13

Air quality

13. Air quality

13.1 Introduction

This chapter summarises the baseline and potential air quality impacts arising from the Nolans Project on the surrounding environment and sensitive receptors. A detailed air quality impact assessment report including assumptions is provided in Appendix Q of this EIS.

Section 3.1.11 of the TOR for the project requires the following information in relation to air quality:

- *Inventory (name, composition and quantities) of Project generated air emissions, including from land disturbance, all processing circuits, disposal facilities, vehicles, plants and machinery*
- *Proposed monitoring regime and equipment*
- *Reporting requirements and compliance with relevant health and/or environmental standards*
- *Air quality target thresholds with reference to regulatory industry-standard, health-related safe-limits, or aspirational parameter levels* and
- *Proposed emission control methods, including dust suppression strategies and monitoring of potential dust impacts.*

Section 5.11 of the TOR requires the following environmental objective relating to air quality to be addressed:

- *Sensitive receptors of project generated emissions to air including dust, radon gas and processing plant emissions will be identified and protected from significant impacts.*

This chapter addresses potential impacts on air quality resulting from dust and processing plant emissions for all stages of the project.

Chapter 12 and Appendix P address potential impacts on environmental air quality resulting from radon gas and other radioactive emissions.

13.2 Overview

A summary of the approach to the air quality impact assessment is described below and more detail is provided in Appendix Q.

The pollutants of interest in this assessment are:

- Dust - particulate matter less than 10 microns (µm) in equivalent aerodynamic diameter (PM_{10})
- Total Suspended Particles (TSP)
- Dust deposition
- Sulfur dioxide
- Nitrogen dioxide and
- Carbon monoxide.

Assessment criteria for dust emissions resulting from the Project are summarised in Table 13-1. These criteria are from various jurisdictions around Australia (as indicated in the table) and are considered ‘industry standard’ for the assessment of particulate matter impact.

Table 13-1 Assessment criteria for dusts

Pollutant and jurisdiction	Averaging period	Return interval	Criterion
Total suspended particulates (NSW Approved Methods)	Annual	Maximum	90 µg/m^3
Particulates as PM_{10} (VIC Mining PEM)	24-hours	Maximum	60 µg/m^3 (for area sources)
Particulates as PM_{10} (VIC SEPP (AQM)	1-hour	99.9%ile Design GLC	80 µg/m^3 (for point sources)
Dust deposition (NSW Approved Methods)	Annual	Rolling 12-month average	2.0 g/m^2/month (increment) 4.0 g/m^2/month (maximum)

Site specific meteorological data and background air quality was required for dispersion modelling to predict the impact from mining operations. Baseline monitoring data for ambient dust was collected to provide an indication of ambient conditions (i.e. without mining) at the project site. Baseline data included:

- in-air concentrations collected on site during 2010 and 2011, and
- deposited dust sampling in the area around the proposed mining operations over five years from 2010 to 2015 that conformed to Australian Standards.

Site specific meteorological data was collected including onsite observational data and BoM data from 2011 to 2015 relating to monthly average temperature, relative humidity and wind dispersion

The existing conditions on site are summarised in Section 13.3 below and described in detail in Appendix Q.

13.3 Existing conditions

13.3.1 Climate

Temperatures follow the expected seasonal pattern of cycling between warmer temperatures in the summer (peaking in December-January) and cooler temperatures (lowest in July) in the winter.

Relative humidity was higher in summer and winter, whilst Spring had the lowest humidity. Rainfall followed a seasonal trend of a wet season in the summer to early autumn months, and dry conditions for the rest of the year. The spring months appear to be especially dry, suggesting this the most vulnerable period for poor dust conditions.

The prevailing wind direction is from the south-east with an average wind speed of 2.77 m/s, remaining fairly constant throughout the year. There are also a small proportion of winds from the north-east. In terms of poor dust conditions, the incidence of light winds is important for poor dispersion while the strongest winds create the most wind erosion. This suggests sensitive receptors west and north-west of the site would be the most vulnerable.

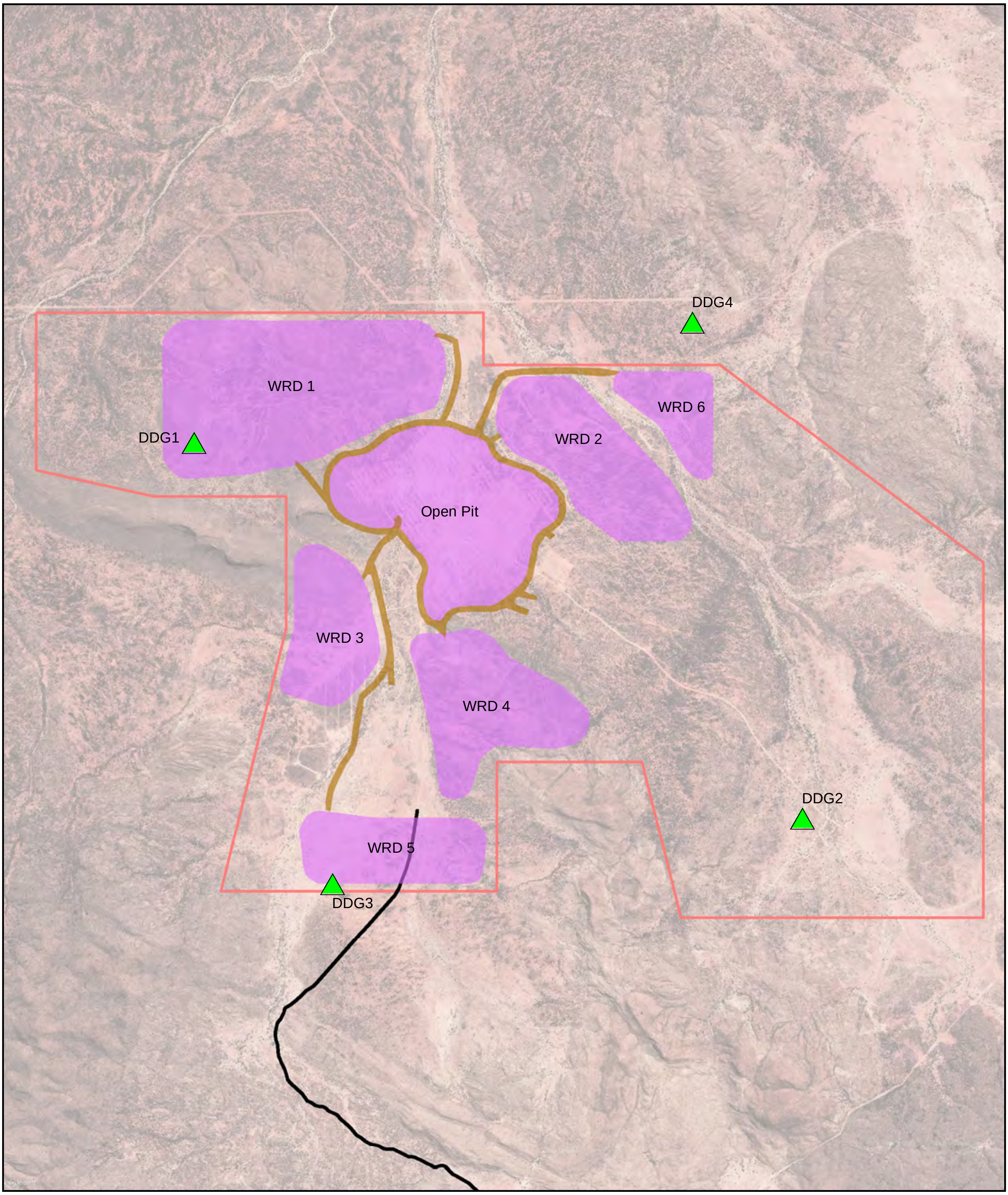
13.3.2 Dust deposition

Dust deposition gauges (DDG) located around the mine site (Figure 13-1) included:

- DDG1 – in the north-west
- DDG2 – in the south east
- DDG3 – in the south west and
- DDG4 - in the north – east.

Fourteen monthly events were recorded where levels of background dust deposition were above the 2.0 g/m^2/month assessment trigger as indicated in Figure 13-2. However, the average across the most continuous monitoring period indicates that all sites were below the annual 2.0 g/m2/month assessment criterion, as summarised in Table 13-2.

Site DDG2 in the southeast quadrant of the mine site, with the lowest value of less than 0.5 g/m^2/month, is the best indicator of the prevailing background dust for the region.



LEGEND

- Dust Deposition Gauge
- Access Road
- Dust Generation Source
- Haul Road
- Mine Site Boundary

1:40,000 @ A4
0 250 500 750 1,000
Metres
Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 53

N

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Nolans Project
Environmental Impact Statement

Job Number	43-22301
Revision	0
Date	13 Apr 2016

Dust deposition gauge locations

Figure 13-1

G:\43\22301\GIS\Maps\4322301_730_DDG.mxd

Level 5, 66 Smith Street Darwin NT 0800 Australia T 61 8 8982 0100 F 61 8 8981 1075 E drwmail@ghd.com W www.ghd.com

Data source: Google Earth Pro - Imagery (Date extracted: 07/03/2016). ARL - Project Areas (2015). GHD - DDG (2016). Created by: CM

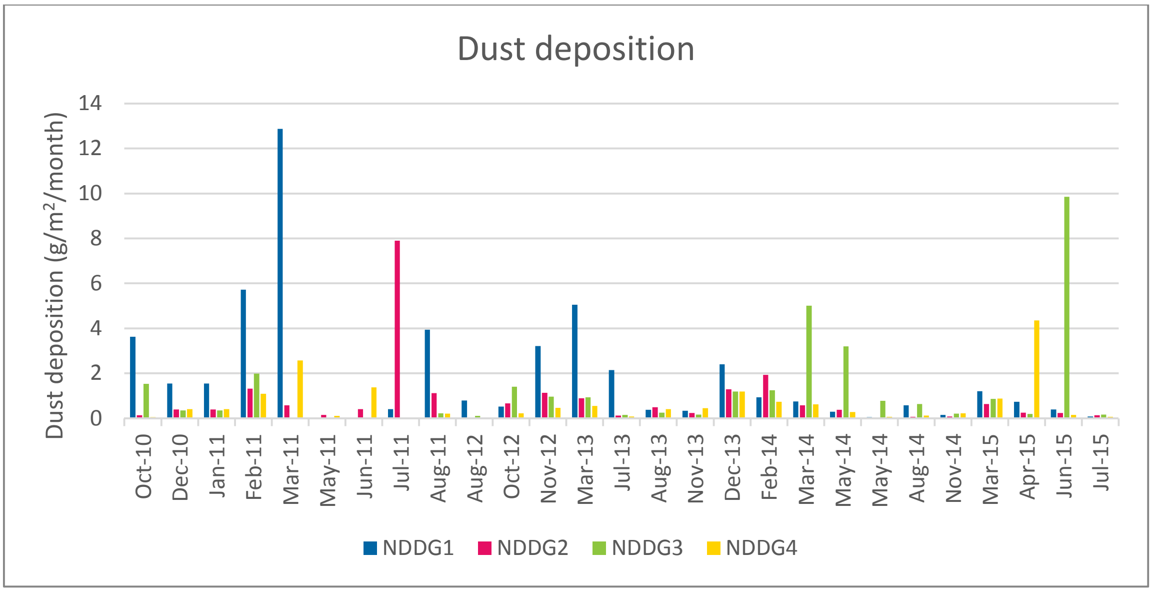


Figure 13-2 Dust deposition from October 2010 to July 2015

Table 13-2 Dust deposition results from October 2010 to July 2015

Monitor	Months where 2.0 g/m²/month is exceeded	12-month average (all data from November 2013 to July 2015 due to ad-hoc gaps in the data dating back to October 2010)
DDG1	8	0.66
DDG2	1	0.49
DDG3	3	1.96
DDG4	2	0.76

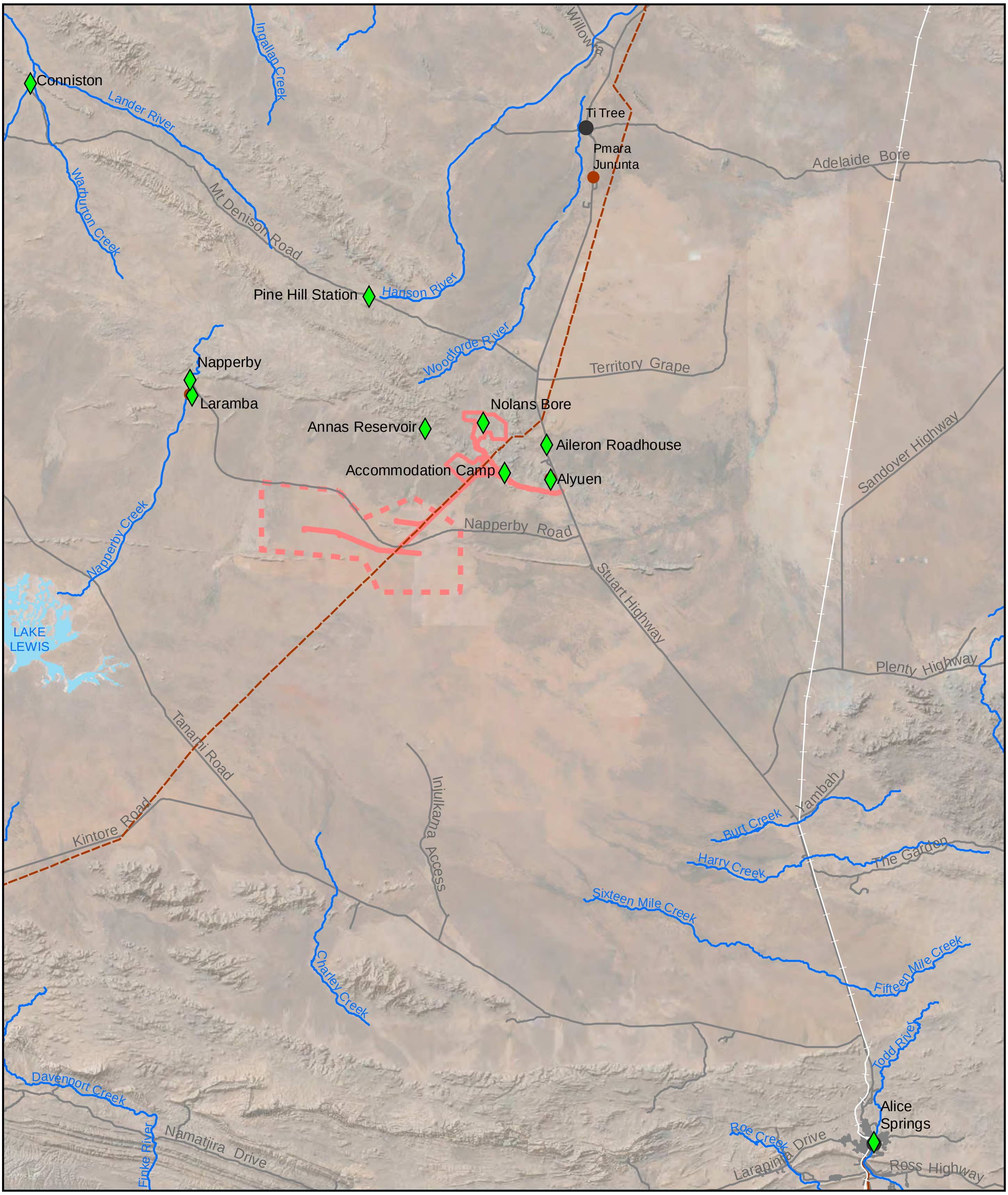
13.3.3 Dust (PM_{10}) monitoring

PM_{10} levels were below the regulation criterion of 60 µg/m³ for the full period monitored although a seasonal increase at the end of summer has been recorded.

Daily averages of PM_{10} were generally less than 20 µg/m³ up until 12 February 2011. After this date, levels increased and appeared to stabilise between 30 and 35 µg/m³. The earlier measurements are more consistent with the accepted non-urban PM_{10} levels found in Australia. The seasonal increase to over 30 µg/m³ is was likely due to local sources at the Aileron Roadhouse, including vehicle and heavy vehicle traffic on dry handstand surfaces, associated with drier and hotter conditions found in summer when during a period of little or no rain occurs.

13.3.4 Sensitive receptors

Communities and family outstations in the surrounding area are considered as sensitive receptors. The location of sensitive receptors considered in the air assessment are indicated in Figure 13-3 and listed in Table 13-3. Note the significant distances, double digit or more in kilometres off-site, from a nominal point of 'Nolans Bore'.



LEGEND

- Sensitive receptor
- Town
- Community
- Major Roads
- Gas Pipeline
- Major Waterways
- Project Areas
- Waterbodies

1:900,000 @ A4

0 10 20 30

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 53

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Arafura Resources Limited
Nolans Project
Environmental Impact Statement

Job Number	43-22301
Revision	0
Date	18 May 2016

Sensitive receptor locations

Figure 13-3

G:\43\22301\GIS\Maps\4322301_731_SensitiveReceptors.mxd

Level 5, 66 Smith Street Darwin NT 0800 Australia T 61 8 8982 0100 F 61 8 8981 1075 E drwmail@ghd.com W www.ghd.com

Data source: GA - Roads, Waterways, Placenames, Placenames, Lakes (2015). ESRI - Shaded Relief (2009). Google Earth Pro - Imagery (Date extracted: 15/12/2015). ARL - Project Areas (2015). GHD - Sensitive receptors (2016). Created by: CM

Table 13-3 Sensitive receptor locations

Site	Easting (mE)	Northing (mN)	Distance (km)
Nolans Bore	319070	7501720	0
Accommodation Camp	322800	7493100	9.4
Aileron Roadhouse	330000	7494900	13
Alyuen	330600	7492000	15
Alice Springs	386000	7378600	140
Pine Hill Station	299500	7523300	29
Laramba	269200	7506400	50
Napperby	268900	7509000	51
Conniston	241600	7559800	97
Annas Reservoir	309200	7500600	10

13.4 Emissions inventory

The emissions inventory for the project includes dust generating sources located at the mine site and gaseous generating sources located at the processing site.

13.4.1 Dust generating sources

Dispersion modelling was undertaken in alignment with the seven pit stages (i.e. as separate worst credible scenarios) where the year with the most material being moved about the site, i.e. a 'nominal year' from each pit stage, has been identified to represent the dust emissions from the mine operations over 41-years.

Table 13-4 Pit staging (Mtpa)

Stage[3]	Nominal year	Ore material types[1]		Ore from pit[1, 4]			To WRD[2]	To concentrator	
		0, 1, 2, 3	4, 5, 6	ROM[5]	LTS[6]	Reject[6]		ROM[5]	LTS[6]
1	1	0.36	0.083	0	0.4	0.05	4.4	0	0
2	8	1.8	0.25	0.7	1.26	0.1	2.8	0.71	0
3	10	0.22	0.48	0.36	0.29	0.1	2.3	0.36	0.74
4	11	0.65	0.77	0.73	0.39	0.3	8.6	0.73	0.37
5	20	0.71	1.14	1.0	0.4	0.4	8.1	1.01	0.09
6	31-35	0.53	1.29	0.6	0.3	0.1	8.9	0.62	0.39
7	38	0.24	0.31	0.2	0.3	0.003	9.4	0.25	0.65

Notes:

1. 'Ore material types' add to approximate 'ore from pit' total
2. 'Ore' plus 'waste' is mining rate – initially 5 Mtpa but then 10 Mtpa (year 11 and thereafter)

3. Approximately five haul trucks will be assigned to waste rock movement while four trucks will be used for the ore material – this ratio will change depending on operational requirements.
4. The ore is saturated below a depth of 12 m but will dry out naturally. The stockpiles will be located adjacent to the northern side of the ROM and will be within tramming distance of the front end loaders and can be watered if required to reduce dust emission
5. From the ROM, a front end loader will be used to tram material to the crusher
6. The LTS and Reject pads will be hardstand constructed from benign waste rock.
7. Tailings from the Reject pad will be relocated to a tailing dam east of the concentrator in the form of a liquid-solid. Some recovery of supernatant water is expected.

Mining

Dust generating sources include limited blasting, and use of excavators, dump trucks and dozers to mine the waste rock and ore within the open pit. It is envisaged that the ore will have high moisture content, and dust generation when mining will be lower than mining waste.

Hauling

Overburden and waste material will be transported out of the pit and deposited in purpose constructed WRDs. Ore will be transported out of the pit to the ROM or long term stockpile

Dust suppression for haul roads and operating areas (in pit as well as WRDs and ROM pad) will be required.

Stockpiles and concentrator

Ore will be processed through a plant producing a concentrate and a tailing product. The ROM plant feed will be rehandled once and will be processed soon after being mined. Lower grade material mined during the early years of the Project will be stockpiled off the ROM pad and rehandled twice – once from the Long Term Stockpile to the ROM, and again from the ROM to primary crusher.

After crushing the material will be wet. The crusher will include a dust suppression system.

The RE and phosphate concentrates will be combined as the feed material and the concentrate is pumped in a wet slurry to an intermediate processing site located immediately to the south of the mine lease area.

Tailings will be transferred to a TSF. The tailing will be wet and so dust emission from these will be insignificant except if they dry out around their edges.

Radiation will be emitted and these were modelled (to assist the Radiation Technical Report at Appendix P) as area sources from stockpile areas (waste rock and tails), processing and beneficiation plants as well as from the open pit, (a tracer methodology was used where Bq/s emissions replaced the usual g/s of air dispersion modelling).

Wind erosion

A topsoil storage with a footprint of 95 ha and height of three metres will be present. It will be used and refilled progressively as dumps are built and closed. Waste soil that is removed from dumps will be added into the stockpile for reuse.

More detailed information regarding dust generating sources is contained in Appendix Q.

13.4.2 Gaseous generating sources

RE intermediate plant

The RE intermediate plant will not be fully enclosed so there will be no need for ventilation stacks. All emissions will have purpose-built scrubbers to mitigate their respective type of emission.

Sulfuric acid plant

It is assumed that the sulfuric acid plant will have a 3/1 Arrangement – i.e. three catalyst beds before intermediate absorber followed by one catalyst bed. This is a standard arrangement for a modern contact sulfuric acid plant for obtaining SO_2 emissions of 4 lb/ST (2 kg/MT) or 99.7% conversion.

Power station

The normal operating natural gas fired generation requirement of approximately 12.5 MW is planned to be supplied by a group of combined cycle gas turbine based generators. The primary pollutants of concern from a gas-fired plant are nitrogen oxides and carbon monoxide. Emissions of particulate matter, sulfur dioxide and other substances were not considered due to a low emissions values and subsequent impacts being insignificant fractions of the respective pollutant criterion.

Key gaseous constituents from these major emitting point source was modelled (Appendix Q) to check compliance to ground level impact. Table 13-5 provides assessment criteria for these gaseous constituents and if plant achieves these compliance limits then other gaseous constituent pollutants will be within limits.

Table 13-5 Assessment criteria for gaseous emissions

Pollutant	Averaging period	Return interval (design GLC)	Criterion
Carbon Monoxide – CO (VIC SEPP (AQM))	1-hour	99.9%ile	29,000 µg/m^3
Nitrogen Dioxide – NO_2 (VIC SEPP (AQM))	1-hour	99.9%ile	190 µg/m^3
Nitrogen Dioxide – NO_2 (NSW Approved Methods)	Annual	Maximum	62 µg/m^3
Sulfur Dioxide – SO_2 (VIC SEPP (AQM))	1-hour	99.9%ile	450 µg/m^3

13.5 Modelled scenarios

Seven scenarios were modelled to represent the dust emissions from mine operations. A summary of these 'nominal year' stages is provided in Table 13-6.

Table 13-6 Summary of modelled mine operational stages uncontrolled wind erosion emissions factors

Stage	Representative Year	ROM Capacity (M-tonnes)	Long term stockpile (LTS) Capacity (M-tonnes)	Reject (M-tonnes)	Mining Rate (M-tonnes)	WRD (M-tonnes)	Uncontrolled PM10 Production Emissions (tonne/y)
1	1	0	0.4	0.05	4.8	4.37	1511
2	8	0.7	1.26	0.1	4.9	2.8	1629
3	10	0.36	0.29	0.1	1.9	2.3	1523
4	11	0.73	0.39	0.3	10	8.6	1759
5	20	1.0	0.4	0.4	10	8.1	1310
6	31-35	0.6	0.3	0.1	10	8.9	2026
7	38	0.2	0.3	0.003	10	9.4	1073

Uncontrolled dust sources

A breakdown of the estimated PM_{10} dust emissions for the stages was assessed, which found that the greatest single source of dust emissions is from haul trucks. The haul trucks are estimated to account for up to 62 per cent of production related PM_{10} emissions (maximum occurring in stage 1).

Dust emissions from haul trucks can be minimised using various control techniques, however, emissions from dumping waste rock have no controls. Only unquantifiable operational controls can be applied to waste rock dumping. These operational controls include gentle dumping of overburden on the WRDs.

Uncontrolled wind erosion

Uncontrolled PM_{10} dust emissions from exposed areas due to wind erosion accounted for approximately 10 per cent of the total dust emissions from the mine, during all stages of its life. As wind erosion has the potential to be the second largest individual dust source, implementing appropriate and effective control measures is important.

13.5.1 Dust control

Control techniques have been assumed and modelled for each of the sources identified at each stage of the mine operations. Some processes have no controls, while other dust sources can be reduced through the application of various measures, including full enclosure if required.

A summary of the controls applied for the air emissions modelling are provided in Table 13-7. Of the identified control measures, these have been applied and used to calculate emissions before and after application. A maximum 74 % reduction in emissions from production activities was found to be achievable with the application of the control measures as summarised in Table 13-8.

Table 13-7 Summary of applied controls (including pit retention)

Activity	Applied controls	Percentage reduction (%)
Graders	Moist soil	50
Excavators/shovels on overburden	None	0
Loading ore to trucks by shovel	None	0
Bulldozers on overburden	None	0
Unpaved haul roads	75% for level 2 watering (> 2 litres/m^2/h)	75
Blasting	None	0
Trucks dumping overburden	None	0
Loading primary crusher	Water Sprays	50
Wind erosion from stockpiles	Water sprays	50
Wind erosion (Active areas)	None	0
Pit Retention	-	50 % for TSP, 5 % for PM10

Table 13-8 Summary of PM_{10} dust emissions with maximum controls applied

Stage	Uncontrolled production emissions (tonne/y)	Controlled production emissions (tonne/y)	Percentage reduction (%)
1	1511	420	72
2	1629	469	71
3	1524	422	72
4	1760	515	71
5	1310	409	69
6	2027	530	74
7	1073	340	68

Pit retention factors

Pit retention control factors have been included. This type of control is a passive control, in that it acts due to the surrounding environment and does not have to be actively applied.

NPI (2012) default pit retention factors are applied to all pit emissions based on the following reduction factors:

- TSP – 50 per cent pit reduction (i.e. 50 % of TSP will not escape the pit) and
- PM_{10} – 5 per cent pit reduction.

Pit retention factors were applied to all dust sources, including wind erosion, from within any operational pit. This includes 50 per cent of the TSP emissions from the following sources:

- Haul roads
- Bulldozers on overburden and
- Graders.

Haul roads

As haul roads have been identified as being responsible for approximately 60 per cent of dust emissions due to active production, special attention has been applied to controlling these emissions. Level 2 watering, as described in NPI (2012) as greater than 2 litre/m^2/h was applied to reduce dust levels for the maximum emissions phase of the mine. Additionally, Arafura has identified the use of a road binding material that is able to achieve an 80 % reduction.

Wind erosion

No controls have been applied to wind erosion from active pits and the large areas of the WRDs.

13.6 Assessment of potential impacts

13.6.1 Mining operations

The pollutants of interest in this assessment of mining operations are:

- Total Suspended Particles (TSP) and
- Particulate matter less than 10 µm in equivalent aerodynamic diameter (EAD) (PM_{10}).

PM_{10}

Appendix Q provides the daily PM_{10} impact contours for each modelled scenario as the 99.9 percentile (Figures B1 to B7). These can be directly compared to the 60 µg/m^3 assessment criterion of Table 13-1.

All of the seven pit stage scenarios modelled show a PM_{10} impact area beyond the mine boundary to the north that extends for 2-4 kilometres. This impact area is across near-mine areas that are devoid of human-related sensitive receptor locations. All other criterion isolines in other directions are generally contained within the mine boundary.

Sensitive receptor locations such as the accommodation village, Aileron Roadhouse, Alyuen and (potentially) Annas Reservoir are well outside the assessment criterion contour. The modelling therefore indicates that human health impact from mining dust is within acceptable levels.

TSP

Appendix Q provides the annual average TSP impact contours (Figures B8 to B14) for each modelled scenario (average for all 8760 hours of 2014). These can be directly compared to the 90 µg/m^3 assessment criterion of Table 13-1.

For annual average TSP, all of the seven pit stage scenarios modelled generally show an impacted area contained within the mine boundary and also well within the PM_{10} daily impact. Pit stages 2 and 4 have marginal extensions of the assessment criterion beyond the northern boundary of the mine operations. This is due to the location of WRD 1 adjacent to the mine boundary and the prevailing south-east quadrant winds for the year. No sensitive receptor location would be adversely impacted.

Dust deposition

Annualised dust deposition impact contours for each modelled scenario are provided in Appendix Q (Figures B15 to B21). These can be directly compared to the 2 g/m^2/month incremental assessment criterion of Table 13-1.

All pit stage scenarios modelled for dust deposition, except stages 5 and 7, show an impacted area just beyond the mine boundary to the north that, however, does not extend as far as the daily PM_{10} impact. Once again, all of these are across near-mine areas that are devoid of sensitive receptors.

All other criterion isolines in other directions are generally contained within the mine boundary with the notable exception of on the western boundary when WRD 3 is in use ('nominal year' stages of 5 and 6).

13.6.2 Gaseous generating sources

Potential emissions considered in this assessment are listed in Table 13-9.

Table 13-9 Gaseous generating sources

Source	Emissions type
Sulfuric acid plant	sulfur dioxide
Power station	nitrogen oxides and carbon monoxide

Sulfur dioxide (SO_2)

The sulfuric acid plant has been assessed for SO_2 emissions and ground level concentrations only, as this is the major component in the tail gas exiting the stack. Appendix Q provides the SO_2 1-hour maximum, as the 99.9 percentile, GLC contours (Figure B22) and the annual average impact contours (Figure B23).

Impacts identified are within two to four kilometres to the south-west and south of the plant, while the annual average reflects the prevailing annual wind pattern with maximum impacts to the north-west. The stack height will be optimised in the design so that the relevant criterion will not be exceeded. At the nearest sensitive receptor location of the accommodation village the assessed impacts are well within the relevant criteria.

Carbon monoxide (CO) and Nitrogen dioxide (NO_2)

The Power Plant has been assessed for CO and NO_2 as a gas fired power plant burns 'cleaner' than for other (solid/liquid) fuels such as coal or diesel. It is universally found that the NO_2 constraint is the pollutant closest to any assessment criterion when the fuel type is natural gas.

Appendix Q provides the CO and NO_2 1-hour maximums, as the 99.9 percentile, GLC contours (Figures B24 and Figure B25, respectively) and the annual average NO_2 impact contours (Figures B26).

As expected, the same pattern as for SO_2 of hourly impacts to the south-west and west with annual impacts to the north-west ensues. In this instance, all of the criteria are at least an order of magnitude below the respective criteria. There is no need to optimise the stack height as a standard 12.5 m high stack is able to achieve the air quality regulated levels. Note that the impact of the power plant exhaust gases is very low at the accommodation village.

13.6.3 Discussion

Key risk pathways associated with air quality have been identified in the risk register for the project (Appendix F). These are discussed below, noting that the key impacts associated with mining dust moving and depositing away from sources, and the gaseous emissions from significant plant (acid and power) are the highest ranked risks. The lower ranked risk pathways were not quantitatively modelled.

- Haulage and transport of material within the Project area, along haul roads within the mine site, and along access tracks; and general site movements over unsealed surfaces resulting in generation and dispersion of particulate or dust
- Wind erosion mobilising dust from exposed surfaces, such as from pits, WRDs, TSFs and RSFs, laydown areas, stockpiles, roads and sites of vegetation clearing
- Drilling, blasting, excavation and materials handling at the mine site during operations results in dispersion of particulates and dust from the mine site (PM_{10})
- Operation of concentrator (comminution and beneficiation circuits) at the mine site, resulting in dispersion of particulate, gas or dust
- Operation of RE processing units, sulfuric acid plant and gas fired generators at the processing site results in dispersion of emissions
- Vehicle emissions and heavy equipment emissions results in impacts to air quality.

The operation of RE processing units (acid plant and power plant) that produce significant amounts of gaseous pollutants have been shown to be well within compliance limits.

As expected, and identified in the risk register, the downwind dispersion of dust has the greatest impact when considering the assessment criteria (Table 13-1, 2.0 g/m^2/month). As usual for large-scale open–pit mining, it is the dust-in-air concentrations rather than the amenity impact of dust deposition that are above nominal compliance limits for greater distances. However, due to the lack of sensitive human receptor locations within the impact zones, the environmental impacts are considered low.

As dust has the greatest potential risk pathway to the air quality values surrounding the mining operations, an audit check on the modelled assessment is recommended as part of ongoing monitoring. A dust monitoring regime is discussed in the next section.

13.7 Mitigation and monitoring

13.7.1 Mitigation and control measures

An Air and Dust Management Plan will be implemented (Appendix X). This will comprise standard dust mitigation measures including:

- Continuous dust monitoring as required during preproduction and construction at site boundary and sensitive receptors

- Chemical or crushed rock treatment of roads (dust suppression for haul roads and operating areas is required to limit dust inhalation by pit personnel and provide safe visual operating conditions. To minimise water usage and subsequent bore field capital and operating costs, a chemical binding agent, would be used in operations)
- Implement road speed limits including lower speeds during highest of wind events
- Use of water sprays on haul roads and unsealed surfaces
- Schedule vehicle and heavy equipment maintenance as per Original Equipment Manufacturer (OEM) requirements
- Diesel fuel to meet Australian standards (for sulfur content)
- Minimise open areas exposed to wind erosion
- Topsoil striping to occur only during suitable wind and weather conditions
- Minimise time between top soil stripping and construction/mining operations. WRD footprints will be developed as required to minimise dust
- Wet ore before crushing and design controls such as use of hooded crusher, covered conveyor and an enclosed HPRG
- Sprays used on ore stockpiles (ROM and Low grade or long term) to limit dust generation
- Once ore is crushed the entire beneficiation process is wet to minimise dust generation
- Dust deposition gauges to monitor and audit the effectiveness of the Air and Dust Management Plan (Appendix X) and
- Controlled emissions release via stack and scrubber.

In the event that exceedances in dust occur implementation of additional management controls would include:

- Operational procedures to include review of weather conditions, wind directions, wind speeds, etc. and stop work if required.

Rehabilitation processes would include:

- Progressive stabilisation of cleared land as activities are completed to limit continued exposure of bare soils and
- Progressive rehabilitation of WRD to minimise exposed material and dust generation.

Plant will be designed to include emission controls (scrubbers) to minimise dispersion of emissions, including potentially:

- Low nitrous oxide burners in design
- Scrubbers installed to control sulfuric acid mist, as required and
- Specific controls for hydrogen flouride emissions

13.7.2 Monitoring

The baseline monitoring data for ambient dust for in-air concentrations and dust deposition would continue through the construction and operation phase of the mine. This would inform future assessments of impacts, based on changes to total dust and anolyte distributions across the network.

Monitoring would conform to Australian Standards and be comparable to US standards as much as is practicable, within the constraints of site access, security, mains power access and ongoing maintenance and servicing requirements.