deposition) complied with the relevant air quality criteria.

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Glossary of terms

Acronym	Description
Air NEPM	*National Environment Protection (Ambient Air Quality) Measure*
BoM	Bureau of Meteorology
GHD	GHD Pty Ltd
GLC	Ground level concentration
Kwinana EPP	*Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999*
NSW AMMAAP	*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*
$PM_{2.5}$	Particulate matter win an aerodynamic diameter of 10 microns or less
PM_{10}	Particulate matter win an aerodynamic diameter of 10 microns or less
ROM	Run of mine
SEPP-AQM	*State Environment Protection Policy (Air Quality Management)*
Simcoa	Simcoa Operations Pty Ltd
SOP	Small open pits
tpa	Tonnes per annum
TSP	Total suspended particulates

1. Introduction

1.1 Project description

Simcoa Operations Pty Ltd (Simcoa) currently operate a quartzite mine (Moora Mine), located approximately 15 km north of Moora, in the WA wheatbelt. Moora Mine is located on tenements M70/191, G70/91, G70/92 and G70/93. Simcoa is proposing to establish a new quartzite mine (North Kiaka Mine) approximately 2 km north of Moora Mine (the Project). The development of the new quartzite mine at North Kiaka is located within tenement M70/1292. The Project Development Envelope is approximately 254.42 ha.

1.2 Purpose of this report

The purpose of this report is to present the outcome of an air quality assessment to support the environmental approvals for the proposed North Kiaka mine expansion.

1.3 Scope of work

The assessment will include the following scope of works:

- A desktop assessment to review existing ambient air quality and meteorological conditions at the Project site.
- Derive site representative meteorological data for use within the assessment.
- Identify dust generating activities for operational activities for the Project and prepare an emission inventory by calculating dust emissions for key mining operations.
- Using approved dispersion modelling methodologies, predict the dust impact from the Project and compare with ambient air quality criteria.
- Provide a report (this document) outlining results based on the above tasks.

1.4 Approach

The approach adopted for this air quality assessment is summarised in the following points. Each point is described in detail in the subsequent sections of this report.

- Outline the proposed Project, including site layout and key operational processes/infrastructure (Section 2).
- Describe the existing environment in terms of land use, meteorology, ambient air quality and sensitive receptors (Section 3).
- Identify the appropriate air quality criteria applicable to the assessment (Section 4).
- Carry out an assessment to identify likely key dust emissions during operation of the Project. Calculate emission rates associated with the Project for input into the air dispersion model (Section 5).
- Carry out air dispersion modelling for one scenario only, reflecting one pit at the North Kiaka Mine, and processing of ore at the Moora mine, with the transport of product via a revised haul truck route (Section 6):
- Predict ground level concentrations (GLCs) of total suspended particulates (TSP), particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$) and dust deposition, and assess against relevant air quality criteria (Section 6).

- Describe the conclusions drawn from the above assessment, subject to the Scope (Section 1.3) and Limitations (Section 1.5) of the report.

1.5 Limitations

This report has been prepared by GHD for Simcoa Operations Pty Ltd and may only be used and relied on by Simcoa Operations Pty Ltd for the purpose agreed between GHD and the Simcoa Operations Pty Ltd as set out in Section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than Simcoa Operations Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Sections 1.6, 5 and 6 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Simcoa Operations Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.6 Assumptions

This assessment assumes the following:

- All information provided by Simcoa, including operational parameters and project site layout is correct.
- All parameters used in the model are based on best estimates using information provided by Simcoa and other relevant data.

2. Project background

2.1 Current operations

Quartzite mining at the existing Moora Mine commenced in 1989. Ore is currently mined from Main and West open pits and is processed through an onsite crushing and wet screening plant at an approved rate of approximately 160,000 tonnes of lump quartz per annum. Ore is stockpiled into different grades in a stockpile area. Waste rock is deposited to one of two waste rock landforms. Some of the mined rock is crushed to produce aggregate, which is sold as a by-product.

The quartzite from the Moora Mine is trucked offsite to the Kemerton Silicon Smelter approximately 17 km north-east of Bunbury in the Kemerton Strategic Industrial Area in the south-west of WA, where it is smelted to produce silicon. The smelter commenced operation in 1989 and is authorised to produce 64,000 tpa of silicon.

The location of Moora Mine is shown in Figure 2-1.

2.1.1 Operating schedule

Mining and processing at the Moora Mine is undertaken on a campaign basis and approximately twelve people are required on site. Operations continue six days a week during daylight hours.

2.2 Proposed North Kiaka Mine expansion

Mining will commence at the proposed North Kiaka Mine, to replace mining at the Moora Mine. The Project is expected to produce approximately 130,000 tonne per annum (tpa) of lump quartz (or approximately 2.34 Million tonnes over the life of the mine).

It is anticipated the North Kiaka Mine and Moora Mine may have a period of approximately seven years in which they will operate concurrently. During this period, Simcoa will develop North Kiaka Mine and use the established infrastructure at the existing Moora Mine (i.e. water resources and processing plant). The ore will be transported from the North Kiaka Mine via trucks along the easement to Moora Mine for processing prior to transportation to the smelter. Upon closure of Moora Mine, the crushing and screening plant will remain at the Moora Mine site and ore will continue to be transported from North Kiaka Mine to Moora Mine for processing.

The proposed development of the North Kiaka Mine is expected to extend Simcoa's operations by approximately 18 years.

The location of the proposed North Kiaka Mine is shown in Figure 2-1.

2.2.1 Key components

Key components of the Project will include the following (see Figure 2-1):

- One mine pit at North Kiaka Mine
- One waste rock landform at North Kiaka Mine
- A new run of mine (ROM) area at North Kiaka Mine
- Hydrocarbon storage
- A linear infrastructure access corridor

Associated infrastructure such as workshops, offices, ablutions, laydown and stockpile areas and a weighbridge.

LEGEND

- Existing Mine boundary
- Proposed Mine Development Envelope
- Pit
- Waste rock landform
- Haul roads
- Infrastructure
- ROM stockpile (within infrastructure)

Scale

0 1000 2000 3000

Metres (A4)

MAP PROJECTION: Universal Transverse Mercator

HORIZONTAL DATUM: Map Grid of Australia (MGA50) Zone 50 J

DATA SOURCE: LandGate (SLIP)

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FIGURE 2-1

Location of Project

REVISION 0

DATE 14.07.2020

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3. Existing environment

3.1 Existing land use

The Moora Mine is located in a broad acre agricultural area 15 km north of the Moora Township, with the main agricultural pursuits being sheep farming and cropping. The Project Site itself is situated on a farm owned by proponents.

Within the premises boundary mining activity occurs within M70/191 and stockpiles are located on G70/91, G70/92 and G70/93. Tenement M70/1292 currently supports broad acre farming.

3.2 Climate and meteorology

The climate of the Moora area is temperature, with hot, dry summers and cool, wet winters. Most rainfall occurs between May and August as a result of cold fronts during winter. The Bureau of Meteorology (BoM) Badgingarra Research Station (site number: 009037) is located approximately 51 km west-north-west of the Project Site. Temperature data from this site indicates the mean maximum temperature of the area ranges from 17.6 °C in July to 34.6 °C in January and February, and the mean minimum temperature of the area ranges from 7.1 °C in August to 17.8 °C in February. Rainfall for the area is variable, peaking in July with a maximum mean monthly recording of 101.2 mm (BoM 2019a). See Figure 3-1 for mean temperature and rainfall data recorded by BoM.

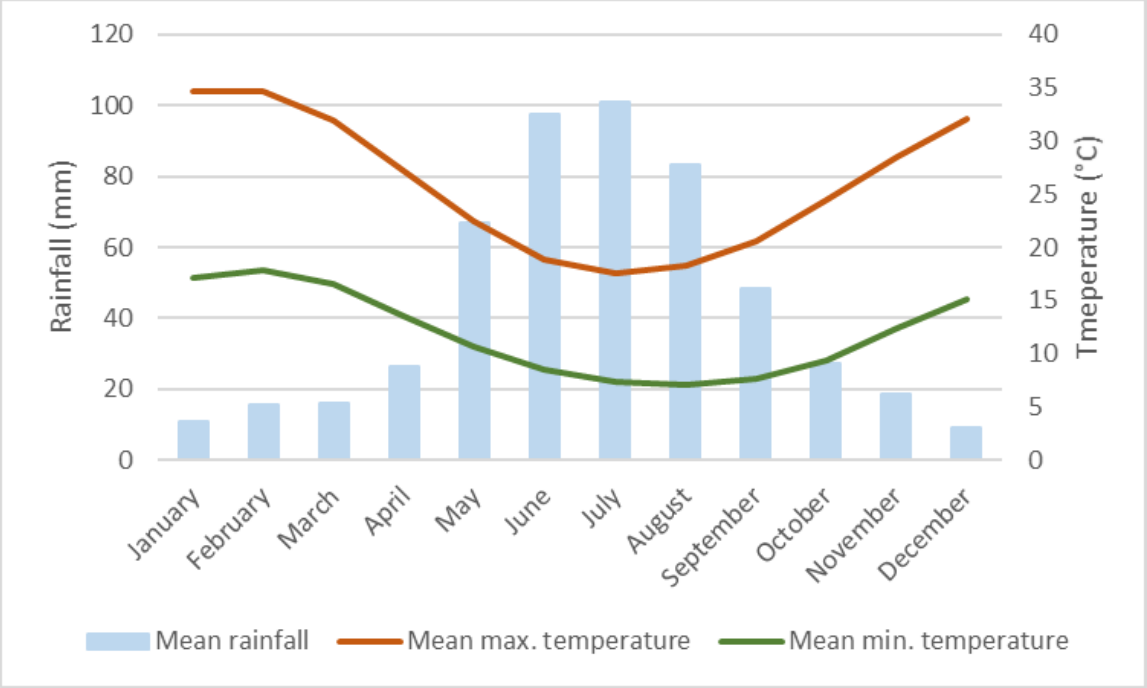


Figure 3-1 Long term temperature and rainfall trends recorded at BoM station 009037

The mean morning (9:00 am) wind speed reported during summer for the BoM Badgingarra Research Station (site number: 009037) is 22.5 km/hr, prevailing predominately from the east and south-east. The wind speed is generally consistent in the afternoon (3:00 pm) with a mean wind speed of 26.2 km/hr reported which prevails from a south-west direction. During winter months winds abate to an average of 12.7 km/hr during the morning prevailing from the north and north-east. Afternoon winds increase to a mean of 21.2 km/hr during winter months and range in direction, but are predominately westerly (BoM 2019a).

3.3 Ambient air quality

As part of Licence L6149/1988/8, Simcoa are required to carry out ambient dust monitoring in accordance with methods described in the licence. The concentration of ambient TSP from Moora Mine must not exceed 1000 µg/m^3 as the difference between two 15-minute sampling periods, one of which shall be upwind and one of which shall be downwind from the site. This method intends to measure the contribution to the local airshed of airborne dust associated with operations at Moora Mine (excluding background concentrations). In accordance with this requirement, Simcoa have carried out ambient dust monitoring at Moora Mine and results are available dating back to 2014. These are shown in Table 3-1.

Table 3-1 Ambient dust monitoring at Simcoa mine

Year	Total suspended particulates (TSP; µg/m^3)		
	Average downwind concentration	Average upwind concentration	Moora Mine contribution to airborne dust
2014	5.0	Below detection limit	5.0
2015	Below detection limit	Below detection limit	Below detection limit
2016	97.3	Below detection limit	97.3
2017	288.9	120.3	168.6
2018	90.5	Below detection limit	90.5

From Table 3-1 is can be seen that the average contribution of airborne TSP from existing Simcoa operations to the local airshed was below the Licence limit of 1000 µg/m^3 for years 2014 to 2018. The largest recorded TSP contribution from Simcoa operations was 169 µg/m^3 in 2017.

3.3.1 Background concentrations

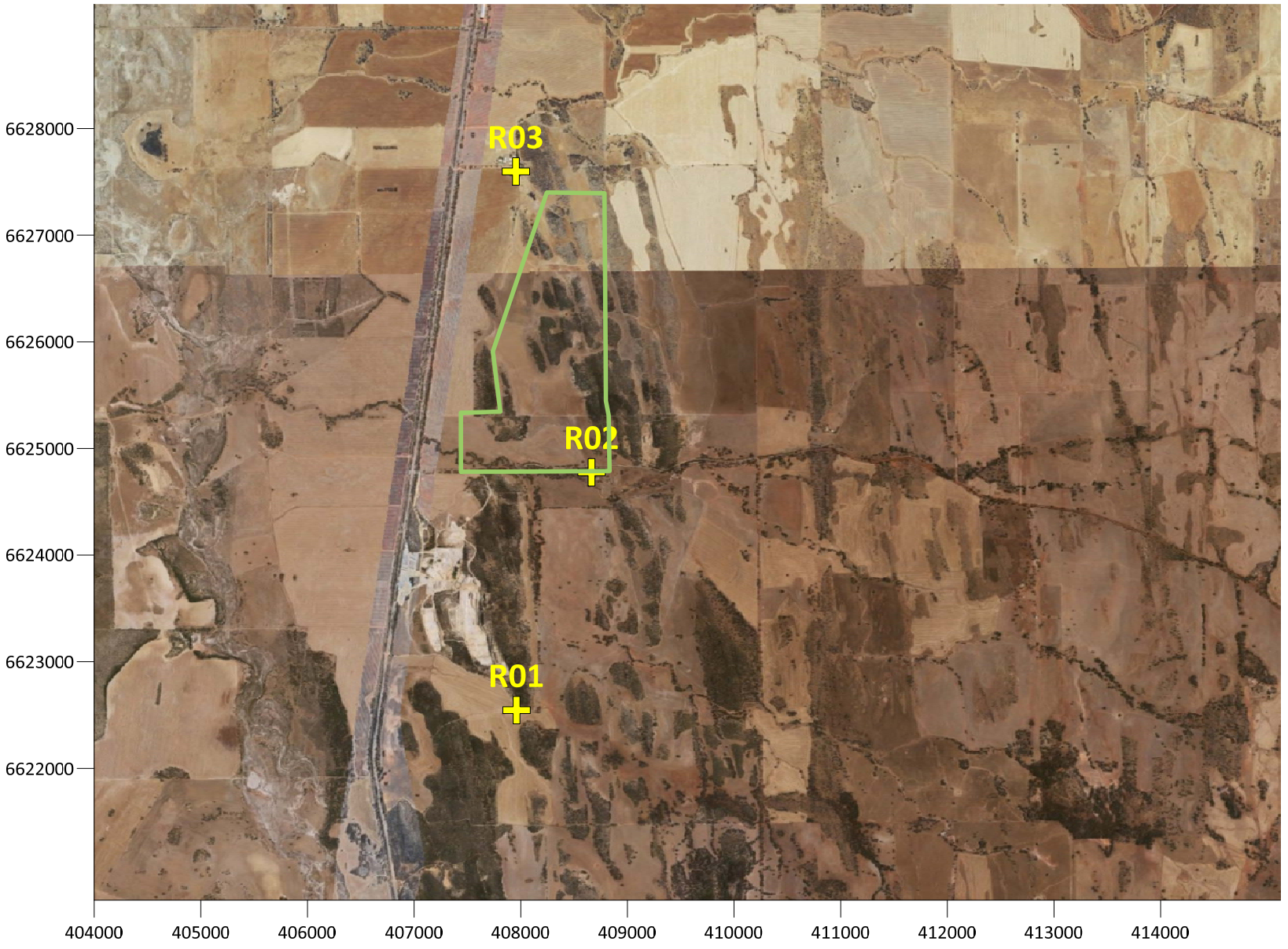
Background air quality monitoring is not available for the Project Site. As there is minimal infrastructure and residential land use within proximity to the Site, an incremental assessment has been conducted (exclusive of background concentrations).

3.4 Sensitive receptors

Three sensitive receptors (rural residential) were identified within proximity of the Project boundary. The closest sensitive receptor to the Moora Mine boundary (R01) is located approximately 170 m south of the premises. However, upon completion of the Project, the closest sensitive receptor will be R02, which will be situated immediately adjacent to the Project boundary. The sensitive receptors identified for inclusion in the air dispersion model are listed in in Table 3-2 and shown in Figure 3-2.

Table 3-2 Sensitive receptors

ID	Location (m UTM)		Distance from Moora Mine boundary	Distance from proposed Project boundary
	Easting	Northing		
R01	407961.28	6622545.91	170 m south	170 m south
R02	408664.29	6624776.31	750 m east	<10 m south
R03	407954.49	6627597.51	2.8 km north	350 m north-west



LEGEND

Sensitive receptor

Proposed Mine Development Envelope

Scale

0 1000 2000 3000

Metres (A4)

MAP PROJECTION: Universal Transverse Mercator

HORIZONTAL DATUM: Map Grid of Australia (MGA50) Zone 50 J

DATA SOURCE: LandGate (SLIP)

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FIGURE 3-2

Sensitive receptors

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4. Air quality criteria

4.1 Types of dust emissions

Emissions from Project operations are generated primarily from mining and process activities. The majority of airborne particulates from the proposed North Kiaka mine expansion are likely to be visible dust, known as TSP, with a proportion of fine particulates as PM_{10} and $PM_{2.5}$.

4.2 Relevant air quality criteria

Predicted dust impacts associated with the operation of the Project will be compared to relevant air quality criteria. The following criteria were reviewed as part of this assessment for relevance to the Project:

- *National Environment Protection (Ambient Air Quality) Measure* (Air NEPM), National Environment Protection Council (2016)
- *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999* (Kwinana EPP), Western Australian Environmental Protection Authority (1999)
- *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW AMMAAP), New South Wales Environmental Protection Authority (2016)
- The Moora Quartzite Mine is also subject to conditions set out in Licence L6149/1988/8

4.2.1 Air NEPM

The Air NEPM was developed to provide benchmark standards for ambient air quality to ensure all Australians have protection from the potential health effects of air pollution. Air NEPM standards have been developed for carbon monoxide, nitrogen dioxide, photochemical oxidants (ozone), sulphur dioxide, lead and particulate matter. As the pollutants of concern for this assessment are particulates, Air NEPM standards for particulate matter only are shown in Table 4-1.

Table 4-1 Air NEPM standards relevant to the Project

Pollutant	Averaging period	Maximum allowable concentration (µg/m^3)
PM_{10}	24-hour	50
	Annual	25
$PM_{2.5}$	24-hour	25
	Annual	8

4.2.2 Other air quality criteria

The Air NEPM does not outline any criteria for TSP or dust deposition. Accordingly, the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999* and *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* have been used for this assessment. These two additional guidelines set limits for criteria as indicated in Table 4-2.

Table 4-2 TSP and dust deposition standards relevant to the project

Pollutant	Averaging period	Maximum allowable concentration	Guideline
TSP	24-hour	90 µg/m^3	Kwinana EPP[1]
	Annual	90 µg/m^3	NSW AMMAAP[2]
Deposited dust	Maximum increase	2 g/m^2/month	NSW AMMAAP[2]
	Maximum total	4 g/m^2/month	NSW AMMAAP[2]

1. *90 µg/m^3 relates to the Standard for Areas B and C, where standard is the concentration of an atmospheric waste which is desirable not to exceed (Western Australian Environmental Protection Authority 1999)*
2. *Relates to impact assessment criteria in Table 7.1 (New South Wales Environmental Protection Authority 2005)*

4.3 Licence L6149/1988/8

The Department of Environmental Regulation set out conditions to which Simcoa must adhere as part of their Licence under the *Environmental Protection Act 1986*. The conditions (shown in Table 4-3) are set out in Licence L6149/1988/8, held by Simcoa for the Moora Quartzite Mine.

Table 4-3 Air pollution control conditions set out in L6149/1988/8

Air pollution control conditions
Dust control
1. The Licensee shall take measures to minimise the generation of visible dust crossing the boundary of the Premises from all materials handling operations, stockpiles, open areas and transport activities.
2. The Licensee shall pave, seal or otherwise treat all trafficked areas and maintain these in a manner which minimises the generation of airborne dust by implementing measures such as sweeping, hosing down or vacuuming to remove spillages.
3. The Licensee shall employ routine maintenance and housekeeping practises to ensure that there is no accumulation of waste materials in or around the Premises, which may lead to the generation of airborne dust.
Ambient dust limit
1. The Licensee shall ensure the concentration of ambient dust from the Premises does not exceed 1000 µg/m^3 when measured in accordance with the following: a. The concentration of airborne dust to be determine as the difference in the concentration of dust in air between two samples of 15 minute duration within a 60 minute period. b. The samples shall be taken at locations within 5 metres of the Premises boundary on opposite sides of the Premises. c. One sampling location shall be generally located upwind of the other sampling location. d. The air shall be sampled at a rate of not less than 100 litres per minute and the samples shall be taken at a height between 1.0 and 2.0 metres above ground level.

5. Emission estimation

5.1 Operational emission sources

The majority of dust from mining activities consists of coarse particles and particles larger than PM_{10}, generated from natural activities such as mechanical disturbance of rock and soil materials by drilling, blasting, dozing, excavation, loading and dumping, and trucks on haul roads. A small amount of dust emissions can be associated with crushing and processing. Dust is also generated when wind blows over open ground and different types of stockpiles. The potentially significant sources of airborne particulates from the site have been assessed as being (Figure 6-2):

- Dust from drilling and blasting of the proposed pit at North Kiaka Mine
- Dust from excavation and dozing in the proposed pit at North Kiaka Mine
- Dust from crushing and screening activities at Moora Mine
- Wind erosion dust from the proposed pit at North Kiaka Mine
- Wind erosion dust from additional stockpiles at North Kiaka Mine (ROM, waste rock landform)
- Wheel-generated dust from the haul road from North Kiaka Mine to processing facilities at Moora Mine

5.2 Emission estimation for modelling

Emissions were estimated in accordance with the *National Pollutant Inventory (NPI) Emission Estimation Technique Manual for Mining (V 3.1*) (Australian Government 2012) where site data was not available.

The NPI sets out default emission factors for TSP and PM_{10} for equipment and processes typically present at mine sites in Australia. These emission factors and associated emission estimation techniques were used to estimate source emissions used in the model. Where emission factors from NPI were not available, emission factors from United States Environmental Protection Agency (US EPA) AP-42 where used. $PM_{2.5}$ was assessed as 30% PM_{10}.

Emissions from diesel generators on site were estimated using emission factors and associated methods *in NPI Emission Estimation Technique Manual for Combustion Engines (V 3.0)* (Australian Government 2008).

The estimated emissions for sources included in the modelling scenario are shown in Table 5-1. These emission rates are based on a yearly throughput of 260,000 tpa extracted at North Kiaka Mine (ore and waste rock) and 130,000 tpa processed at Moora.

Table 5-1 Emission sources and rates used in the model

Emission source	Number of sources	Control, control efficiency[1]	TSP (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)
North Kiaka Mine – Mechanically generated dust					
Drilling	1 (6 holes per blast)	Pit retention, 50% (TSP), 5% (PM_{10})	0.492	0.491	0.147
Blasting	1	Pit retention, 50% (TSP), 5% (PM_{10})	12.298	12.108	3.632

Emission source	Number of sources	Control, control efficiency[1]	TSP (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)
Front end loader	2	Pit retention, 50% (TSP), 5% (PM_{10})	0.241	0.220	0.066
Dozer	1	Pit retention, 50% (TSP), 5% (PM_{10})	2.361	1.082	0.325
Wheel-generated dust from haul trucks	1	No control	3.263	0.964	0.289
North Kiaka Mine – Wind erosion					
Pit	1	No control	0.689	0.344	0.103
Waste rock landform	1	No control	1.000	0.500	0.150
ROM stockpile	1	No control	0.089	0.044	0.013
Moora processing					
Primary crusher	1	No control	1.929	0.193	0.058
Secondary crusher	1	No control	5.787	0.331	0.099
Tertiary crusher	1	No control	13.50	0.772	0.231
Screening	3	No control	0.121	0.041	0.012
Conveyor	2	No control	0.014	0.005	0.002
Diesel generators					
Generator (Moora Mine)	3	No control	0.30	0.15	0.15
Generator (North Kiaka)	3	No control	0.30	0.15	0.15

1. As per NPI (Australian Government 2012)

It is noted that watering will occur as required on haul roads and during drilling and blasting in order to mitigate dust emissions. This will be done using water taken partly from the licence (Simcoa are licenced to extract 250,000 KL/annum) and partly from dewatering. However, the NPI sets out control efficiencies for watering at a minimum rate of 2 $L/m^2/hr$. Simoca's licence does not allow for watering at this volume and therefore Simcoa cannot commit to this rate of watering for modelling purposes. In order to demonstrate a worst case scenario, watering has been excluded as a control in this modelling assessment, however in reality, watering will occur as required.

The following operating times were included in the model:

- All stationary equipment, mobile equipment and mine vehicles operate from 6:00 am to 6:00 pm (daylight hours) on Monday to Saturday.
- Drilling occurs from 6:00 am to 6:00 pm on Monday to Friday.[1]
- Blasting occurs at the proposed North Kiaka Mine on a Monday between the hours of 8:00 am and 4:00 pm.[2]
- Wind erosion occurs constantly and generators are operating constantly.[3]

[1] In reality, drilling will occur from 6:30 am to 5:30 pm on Monday to Friday. Drilling will not occur every day, but as required, which is about 50 percent of the total work time. However, in order to demonstrate a worst case scenario, and as exact drilling days cannot be guaranteed, drilling was included in the model every weekday. Further, the AERMOD model allows for variable emissions beginning and ending on the full hour only, as opposed to the half hour that is scheduled in reality.

[2] In reality, blasting will occur 36 times per year between 8:00 am and 4:00 pm on Monday to Friday. The actual blast times are given as a notice on a sign at the mine entrance. In order to demonstrate a worst case scenario, and as exact blasting times cannot be guaranteed, blasting was included in the model as every possible hour on a Monday only. The day of the week will not affect the dispersion of dust, only the hour of the day.

[3] In reality, generators will only be operational when the mine is operational, however for a worst case assessment, generators were included in the model as operating constantly.

Existing waste rock landforms and ROM stockpiles at the Moora mine are to be rehabilitated and revegetated upon cessation of mining activities at Moora Mine. As per the Mine Closure Plan, rehabilitation and revegetation of a large portion of the waste rock landforms has already been completed specifically on the Southwest, West and Old North waste rock landforms. It is expected that pit lakes will form in the existing mining pits at Moora Mine, which will inhibit the dispersion of windblown dust from the pit surface.

The Draft Mine Closure Plan for the Moora Mine (GHD 2020) states that the peak ambient dust levels at the Southwest Waste Dump, at the West Entry point and at the East Entry point (existing Moora Mine), taken during the October 2010 sampling campaign, were significantly less than the licence conditions which state that dust leaving the Project must not exceed 1,000 µg/m^3 of air. High volume dust monitoring indicates this figure has not been exceeded at the Project since 2009 (Simcoa 2011b; 2015; 2016). The implication for closure is that dust generation is unlikely to be an issue in the longer term once demolition, rehabilitation and revegetation have been completed at the Moora Mine. As such, dust sources associated with mining activities (pits, waste rock landforms and stockpiles) at the Moora Mine, have been excluded from this assessment.

6. Dispersion modelling

6.1 Meteorological modelling - AERMET

6.1.1 Meteorological data file construction

Atmospheric dispersion modelling for regulatory purposes requires meteorological data that is representative of conditions at the site for input into the modelling software. GHD has used meteorological data from the Badgingarra Bureau of Meteorology station as shown in Figure 6-1. Meteorological data for the period 1 January 2014 to 31 December 2018 were examined for use in this assessment. One year of data covering the period 1 May 2014 to 30 April 2015 was chosen as this year is recent and is generally seen to be representative of average weather of the area. The meteorological parameters used from Badgingarra Station were temperature (°C), wind speed (m/s) and wind direction (degrees).

As ambient temperature at two heights on the mast at Badgingarra Station was not available, atmospheric stability as defined by the Monin Obukov length, was determined using cloud cover estimates. The ceilometers operated by BoM (which give cloud cover using a LIDAR beam) are too remote from the site. Therefore, an alternative cloud cover dataset was developed where hourly cloud cover (expressed in tenths) was determined using satellite images covering the Wheatbelt region. Satellite images from the Japanese Meteorology Agency fleet (Himawari-8 and -9 during 2018; BoM 2019b) as well as from the polar orbiting satellites of 'worldview earth data', operated by NASA (NASA 2019), were used to form the cloud dataset.

Figure 6-1 Location of meteorological station

6.1.2 AERMET usage

The AERMOD meteorological processor, AERMET, was used to synthesize the AERMOD meteorological file. This process was undertaken in accordance with US EPA guidance. AERMET was used in 'on-site' observation mode using the input raw, hourly meteorological

data obtained from the Badgingarra Station (temperature, wind speed and wind direction), the cloud cover estimates and appropriate land use categorisations for the site.

6.2 Dispersion modelling –AERMOD

AERMOD is the US EPA's approved model for estimating the impacts of emissions to air by industry. AERMOD is an advanced Gaussian plume model and extends on the Pasquill-Gifford atmospheric stability categorisation by modelling the turbulence using micro-meteorological parameters to calculate the Monin-Obukov length. This provides a continuously varying measure of atmospheric turbulence from one hour to the next. A sample AERMOD configuration file used in this assessment is shown in Appendix A.

6.2.1 Model configuration

Table 6-1 provides the AERMOD parameters that were applied to the model.

Table 6-1 Model parameter inputs and settings

Parameter	Setting
Averaging times	1-hour, 24-hour, monthly or annual
Model grid centre coordinates (m UTM)	408176 E, 6624932 N
Emission rates	See Section 5.2
Source type	Volume (Figure 6-2)
Topography	Elevated
Surrounding land use	Irwin Rural

Gridded receptors

The model domain was set up using uniform Cartesian (gridded) receptors at a resolution of 200 m. 51 by 51 gridded receptors were set up to cover an area of 10 km by 10 km covering Moora Mine and the proposed North Kiaka Mine expansion (Figure 6-2).

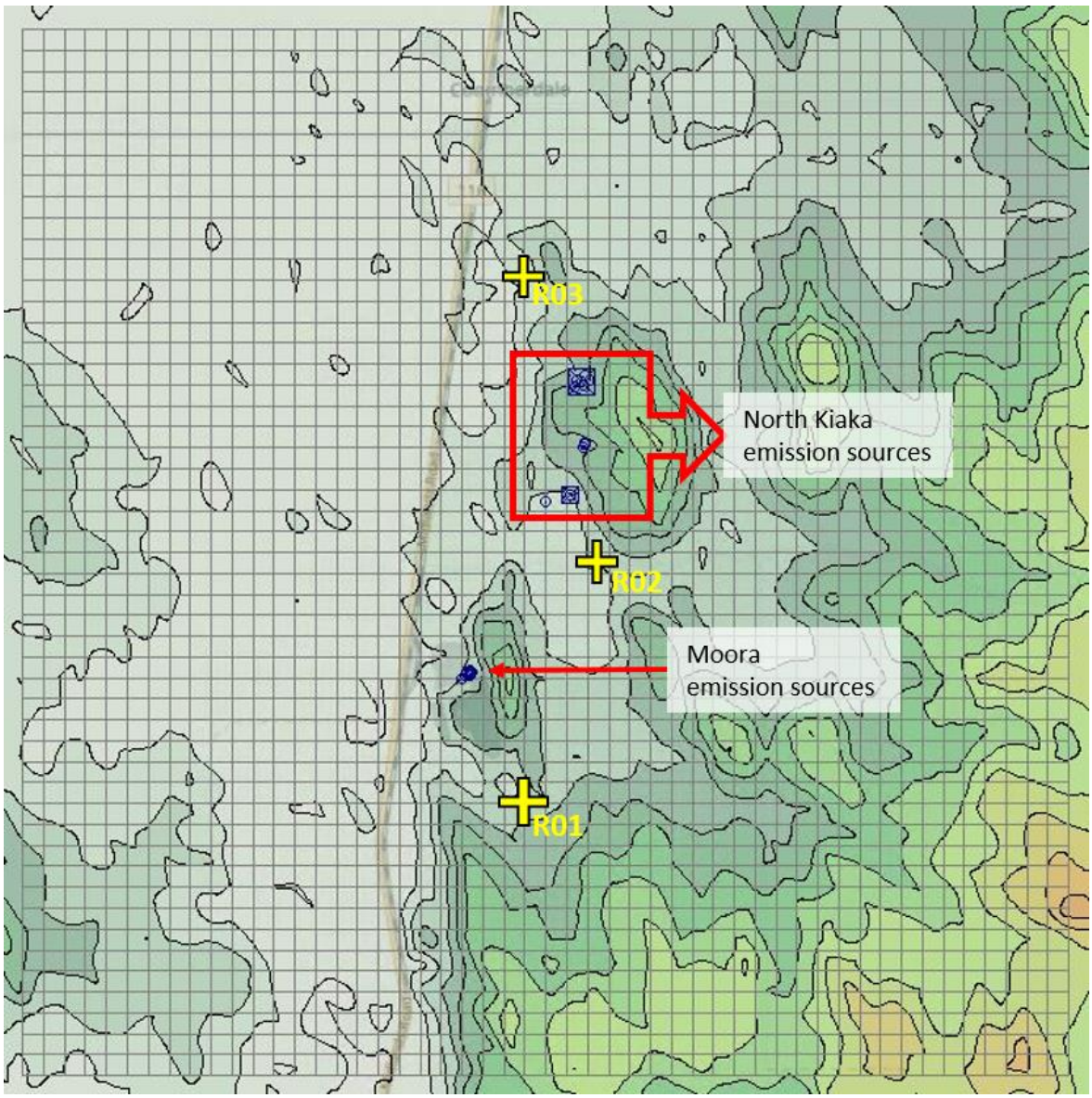

Figure 6-2 Emission sources and gridded receptor network used in model

Dust deposition

Dust deposition was included in the modelling for TSP in order to predict the amount of dust deposited on surfaces once it is no longer entrained in the air column. Dry deposition was selected in AERMOD along with dry depletion, and Method 1 for handling dry deposition by total particulate mass was selected, where 10% or more of the particles have a diameter equal to or greater than 10 microns (i.e. TSP).

Particle data were included in the model as shown in Table 6-2.

Table 6-2 Particle data used for dust deposition

Particle diameter (microns)	Mass fraction (0 to1)	Particle density (g/cm^3)
1.0	0.50	0.70
2.5	0.25	0.70
10.0	0.25	0.70

6.3 Dispersion modelling results

Table 6-3 to Table 6-6 show the predicted maximum ground level concentrations for PM_{10}, $PM_{2.5}$, TSP and dust deposition respectively. Predicted concentrations are presented as incremental (exclusive of background concentrations) and a percentage comparison to the assessment criteria is also included as part of the dispersion modelling results.

Predicted incremental GLC contour figures are presented in Appendix B.

Table 6-3 demonstrates predicted maximum incremental (no background) 24-hour and annual PM_{10} concentrations comply with the relevant criteria at all sensitive receptors during Project operations.

Table 6-3 Predicted PM_{10} concentrations

Sensitive receptor	Max. 24-hour PM_{10}	Percent of criteria	Annual PM_{10}	Percent of criteria
	50 µg/m^3 (Air NEPM)		25 µg/m^3 (Air NEPM)	
R01	12	24%	0.7	3%
R02	14	28%	1.5	6%
R03	8	16%	1.0	4%

Table 6-4 demonstrates predicted maximum incremental (no background) 24-hour and annual $PM_{2.5}$ concentrations comply with the relevant criteria at all sensitive receptors during Project operations.

Table 6-4 Predicted $PM_{2.5}$ concentrations

Sensitive receptor	Max. 24-hour $PM_{2.5}$	Percent of criteria	Annual $PM_{2.5}$	Percent of criteria
	25 µg/m^3 (Air NEPM)		8 µg/m^3 (Air NEPM)	
R01	5	20%	0.4	5%
R02	7	28%	0.8	10%
R03	3	13%	0.5	6%

Table 6-5 shows predicted maximum 24-hour TSP concentrations exceed the Kwinana EPP criteria at R02, but comply with the criteria at R01 and R03 during Project operations. An investigation into subsequent highest predicted concentrations showed only the highest concentration exceeded the Kwinana EPP criteria at R02. The second highest concentration at R02 was 49 µg/m^3 (Figure B-3). Therefore, exceedances are predicted to occur no more than 1 day in the year. It is important to also mention that exceedances occur when worst case meteorological conditions as well as worst case emissions align, which is less likely to occur in reality. Furthermore, this modelling assessment did not include watering as a dust mitigation measure, however, it is anticipated that watering of the haul road, and watering during drill and blast operations will reduce emissions of dust.

Predicted annual TSP concentrations comply with the NSW AMMAAP annual criteria at all sensitive receptors.

Table 6-5 Predicted TSP concentration

Sensitive receptor	Max. 24-hour TSP	Percent of criteria	Annual TSP	Percent of criteria
	90 µg/m^3 (Kwinana EPP)		90 µg/m^3 (NSW AMMAAP)	
R01	84	93%	3	4%
R02	93	103%	5	5%
R03	22	24%	2	2%

Table 6-6 demonstrates predicted maximum monthly increase and total monthly dust (TSP) deposition comply with the relevant criteria at all sensitive receptors during Project operations.

Table 6-6 Predicted dust deposition

Sensitive receptor	Max. monthly increase	Percent of criteria	Max. total monthly deposition	Percent of criteria
	2 µg/m^2/month (NSW AMMAAP)		4 µg/m^2/month (NSW AMMAAP)	
R01	0.04	2%	0.04	1%
R02	0.08	4%	0.08	2%
R03	0.04	2%	0.04	1%

7. Conclusion

7.1 Discussion

From the modelling results in Section 6.3 it is evident that predicted maximum and annual concentrations of PM_{10}, $PM_{2.5}$ and dust deposition comply with the relevant criteria at the sensitive receptors during Project operations. The predicted maximum 24-hour concentration of TSP exceeded the Kwinana EPP criteria at R02, but complied at R01 and R03. Subsequent highest concentrations complied comfortably with the Kwinana EPP criteria. Predicted annual concentrations of TSP comply with the NSW AMMAAP criteria.

It is likely that dust concentrations will be reduced in reality, compared to concentrations shown in this assessment, as watering of haul roads and watering during drill and blast operations will occur as required. The minimum NPI control efficiencies for watering exceed Simcoa's water licence and hence a worst case scenario was assumed, with watering excluded from dust mitigation methods.

7.2 Concluding remarks

This report assessed impacts of dust emissions associated with the operation of Simcoa's existing Moora Mine and proposed North Kiaka Mine. Predicted concentrations of PM_{10}, $PM_{2.5}$ TSP and dust deposition were compared to relevant air quality criteria including *National Environment Protection (Ambient Air Quality) Measure, Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999*, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* and conditions set out in Licence L6149/1988/8.

Predicted results showed that maximum 24-hour concentrations of TSP exceed air quality criteria at one out of three sensitive receptors during Project operations. Note that watering of haul roads and during drill and blast methods was not included in the assessment, however will be implemented in reality as required. All other averaging periods and pollutants were predicted to comply with the respective criteria.

As a result of the dispersion modelling assessment, emissions associated with the operation of the Project are not expected to adversely affect local air quality, with the exception of a potential exceedance of TSP up to one day in the year. This would occur when worst case meteorological conditions align with worst case emissions, the likelihood of which is low in reality.

References

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Appendices

Appendix A – Sample AERMOD configuration file

*** MODELOPTs: RegDFAULT CONC ELEV RURAL

*** MODEL SETUP OPTIONS SUMMARY ***

**Model Is Setup For Calculation of Average CONCentration Values.

-- DEPOSITION LOGIC --

**NO GAS DEPOSITION Data Provided.

**NO PARTICLE DEPOSITION Data Provided.

**Model Uses NO DRY DEPLETION. DRYDPLT = F

**Model Uses NO WET DEPLETION. WETDPLT = F

**Model Uses RURAL Dispersion Only.

**Model Uses Regulatory DEFAULT Options:

1. Stack-tip Downwash.
2. Model Accounts for ELEVated Terrain Effects.
3. Use Calms Processing Routine.
4. Use Missing Data Processing Routine.
5. No Exponential Decay.

**Other Options Specified:

CCVR_Sub - Meteorological data includes CCVR substitutions

TEMP_Sub - Meteorological data includes TEMP substitutions

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of: PM_10

**Model Calculates 2 Short Term Average(s) of: 1-HR 24-HR
and Calculates ANNUAL Averages

**This Run Includes: 23 Source(s); 1 Source Group(s); and 2605 Receptor(s)

with: 0 POINT(s), including
0 POINTCAP(s) and 0 POINTHOR(s)
and: 23 VOLUME source(s)
and: 0 AREA type source(s)
and: 0 LINE source(s)
and: 0 OPENPIT source(s)
and: 0 BUOYANT LINE source(s) with 0 line(s)

**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date: 16216

**Output Options Selected:
Model Outputs Tables of ANNUAL Averages by Receptor
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs External File(s) of Concurrent Values for Postprocessing (POSTFILE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 10.00 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0

Emission Units = GRAMS/SEC ; Emission Rate Unit Factor = 0.10000E+07

Output Units = MICROGRAMS/M**3

**Approximate Storage Requirements of Model = 4.2 MB of RAM.

**Detailed Error/Message File: PM10.err

**File for Summary of Results: PM10.sum

*** MODELOPTs: RegDFAULT CONC ELEV RURAL

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***

(1=YES; 0=NO)

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***

(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** MODELOPTs: RegDFAULT CONC ELEV RURAL

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: Simcoa_AERMET.SFC Met Version: 16216

Profile file: N.PFL

Surface format: FREE

Profile format: FREE

Surface station no.: 0 Upper air station no.: 999

Name: UNKNOWN Name: UNKNOWN

Year: 2014 Year: 2014

First 24 hours of scalar data

YR MO DY JDY HR H0 U* W* DT/DZ ZICNV ZIMCH M-O LEN Z0 BOWEN ALBEDO REF WS WD HT REF TA HT

- -

14 05 01 121 01 -33.4 0.342 -9.000 -9.000 -999. 479. 128.5 0.15 5.78 1.00 3.70 155. 10.0 282.4 10.0

14 05 01 121 02 -32.4 0.332 -9.000 -9.000 -999. 460. 121.3 0.15 5.78 1.00 3.60 157. 10.0 282.6 10.0

14 05 01 121 03 -30.5 0.313 -9.000 -9.000 -999. 420. 107.7 0.15 5.78 1.00 3.40 148. 10.0 282.9 10.0

14 05 01 121 04 -34.3 0.351 -9.000 -9.000 -999. 500. 135.8 0.15 5.78 1.00 3.80 144. 10.0 282.9 10.0

14 05 01 121 05 -35.2 0.361 -9.000 -9.000 -999. 520. 143.3 0.15 5.78 1.00 3.90 150. 10.0 283.0 10.0

14 05 01 121 06 -33.3 0.342 -9.000 -9.000 -999. 480. 128.5 0.15 5.78 1.00 3.70 150. 10.0 282.8 10.0

14 05 01 121 07 -27.7 0.284 -9.000 -9.000 -999. 365. 88.9 0.15 5.78 1.00 3.10 132. 10.0 283.0 10.0

14 05 01 121 08 -13.1 0.309 -9.000 -9.000 -999. 412. 197.8 0.15 5.78 0.49 3.30 145. 10.0 284.2 10.0

14 05 01 121 09 87.8 0.486 0.500 0.005 50. 814. -115.1 0.15 5.78 0.33 4.80 130. 10.0 286.9 10.0

14 05 01 121 10 178.4 0.600 1.451 0.005 603. 1114. -106.4 0.15 5.78 0.28 5.90 116. 10.0 289.2 10.0

14 05 01 121 11 243.6 0.582 1.816 0.005 866. 1068. -71.3 0.15 5.78 0.26 5.60 119. 10.0 291.4 10.0

14 05 01 121 12 280.1 0.604 2.077 0.005 1126. 1127. -69.2 0.15 5.78 0.26 5.80 126. 10.0 292.8 10.0

14 05 01 121 13 285.2 0.588 2.228 0.005 1366. 1082. -62.5 0.15 5.78 0.25 5.60 122. 10.0 293.6 10.0

14 05 01 121 14 263.5 0.567 2.285 0.005 1594. 1027. -60.9 0.15 5.78 0.26 5.40 129. 10.0 294.4 10.0

14 05 01 121 15 195.7 0.585 2.171 0.005 1842. 1073. -89.9 0.15 5.78 0.27 5.70 136. 10.0 294.4 10.0

14 05 01 121 16 126.5 0.565 1.960 0.005 2096. 1020. -125.2 0.15 5.78 0.30 5.60 136. 10.0 293.9 10.0

14 05 01 121 17 29.4 0.488 1.274 0.005 2476. 824. -347.1 0.15 5.78 0.40 5.00 129. 10.0 292.8 10.0

14 05 01 121 18 -31.9 0.342 -9.000 -9.000 -999. 497. 128.7 0.15 5.78 0.74 3.70 129. 10.0 291.0 10.0

14 05 01 121 19 -26.2 0.275 -9.000 -9.000 -999. 349. 83.1 0.15 5.78 1.00 3.00 138. 10.0 288.9 10.0

14 05 01 121 20 -37.4 0.390 -9.000 -9.000 -999. 585. 167.4 0.15 5.78 1.00 4.20 153. 10.0 287.9 10.0

14 05 01 121 21 -30.1 0.313 -9.000 -9.000 -999. 424. 107.8 0.15 5.78 1.00 3.40 150. 10.0 286.6 10.0

14 05 01 121 22 -37.7 0.390 -9.000 -9.000 -999. 584. 167.3 0.15 5.78 1.00 4.20 152. 10.0 285.4 10.0

14 05 01 121 23 -29.4 0.303 -9.000 -9.000 -999. 406. 101.3 0.15 5.78 1.00 3.30 134. 10.0 284.9 10.0

14 05 01 121 24 -32.1 0.332 -9.000 -9.000 -999. 459. 121.4 0.15 5.78 1.00 3.60 135. 10.0 285.1 10.0

First hour of profile data

YR MO DY HR HEIGHT F WDIR WSPD AMB_TMP sigmaA sigmaW sigmaV

14 05 01 01 10.0 1 155. 3.70 282.5 99.0 -99.00 -99.00

F indicates top of profile (=1) or below (=0)

*** MODELOPTs: RegDFAULT CONC ELEV RURAL

*** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER 1 YEARS ***

** CONC OF PM_10 IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	120.46654 AT (408576.00, 6626532.00, 252.10, 261.00, 0.00)	GC	UCART1
	2ND HIGHEST VALUE IS	57.63972 AT (408576.00, 6625932.00, 245.00, 259.00, 0.00)	GC	UCART1
	3RD HIGHEST VALUE IS	51.56772 AT (407376.00, 6623732.00, 230.90, 276.00, 0.00)	GC	UCART1
	4TH HIGHEST VALUE IS	36.50842 AT (408376.00, 6626532.00, 249.40, 258.00, 0.00)	GC	UCART1
	5TH HIGHEST VALUE IS	25.51083 AT (408176.00, 6625332.00, 229.00, 229.00, 0.00)	GC	UCART1
	6TH HIGHEST VALUE IS	20.50579 AT (408576.00, 6626732.00, 247.50, 247.50, 0.00)	GC	UCART1
	7TH HIGHEST VALUE IS	20.08050 AT (408376.00, 6625332.00, 225.20, 260.00, 0.00)	GC	UCART1
	8TH HIGHEST VALUE IS	17.10941 AT (408176.00, 6625532.00, 229.90, 229.90, 0.00)	GC	UCART1
	9TH HIGHEST VALUE IS	15.72338 AT (407376.00, 6623932.00, 226.60, 276.00, 0.00)	GC	UCART1

10TH HIGHEST VALUE IS 14.81955 AT (407576.00, 6623732.00, 240.00, 276.00, 0.00) GC UCART1

*** RECEPTOR TYPES: GC = GRIDCART

GP = GRIDPOLR

DC = DISCCART

DP = DISCPOLR

*** MODELOPTs: RegDFAULT CONC ELEV RURAL

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF PM_10 IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	9370.82537	ON 14072406: AT (408576.00, 6626532.00, 252.10, 261.00, 0.00)	GC	UCART1

*** RECEPTOR TYPES: GC = GRIDCART

GP = GRIDPOLR

DC = DISCCART

DP = DISCPOLR

*** MODELOPTs: RegDFAULT CONC ELEV RURAL

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF PM_10 IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	1162.83051	ON 14072424: AT (408576.00, 6626532.00, 252.10, 261.00, 0.00)	GC	UCART1

*** RECEPTOR TYPES: GC = GRIDCART

GP = GRIDPOLR

DC = DISCCART

DP = DISCPOLR

*** MODELOPTs: RegDFAULT CONC ELEV RURAL

*** Message Summary : AERMOD Model Execution ***

--------- Summary of Total Messages --------

A Total of 0 Fatal Error Message(s)

A Total of 0 Warning Message(s)

A Total of 507 Informational Message(s)

A Total of 8760 Hours Were Processed

A Total of 0 Calm Hours Identified

A Total of 507 Missing Hours Identified (5.79 Percent)

******** FATAL ERROR MESSAGES ********

*** NONE ***

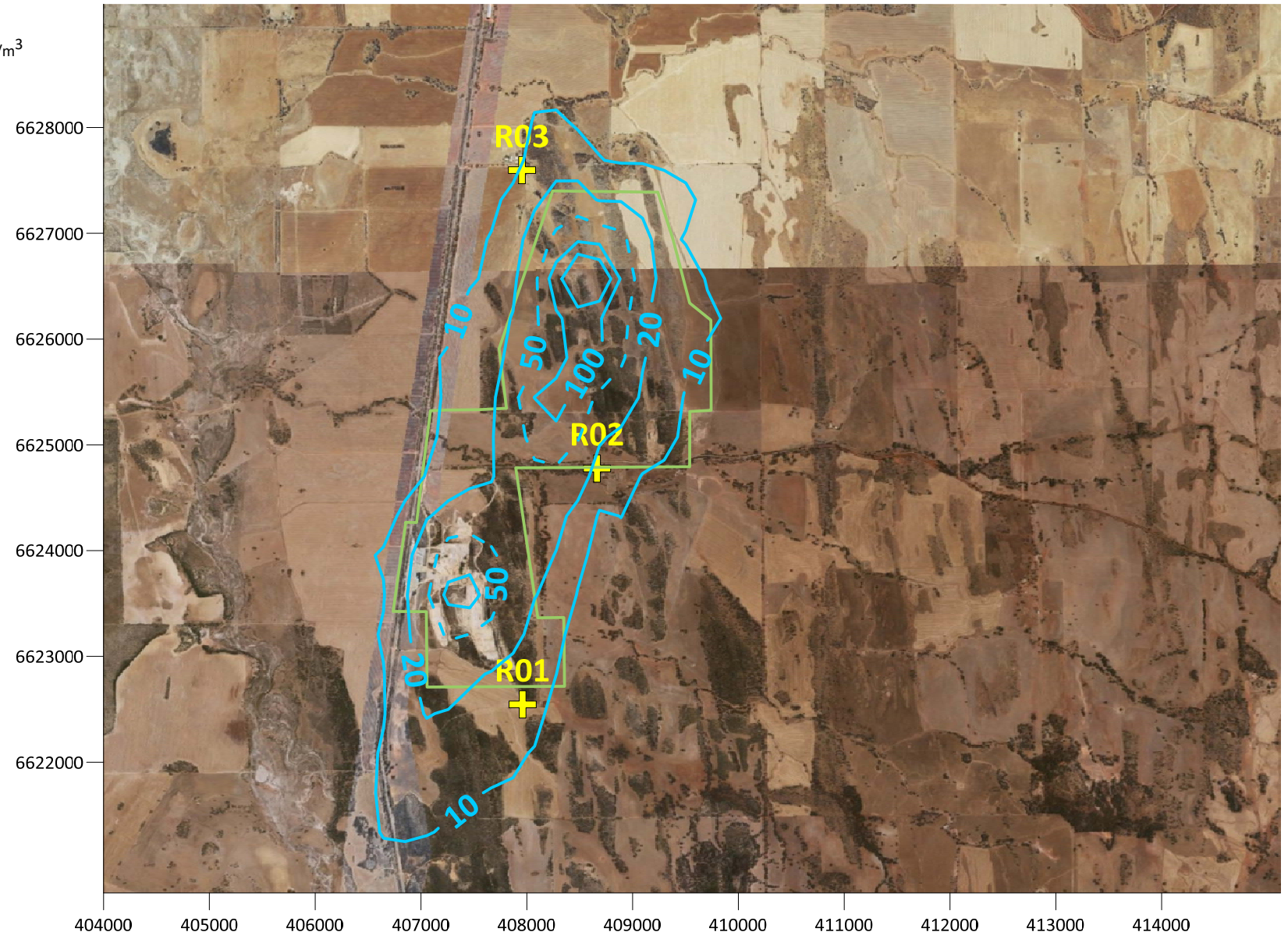
******** WARNING MESSAGES ********

*** NONE ***

Appendix B – Predicted ground level concentration contour figures

Criteria:

Air NEPM 50 µg/m^3



LEGEND

- Sensitive receptor
- Project boundary
- Maximum predicted PM_{10} concentration contours

Scale

0 1000 2000 3000

MAP PROJECTION: Universal Transverse Mercator

HORIZONTAL DATUM: Map Grid of Australia (MGA50) Zone 50 J

DATA SOURCE: LandGate (SLIP)

Simcoa Operations Pty Ltd
Simcoa s38 Environmental Approvals
Air Quality

GHD

FIGURE B-1

Predicted incremental maximum 24-hour PM_{10} concentrations

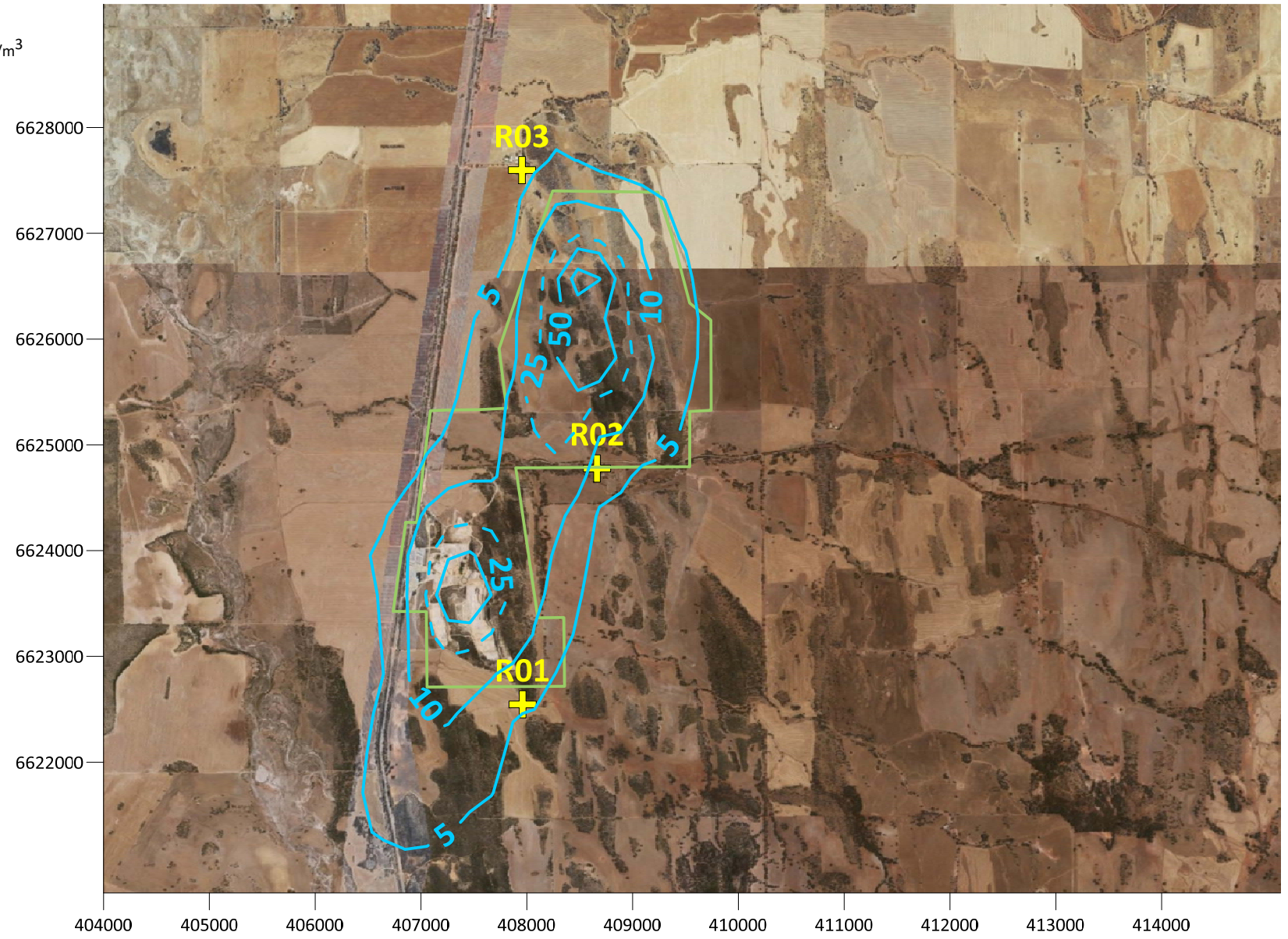
REVISION 0

DATE 06.08.2020

File path: \\ghdnet\ghd\AU\Perth\Projects\61\12518217\Tech\Air and Noise\Air assessment\06. WP\Surfer

CREATED	CHECKED	APPROVED
GF	JF	JF

Criteria:
Air NEPM 25 µg/m^3



LEGEND

- Sensitive receptor
- Project boundary
- Maximum predicted $PM_{2.5}$ concentration contours

Scale

0 1000 2000 3000

MAP PROJECTION:
Universal Transverse Mercator

HORIZONTAL DATUM:
Map Grid of Australia (MGA50)
Zone 50 J

DATA SOURCE:
LandGate (SLIP)

Simcoa Operations Pty Ltd
Simcoa s38 Environmental Approvals
Air Quality

FIGURE B-2

Predicted incremental maximum 24-hour $PM_{2.5}$ concentrations

REVISION 0

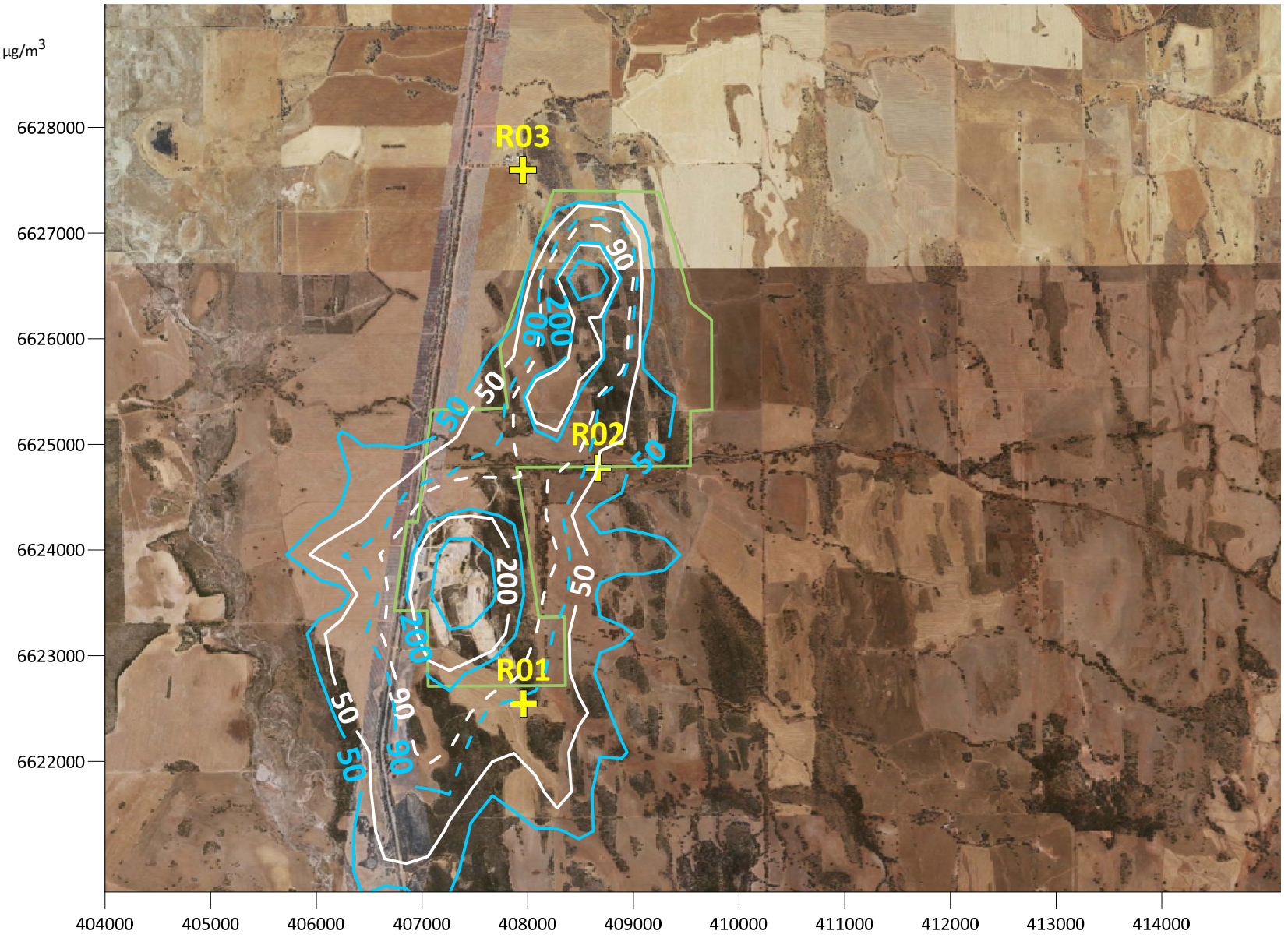
DATE 06.08.2020

File path: \\ghdnet\ghd\AU\Perth\Projects\61\12518217\Tech\Air and Noise\Air assessment\06. WP\Surfer

CREATED	CHECKED	APPROVED
GF	JF	JF

Criteria:

Kwinana EPP 90 µg/m^3



LEGEND

- Sensitive receptor
- Project boundary
- Maximum predicted TSP concentration contours
- 2nd highest predicted TSP concentration contour

Scale

0 1000 2000 3000

MAP PROJECTION: Universal Transverse Mercator

HORIZONTAL DATUM: Map Grid of Australia (MGA50) Zone 50 J

DATA SOURCE: LandGate (SLIP)

Simcoa Operations Pty Ltd
Simcoa s38 Environmental Approvals
Air Quality

FIGURE B-3

Predicted incremental maximum (and second highest) 24-hour TSP concentrations

REVISION 0

DATE 06.08.2020

File path: \\ghdnet\ghd\AU\Perth\Projects\61\12518217\Tech\Air and Noise\Air assessment\06. WP\Surfer

CREATED	CHECKED	APPROVED
GF	JF	JF

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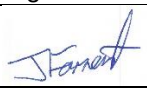
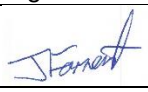
12518217-95338-91/https://projectsportal.ghd.com/sites/pp18_04/simcoas38environment/ProjectDocs/12518217-REP-A_Simcoa s38 air quality assessment update.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	G Formentin	J Forrest		J Forrest		18.08.2020

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