

Appendix C – Air Quality and Dust Management Plan



Arafura Resources Limited
Nolans Project
Air Quality and Dust Management Plan

March 2016

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Table of contents

1.	Introduction	1
1.1	Purpose	1
1.2	Objective.....	1
1.3	Legislation and Guidelines.....	1
1.4	Previous Investigations.....	2
2.	Existing Conditions.....	3
2.1	Climate.....	3
2.2	Sensitive Receptors.....	6
2.3	Potential Dust and Pollutant Impacts	6
2.4	Ongoing Dust Monitoring.....	9
3.	Air and Dust Management.....	11
3.1	Key Activities, Risks and Impacts	11
3.2	Objective.....	12
3.3	Mitigation Measures	12
3.4	Trigger, Action and Response Plan.....	14
4.	Previous Period Performance.....	16
5.	References	17

Table index

Table 1-1	Summary of Air Quality Investigations	2
Table 2-1	Climate Summary from 1987 to 2015 (Source: BOM, Territory Grape Farm Station No. 015643)	3
Table 2-2	Sensitive Receptor Locations	6
Table 2-3	Potential Air Pollutants and Dust Sources.....	7
Table 2-4	Operations (Worst-case) Predicted Particle Concentrations at Receptors (GHD, 2016)	8
Table 2-5	Predicted CO, NO ₂ and SO ₂ Concentrations at Receptors	8
Table 2-6	Dust Deposition Gauges.....	9
Table 3-1	Key Activities, Risks and Impacts	11
Table 3-2	Air and Dust Objectives	12
Table 3-3	Mitigation Measures	12
Table 3-4	Trigger, Action and Response Plan.....	14

Figure index

Figure 2-1	Annual and Seasonal Wind Roses (Source: BOM, Territory Grape Farm Station No. 015643)	4
Figure 2-2	Annual Wind Roses (Source: Arafura Resources, Nolans AWS)	5
Figure 2-3	Dust Deposition Gauge Locations – Mine Site	10

Appendices

Appendix A – Risk Matrix

1. Introduction

1.1 Purpose

The Nolans Project involves several key activities with the potential to impact on air quality. Arafura Resources Limited (Arafura Resources) will manage Air quality and Dust emissions in accordance with the Air Quality and Dust Management Plan (AQDMP).

The purpose of the AQDMP is to provide a framework for environmental management. The Plan has been developed in accordance with NT EPA requirements and references Commonwealth air quality legislation.

The impacts of dust emissions fall under two categories, namely health and amenity as follows:

- Potential health impacts are attributable to the concentration of respirable particles in ambient air. Respirable particles of dust (PM_{10}) would have maximum impact under light winds and stable atmospheric conditions. These conditions most frequently occur overnight and very early in the morning. Greater amounts of dust can be generated from exposed surfaces under strong wind conditions which are associated with a neutral atmospheric stability.
- Presence of Total Suspended Particles (TSP), greater than 35 micron, is likely to affect amenity by way of reducing visibility (whilst in the air column) and by soiling of materials via dust deposition. Amenity impacts are most noticeable in high wind conditions, when larger particles may be entrained into the air column from erodible surfaces and transported a significant distance before being deposited and soiling surfaces. Mitigation of amenity related dust impacts would in turn act to reduce health impacts due to dust emissions.

1.2 Objective

The AQDMP has been established to minimise the health risk or loss of amenity due to emission of dust or pollutants from the Mine, Sulphuric Acid Plant or Power Station to the environment. The AQDMP has been designed to achieve this objective through the following process:

- Characterising and ranking potential impacts of major dust and air quality emission sources assisted by modelling of dust and air quality;
- Implementation of a dust prevention strategy including dust, mitigation measures and monitoring of dust impact; and
- Annual performance reviews against monitoring results to determine if additional mitigation measures are required.

1.3 Legislation and Guidelines

The AQDMP has been developed with reference to several industry standards and guidelines in relation to dust and pollutants. A summary of legislation and guidelines are provided below:

- National Environment Protection (Ambient Air Quality) Measure (Air NEPM);
- National Environment Protection (Air Toxics) Measure (Air Toxics NEPM);
- National Greenhouse and Energy Reporting Act 2007 (NGER Act);
- WA Environmental Protection Authority (EPA) criteria for total suspended particulates (TSP);
- Victoria Mining and Extractive Industries Protocol for Environmental Management (PEM) criteria for $PM_{2.5}$ and PM_{10} ;

- Victorian Environment Protection Authority (Vic EPA) Design Criterion for PM₁₀, CO, NO₂ and SO₂;
- Victorian State Environment Protection Policy (Air Quality Management) - EPA Victoria;
- National Standards for Air Quality - Australian Government, Department of the Environment and Heritage, 2005;
- Department of Sustainability, Environment, Water, Population and Communities, National Pollutant Inventory Emission Estimation Technique Manual for Mining Version 3.1 (January 2012);
- Department of Infrastructure 2013/2014 Standard Specification for Environmental Management; and
- EPA Victoria, Best Practice Environmental Management – Environmental Guidelines for Major Construction Sites.

1.4 Previous Investigations

A summary of previous investigations in air quality at the site is provided in Table 1-1.

Table 1-1 Summary of Air Quality Investigations

Report Title	Arthur	Date	Purpose
Air Quality (EIS, Appendix Q)	GHD	March 2016	<p>The assessment was undertaken to address NT EPA Terms of Reference. The report:</p> <ul style="list-style-type: none"> • Qualitatively assesses the likely level of dust generation and other pollutants associated with construction of the Project. • Models dust and emissions from the operation of the Project. • Assesses air quality impacts from the operation of the Project, including dispersion modelling and assessment against relevant air quality criteria. • Specifies intended air quality management and mitigation measures during establishment and operation of the Project to allow compliance with relevant air quality criteria.

2. Existing Conditions

2.1 Climate

The Bureau of Meteorology (BOM) Territory Grape Farm Station is situated approximately 40 km north east of the Mine Site (BOM Site No. 015643).

The Station has collected temperature and rainfall from 1987 to 2015. The data indicates the climate of the region is arid to semi-arid in nature with a mean annual rainfall of approximately 310 mm. This corresponds to a Desert or Grassland (hot persistently dry) climate classification. Rainfall generally falls over 30 days across the year predominately between October and March. However, rainfall in the region is highly variable.

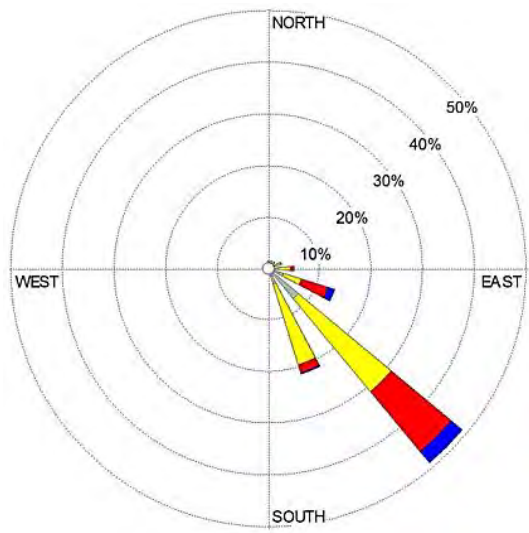
The average annual mean minimum and maximum temperature range from 5.1 to 21.9°C and 22.5 to 36.3°C respectively. The higher temperatures are generally experienced from October to March (corresponding with higher rainfall in the region – suggesting that most rainfall is from convectively driven weather systems with storms).

The winds at the Territory Grape Farm Station are predominant south easterly wind direction throughout the year. The average monthly wind speeds range from 2.50 to 3.17 m/s with an annual average of 2.86 m/s. An on-site Automatic Weather Station provides site-specific wind data for the Project. Average annual wind speeds have been measured at 2.77 m/s at the Site.

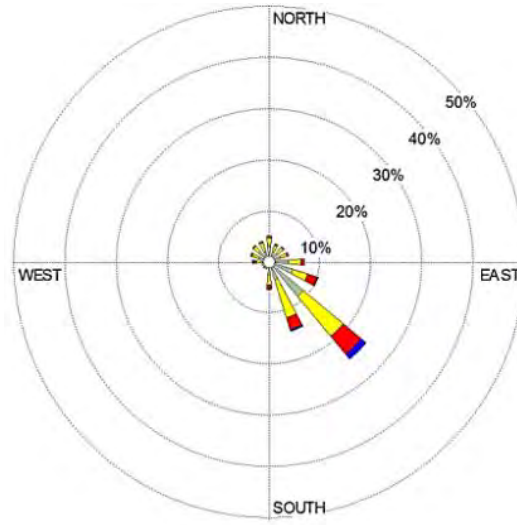
A summary of climate data is provided in Table 2-1 and wind rose are provided in Figure 2-1 and Figure 2-2.

Table 2-1 Climate Summary from 1987 to 2015 (Source: BOM, Territory Grape Farm Station No. 015643)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Temperature													
Mean Max (°C)	37.3	36.2	34.3	30.4	25.5	22.2	22.5	25.3	30.4	33.3	35.6	36.3	30.8
Mean Min (°C)	21.9	21.7	19.5	14.5	9.5	6.2	5.1	7.0	11.9	15.6	18.8	21.1	14.4
Rainfall													
Mean (mm)	62.4	65.8	21.0	18.0	22.5	8.6	4.7	4.6	10.0	14.7	30.9	50.5	312
Decile 5 (median) (mm)	44.2	33.8	10.2	3.0	1.0	1.6	0.0	0.0	1.6	7.1	19.1	40.7	298
Mean No. Days (≥1 mm)	4.3	4.7	2.1	1.5	2.2	1.2	0.7	0.8	1.0	2.7	3.9	4.9	30

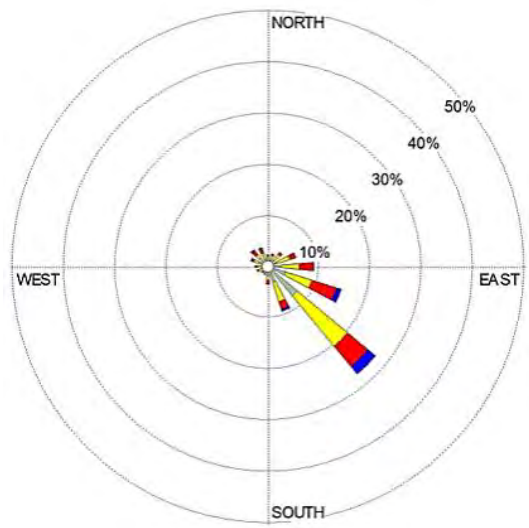


Spring (September – November)

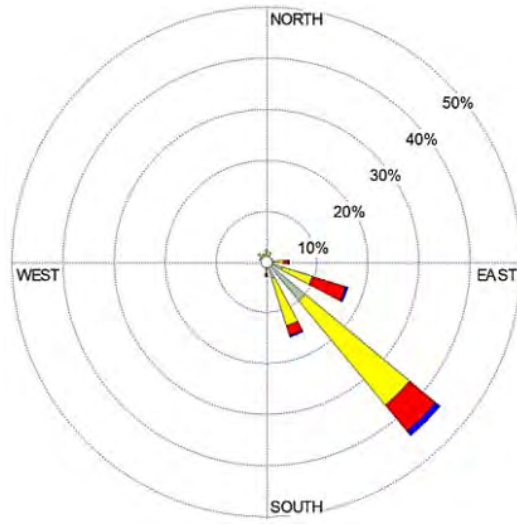


Summer (December – February)

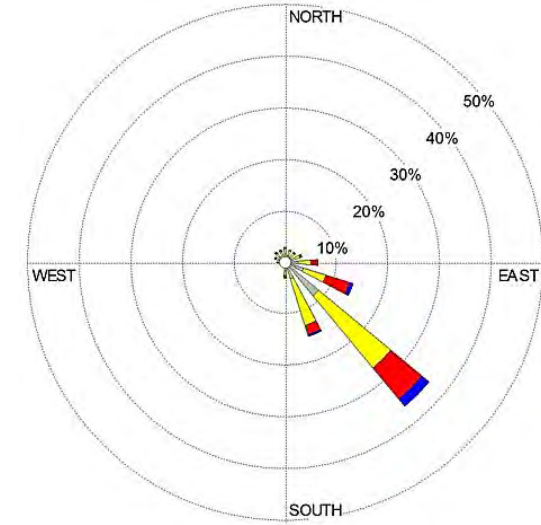
Wind Speed (m/s)	Average wind speed (m/s)
>= 10.0	Annual: 2.86
8.0 - 10.0	Spring: 3.17
6.0 - 8.0	Summer: 2.50
4.0 - 6.0	Autumn: 2.92
2.0 - 4.0	Winter: 2.84
0.0 - 2.0	



Autumn (March – May)



Winter (June – August)



Annual

Figure 2-1 Annual and Seasonal Wind Roses (Source: BOM, Territory Grape Farm Station No. 015643)

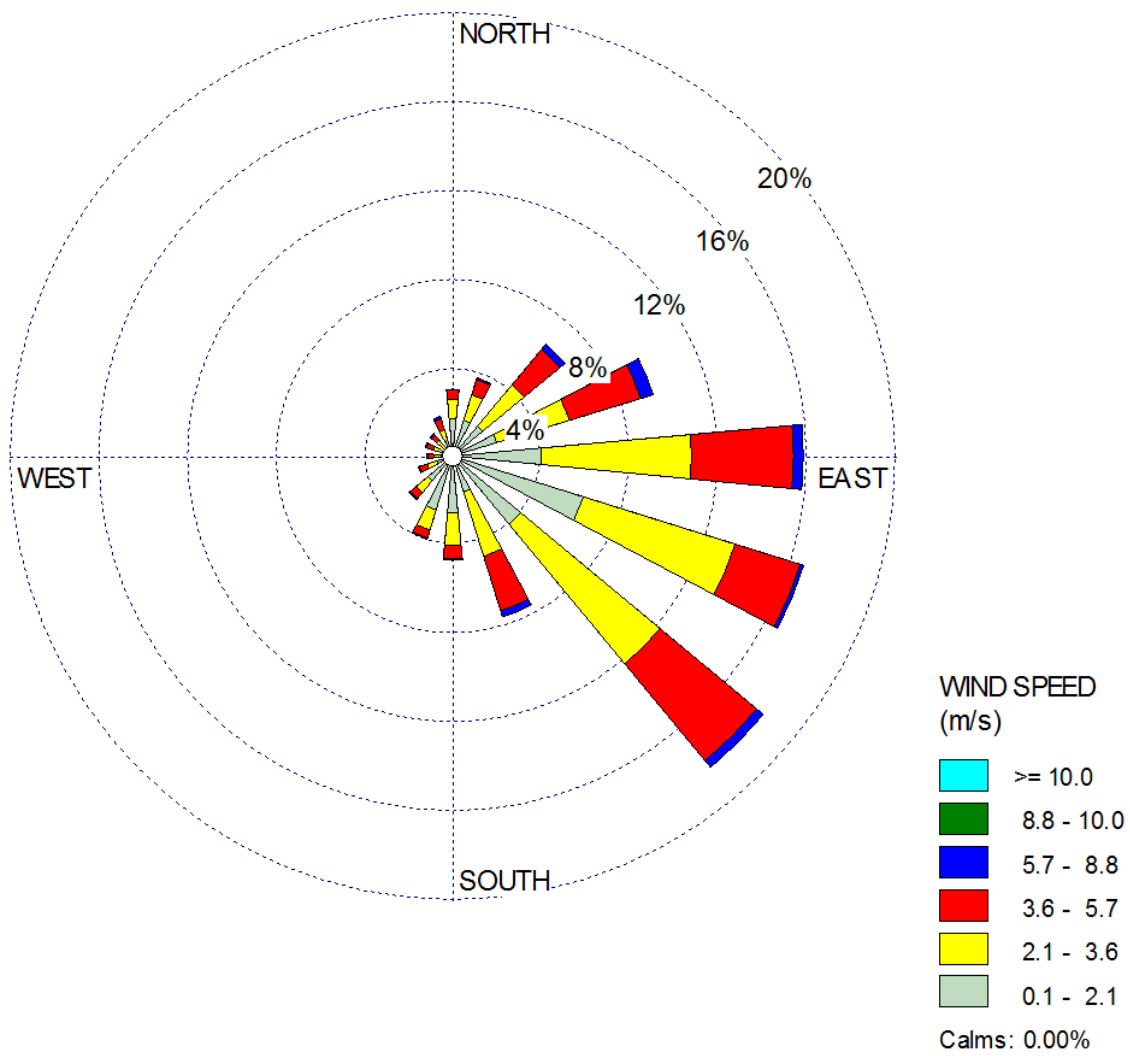


Figure 2-2 Annual Wind Roses (Source: Arafura Resources, Nolans AWS)

2.2 Sensitive Receptors

The Nolans Project Area lies within the Burt Plain bioregion. Land use immediately adjacent is pastoral activities. Existing infrastructure includes the Stuart Highway, the Amadeus Gas Pipeline, pastoral station tracks and wells for stock watering.

The nearest non-mining sensitive receptor is Aileron Roadhouse approximately 12 km to the east of the mine site. The access road is westward off the Sturt highway approximately 10 km to the west of the Alyuen community.

A number of sensitive receptors were identified in the wider region as listed in Table 2-2 .

Table 2-2 Sensitive Receptor Locations

Name	Coordinates		Distance from Mine (km)
	Easting	Northing	
Nolans Bore	319070	7501720	0
Accommodation Camp	322800	7493100	9.4
Annas Reservoir ^A	309200	7500600	10
Aileron Roadhouse	330000	7494900	12
Alyuen	330600	7492000	15
Pinehill Station	299500	7523300	29
Laramba	269200	7506400	50
Napperby	268900	7509000	50
Conniston	241600	7559800	97
Alice Springs	386000	7378600	135

Note: ^A Potential ad-hoc camping location.

2.3 Potential Dust and Pollutant Impacts

An assessment potential impact from dust and key pollutants from the Project were assessed as part of the EIS (EIS, Appendix Q). The assessment included the adjacent area to the Mine Site boundary and to the nearest sensitive receptors.

A United States Environmental Protection Agency (US EPA) approved CALPUFF dispersion model (version 5.8.4) was used to predicted particle concentrations at a grid around the Project and inclusive of the nearest sensitive receptor locations.

The dust model utilised on-site meteorological data obtained from Arafura Resources and activities input replicating worst-case total emissions for each of the seven pit and associated infrastructure stages.

2.3.1 Assessment Guideline Values

Dust

The dust assessment guideline values were adopted from the following references with the most conservative value utilised for the assessment:

- National Environment Protection (Ambient Air Quality) Measure (Air NEPM);
- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (NSW Approved Methods);
- Victorian State Environment Protection Policy (Air Quality Management) - EPA Victoria; and
- Victoria Mining and Extractive Industries Protocol for Environmental Management (PEM) criteria for PM_{2.5} and PM₁₀.

The levels are provided within the assessment in Table 2-4.

Pollutants

The pollutant guideline values for assessing stack emissions from the power station were adopted from the following reference with the most conservative value utilised for the assessment:

- National Environment Protection (Ambient Air Quality) Measure (Air NEPM);
- National Environment Protection (Air Toxics) Measure (Air Toxics NEPM); and
- Victorian State Environment Protection Policy (Air Quality Management) - EPA Victoria.

The levels are provided within the assessment in Table 2-5.

2.3.2 Sources

The modelling assessed the operational stages of seven pit stage scenarios including the initial establishment period. Mine site activities with potential to generate dust and pollutants were established and modelled. Activities included within the model are provided in Table 2-3.

Table 2-3 Potential Air Pollutants and Dust Sources

Source Type	Source Location
Dust	
Wind erosion.	Mine pit, long-term ore stockpiles, crushed ore stockpile, waste rock dumps.
Drilling of ore and waste rock.	Mine pit – ad hoc (limited).
Blasting of ore and waste rock.	Mine pit – assumed to occur every day (very conservative).
Loading ore and waste rock into haul trucks using excavators/shovels or front end loaders.	Mine pit.
Hauling ore and waste rock.	Haul roads from mine pit to the crushing plant, ROM long-term ore stockpiles and waste rock dump.
Unloading ore and waste rock from haul trucks.	Crushing plant, long-term ore stockpiles and waste rock dumps.
Dozing of waste rock and long-term ore stockpiles.	Waste rock dumps and long-term ore stockpiles.
Grading.	Haul roads and waste rock dumps.
Primary crusher.	Crushing plant.
Ore handling and transfer.	Crushing plant, crushed ore stockpile and crushed ore stockpile to processing plant via ore conveyor.
Pollutants	
Stack emissions including Nitrogen (NO _x) and Carbon Monoxide (CO).	Power Station.
Sulfur Dioxide (SO ₂).	Sulphuric Acid Plant.

2.3.3 Impacts

Construction

Construction activities were not modelled as part of the EIS process as the initial clearing activities are much smaller than when worst case operations are occurring for each pit stage scenario. Emission locations of dust during construction will consistently change throughout the program reducing potential persistent impacts across the establishment periods (clearing pit and dump areas and moving top soil to storage areas). Dust emissions during construction are not considered to represent a significant source of emission with mitigation measures as outlined in Section 3.3.

Operation

Modelled air emissions during the operation phase are unlikely to have an adverse impact, with particulate and other air pollutant concentrations below the assessment guidelines.

The predicted concentrations for CO, NO₂ and SO₂ at sensitive receptor locations are below the adopted assessment criteria. Impact contours for CO, NO₂ and SO₂ barely extend beyond the Project boundary.

A summary of predicted dust and pollutant impacts at sensitive receptors is provided in Table 2-4 and Table 2-5 respectively.

Table 2-4 Operations (Worst-case) Predicted Particle Concentrations at Receptors (GHD, 2016)

Receptor	PM ₁₀	TSP	Dust deposition
Averaging period	24-hour	Annual	Monthly
Rank	Highest	Max	Rolling 12-month average
Guideline	60 µg/m ³	90 µg/m ³	2.0 g/m ² /month (increment)
Source	VIC Mining PEM	NSW Approved Methods	NSW Approved Methods
Nolans Bore – on-site	842 (3)	401 (2)	6.6 (2)
Accommodation Village	<19.8 (6)	<16 (5)	<0.06 (2)
Annas Reservoir	<46.3 (4)	<27.8 (5)	<0.49 (2)
Aileron Roadhouse	<6.5 (6)	<5 (4)	<0.02 (2)
Alyuen	<6.5 (6)	<5 (4)	<0.02 (2)
Pinehill Station	<10.5 (2)	<6.7 (5)	<0.18 (2)
Laramba	BDL	BDL	BDL
Napperby	BDL	BDL	BDL
Conniston	BDL	BDL	BDL
Alice Springs	BDL	BDL	BDL

Note: PM₁₀: Particulate Matter < 10 µm.
TSP: Total Suspended Particulates.
BDL – Below Detection Limit (outside modelled grid).
'<' sign indicates beyond the model grid limits.
Bracket number indicates worst-case stage.

Table 2-5 Predicted CO, NO₂ and SO₂ Concentrations at Receptors

Receptor	CO	NO ₂ ¹		SO ₂
Averaging period	1-hour	1-hour	Annual	1-hour
Rank	99.9%ile	99.9%ile	Max-	99.9%ile
Guideline	29,000 µg/m ³	190 µg/m ³	62 µg/m ³	450 µg/m ³
Source	EPP (VIC EPA)	EPP (VIC EPA)	NSW Approved Methods	Air Toxics NEPM
Nolans Bore – on-site	14	3	< 1	132
Accommodation Village	7	2	< 1	105
Annas Reservoir	<9	< 1	< 1	<75
Aileron Roadhouse	11	2	< 1	<126
Alyuen	4	1	< 1	<65
Pinehill Station	<4	< 1	< 1	<59
Laramba	BDL	BDL	BDL	BDL
Napperby	BDL	BDL	BDL	BDL
Conniston	BDL	BDL	BDL	BDL
Alice Springs	BDL	BDL	BDL	BDL

Note: ¹ Taken as 30% of NO_x results.
BDL – Below Detection Limit – well outside modelled grid
'<' sign indicates beyond the model grid limits

2.4 Ongoing Dust Monitoring

A series of dust deposition gauges are present across the Mine Site that were utilised for the EIS assessment (EIS Appendix Q). The locations bound the Mine Site upwind (DDG2), adjacent (DDG2 and DDG3) and downwind (DDG1) with a fifth location to be installed at the nearest sensitive receptor (the Accommodation Village).

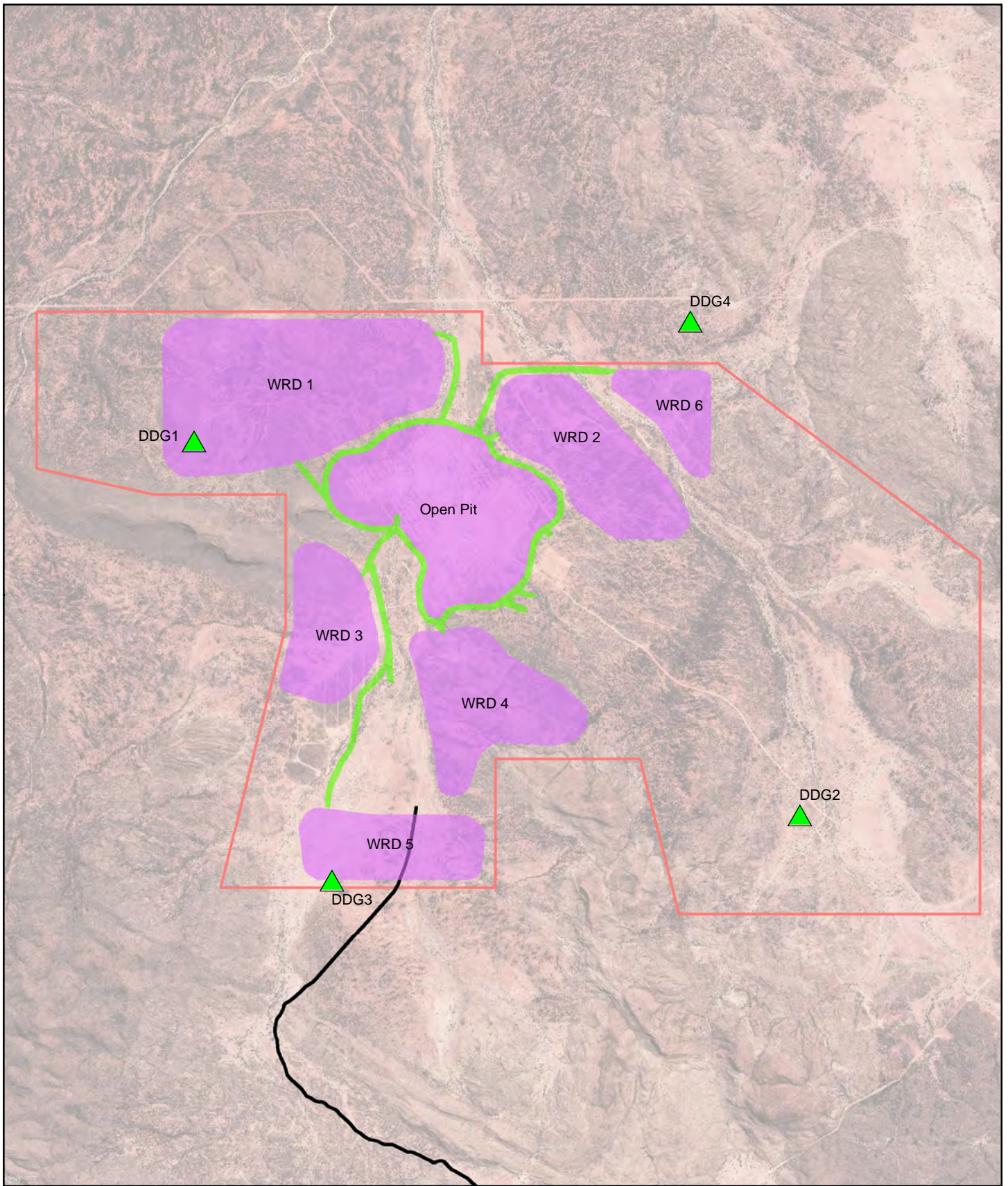
Dust deposition monitoring will be undertaken through the construction and operational phases. Samples will be analysed by an independent NATA Accredited Laboratory. A summary of the gauge locations and sample frequencies are provided in Table 2-6. Gauges DDG1 to DDG4 are illustrated in Figure 2-3.

Table 2-6 Dust Deposition Gauges

ID	Details	Sampling Frequency
DDG1	Downwind, currently situated to the southwest of Waste Rock Dump (WRD) 1.	Monthly
DDG2	Upwind, situated southeast of the Mine Site.	
DDG3	Adjacent, situated south of WRD 5.	
DDG4	Adjacent, situated north of WRD 6.	
DDG5	Accommodation Village (northeast boundary).	

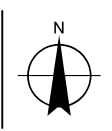
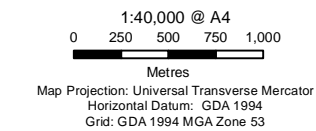
Note: DDG1 to be relocated outside of WRD 1 footprint prior to construction.

The onsite meteorological monitoring station will be utilised throughout the construction and operations phase to determine local wind conditions at the time of any high dust event.



LEGEND

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



Arafura Resources Limited
 Nolans Project

Job Number	43-22301
Revision	0
Date	18 Mar 2016

Dust Deposition Gauge Locations - Mine Site

Figure 2-3

3. Air and Dust Management

Air and dust management refers to previous monitoring and modelling carried out across the Project as detailed in Section 2. Management of air and dust is structured as follows:

- **Key Activities, Risks and Impacts:** A summary of the key activities being undertaken during the management period. The potential environmental impacts and residual risk levels are identified for each environmental aspect.
- **Objective:** The guiding environmental management objective(s) and activities that apply to the element.
- **Mitigation Measures:** The procedures to be employed to ensure that the relevant objectives are met.
- **Responsibility:** Nominates the responsible position for implementing actions and monitoring.
- **Trigger, Action, Response Plan (TARP):** The actions to be implemented in the case of non-compliance. This includes strategies of remediation and the person(s) responsible for the actions.

3.1 Key Activities, Risks and Impacts

The key activities and potential environmental impact have been identified for air and dust are listed in Table 3-1. The risk matrix is provided in Appendix A.

Table 3-1 Key Activities, Risks and Impacts

Activity	Potential Environmental Impact	Residual Risk Level		
		Consequence	Likelihood	Risk
Site establishment (including vegetation clearing and soil compaction) results in altered environment character and modification to ecological processes from construction of Project.	Dispersion of particulate matter in the air resulting in reduced air quality at nearby sensitive receptors or beyond the Project boundary with impacts to human health, in particular PM ₁₀ . Impacts from other particulate sizes (TSP) from dust fallout and deposition, including to flora and amenity at sensitive receptors.	Minor	Unlikely	Low
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 (TSP).	Dispersion of particulate matter (predominantly TSP, with some PM ₁₀) in the air resulting in reduced air quality at the Project boundary and/or at nearby sensitive receptors, with impacts to human health.	Moderate	Possible	Medium
Wind erosion mobilising dust from exposed surfaces, such as pits, waste dumps, tailings storage facility, residue storage facility, laydown areas, stockpiles, roads and sites of vegetation clearing.	Dispersion of particulate matter in the air (TSP and PM ₁₀), excluding radioactive material, resulting in reduced air quality at nearby sensitive receptors with impacts to human health. Impacts from dust fallout and deposition, including to flora, and amenity at sensitive receptors.	Minor	Possible	Medium

Activity	Potential Environmental Impact	Residual Risk Level		
		Consequence	Likelihood	Risk
Drilling, blasting, excavation and materials handling at the mine site during operations results in dispersion of particulates and dust.	Dispersion of particulate matter (excluding radioactive material) in the air from activity contained to the mine pit over typically limited time frames, resulting in reduced air quality at nearby sensitive receptors at or beyond the Project boundary with impacts to human health.	Minor	Unlikely	Low
Operation of concentrator (comminution and beneficiation circuits) at the Mine Site, resulting in dispersion of particulate, gas or dust.	Dispersion of particulate matter (TSP and PM ₁₀) in the air resulting in reduced air quality beyond the Project boundary or at nearby sensitive receptors with impacts to human health.	Minor	Rare	Low
Operation of RE processing units, sulfuric acid plant and gas fired generators at the Processing Site results in dispersion of emissions.	Emission of fine particles and gaseous pollutants from the processing site, including SO _x , NO _x , CO, fluoride compounds and sulfuric acid. Dispersion resulting in reduced air quality at nearby sensitive receptors (> 5 km) with impacts to human health.	Minor	Rare	Low
Vehicle emissions and heavy equipment emissions results in impacts to air quality.	Emissions of CO, NO _x , SO _x , Particles and Volatile Organic Compounds (VOC) released from combustion sources including earthmoving equipment, haul trucks and site vehicles. Dispersion resulting in reduced air quality beyond the Project boundary or at nearby sensitive receptors with impacts to human health.	Minor	Rare	Low
Operation of the gas fired power station.	Emissions from the stack potentially impacting the workforce and/or sensitive receptors.	Minor	Unlikely	Low

3.2 Objective

The air and dust management objectives have been established and are detailed in Table 3-2.

Table 3-2 Air and Dust Objectives

Objective	Target	Indicator
Minimise dust impacts at the Project.	No reports of dust impacts from the Project at sensitive receptors.	Number of incidents of dust deposition at selected sensitive receptor sites.
Minimise air pollutant impacts at the Project.	No reports of pollutant impacts from the Project at sensitive receptors.	Number of pollutant impacts/complaints at selected sensitive receptor sites.
	Utilise best practice for the management of the Power Station and Acid Plant with SCADA monitoring of stack emissions.	Number of stack emissions outside of design specification.

3.3 Mitigation Measures

Mitigation measures have been developed to minimise potential impacts associated to air quality and dust emissions. The mitigation measures, timing and responsibilities are provided in Table 3-3.

Table 3-3 Mitigation Measures

ID	Mitigation Measure	Timing	Responsibility
Site Induction			

ID	Mitigation Measure	Timing	Responsibility
AD1	Site induction will include the following components for air and dust management: <ul style="list-style-type: none"> Description of dust risks across the Project and areas of higher risk (i.e. adjacent to the Stuart Highway); and Requirement for speed restrictions across the Project. 	Site Induction	Environmental Officer
Water Cart / Water Spraying			
AD2	Water carts will operate across the Project during construction and operation.	Construction and Operation	Area Managers
AD3	Application of chemical binding agents on unsealed roads or large areas of disturbance may be considered for managing dust levels.		
AD4	Water trucks will spray ore during excavation where deemed necessary.		
Dust General			
AD5	Defined access roads and haul routes to be used.	Construction and Operation	Area Managers
AD6	Tailings will kept moist (dust emission insignificant).		
AD7	Stockpiles of soils across the Project will be managed to reduce dust emission including spraying with water or covering.		
AD8	Areas cleared which are no longer required and topsoil storage areas will be rehabilitated in accordance with the Closure and Rehabilitation Management Plan and Erosion and Sediment Control Plan.		
AD9	Access Road from the Mine Site to Stuart Highway will be sealed and maintained.	Operation	Area Managers
AD10	Offloading of waste and ore will be undertaken from minimum heights with water sprays utilised at high frequency dump locations (i.e. start of crushing circuit).		
Processing			
AD11	Ore to be sprayed with water prior to entering crushing circuit.	At all times	Area Managers
AD12	Float cells will be installed on the windward side of the crushing circuit and a dust suppression system over the jaw crusher.	At all times	Area Managers
AD13	Low grade ore stockpile to be managed to reduce dust emissions.	At all times	Area Managers
Air Pollutants General			
AD14	All construction and maintenance equipment/vehicles to be operated and maintained to manufacturer's specifications in order to minimise exhaust emissions.	Construction and Operation	Area Managers
AD15	Power Station stack height to be a minimum of 12.5 m and have an internal diameter of 0.6 m. Acid Plant stack height to be a minimum of 20 m and have an internal diameter of 1.36 m.	Design, Construction and Operation	Area Managers
Monitoring and Inspections			
AD16	Regular visual dust inspections of work areas to determine if additional dust suppression measures are required.	As required	Area Supervisors
AD17	Depositional dust gauges collection, replacement and laboratory assessment (NATA accredited) in accordance with Section 2.4.	Monthly	Environmental Officer
AD18	Monthly assessment of dust mitigation measures and laboratory data.	Monthly	Environmental Officer
AD19	Annual stack emission testing, assessment and recommendation for mitigation measures.	Annual	Environmental Officer
AD20	Annual Energy Efficiency Assessment.	Annual	Environmental Officer
AD21	Annual Air Quality and Dust Management Plan performance review (Section 4).	Annual	HSEC Manager

3.4 Trigger, Action and Response Plan

The Trigger, Action and Response Plan (TARP) provides an outline of remedial actions and responses to the situation. The TARP is outlined in Table 3-4.

Table 3-4 Trigger, Action and Response Plan

Responsibility	Situation		
	Standard	Level 1	Level 2
	Activities and associated dust emissions are contained within Project area.	Trigger: Dust complaint received but not validated.	Trigger: Dust complaint received and confirmed as valid.
Site Personnel	Comply with site inductions and mitigation measures outlined in Table 3-3.		
Environmental Officer and Area Supervisors	<ul style="list-style-type: none"> Regular visual inspections across Project to determine if additional measures are required. Monthly inspection and reporting of all dust control measures. 	<ul style="list-style-type: none"> Undertake an investigation of the complaint including an assessment of operations, weather conditions and visual observation of impact. Record as the Complaints Form (within Appendix A of the Environmental Management Plan). 	<ul style="list-style-type: none"> Undertake an investigation of the complaint including an assessment of operations, weather conditions and visual observation of impact. Review efficiency of dust mitigation measures and detail additional mitigation measures and associated monitoring at sensitive receptors (including complainant location where appropriate).
Construction Manager and Area Manager	<ul style="list-style-type: none"> Review reports and determine if additional measures are to be implemented. 	<ul style="list-style-type: none"> Provide feedback to complainant. 	<ul style="list-style-type: none"> Review and implement additional dust mitigation measures provided by the HSEC Manager. Provide feedback to complainant.
	Activities and associated dust emissions are contained within Project area.	Trigger: Monthly Dust Deposition Gauge (DDG) exceeds 4 g/m ² /month OR one or more incremental monthly values (DDG value less background – the minimum of the monthly DDG) exceeds 2 g/m ² /month.	Trigger: Rolling 12-month Dust Deposition Gauge (DDG) exceeds 4 g/m ² /month OR one or more incremental values (DDG value less background – the minimum of the monthly DDG) exceeds 2 g/m ² /month.
Environmental Officer	<ul style="list-style-type: none"> Regular visual inspections across Project to determine if additional measures are required. Monthly reporting of all dust deposition gauge monitoring. 	<ul style="list-style-type: none"> Undertake an investigation of the exceedance including an assessment of operations and prevailing weather conditions. 	<ul style="list-style-type: none"> Undertake an investigation of the exceedance including an assessment of operations and prevailing weather conditions. Review efficiency of dust mitigation measures and detail additional mitigation measures to be considered.
Area Manager	<ul style="list-style-type: none"> Review reports and determine if additional measures are to be implemented. 	<ul style="list-style-type: none"> Provide feedback to HSEC Manager. 	<ul style="list-style-type: none"> Review and implement additional dust mitigation measures provided by the HSEC Manager.
	Annual stack emission test within operational limits.	Trigger: Stack emission tests indicate concentrations exceed design criteria by 20%	Trigger: Stack emission tests indicate concentrations exceed design criteria by 50%
Environmental Officer	<ul style="list-style-type: none"> Schedule and manage subcontractor to undertake annual testing of the power station stacks. Stack sampling is to comply with the 	<ul style="list-style-type: none"> Assess subcontractors report and recommendations. Evaluate the viability of mitigation measures and produce summary report for HSEC and Area Manager. 	

	Victorian EPA Guideline "A Guide to the Sampling and Analysis of Air Emissions and Air Quality".	
Area Manager	-	<ul style="list-style-type: none"> • Review summary report of emissions failure and potential mitigation measures. • Determine in consultation with the subcontractor and HSEC Manager what remedial works will be undertaken.

4. Previous Period Performance

No previous period performance data is available for review.

5. References

EPA Vic, 1996. Best Practice Environmental Management - Environmental Guidelines for Major Construction Sites. Melbourne, February 1996.

GHD, 2015. Air Quality Technical Report (Document No. G:\43\22301\WP\36700.docx).

Bureau of Meteorology (BOM), 2015. Climate Statistics for Australian Locations - Monthly Climate Statistics – All Years of Record – Territory Grape Farm.

http://www.bom.gov.au/climate/averages/tables/cw_015643.shtml. Accessed 5 May 2015.

Appendices

Appendix A – Risk Matrix

An environmental risk assessment was undertaken for the Nolans Project and associated construction, operation and closure. The risk assessment identified the risk source (hazard and event), receptors and potential impact. The consequence and likelihood were determined using the descriptions identified in Table A1 and Table A2 respectively. The risk matrix is provided in Table A3.

Table A1 Consequence Description

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Air	Air quality	No measurable air quality impacts or exceedance of air quality standards.	Local short term and approaching exceedance of air quality standards.	Local minor long term, or widespread minor short term or exceedance of air quality standards.	Widespread (regional) major short term exceedance of air quality standards.	Regional long term change in air quality or exceedance of air quality standards.
Air	Noise	Applicable standards / guidelines met at all sensitive receptors at all times.	Isolated and temporary increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.	Short term, local increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.	Long term, local increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.	Long term, regional increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.
Biodiversity	Listed Flora Species	Minor local habitat modification and/or lifecycle disruption for a listed species.	Moderate local habitat modification and/or lifecycle disruption for a listed species.	Substantial local habitat modification and/or lifecycle disruption for a listed species.	Moderate regional habitat modification and/or lifecycle disruption for a listed species.	Substantial regional habitat modification and/or lifecycle disruption for a listed species.
Biodiversity	Listed Threatened Fauna Species	No loss of individuals of listed fauna species.	Minor local decrease in size of population(s) of listed fauna species.	Moderate local decrease in size of population(s) of listed fauna species.	Substantial local decrease in size of population(s) of listed fauna species.	Moderate or substantial regional decrease in size of population(s) of listed fauna species.
Biodiversity	General flora and fauna	Insignificant or imperceptible effects.	Local short term decrease in abundance of some species with no lasting effects on local population.	Local long term decrease in abundance of some species resulting in some change to community structure.	Regional decrease in abundance of some species resulting in some changes to community structure.	Regional loss of numerous species resulting in the dominance of only a few species.
Historic and cultural heritage	Aboriginal and cultural heritage	Minor repairable damage to more common structures or sites. No disturbance of historic and / or cultural heritage sites.	Moderate or repairable damage or infringement to sensitive structures or sites of cultural significance or sacred value.	Considerable damage or infringement to sensitive structures or sites of cultural significance or sacred value.	Major damage or infringement to sensitive structures or sites of cultural significance or sacred value.	Irreparable and permanent damage to sensitive structures or sites of cultural significance or sacred value.

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Human health and safety	Safety	Low level short term subjective inconvenience or symptoms. Typically a first aid and no medical treatment.	Reversible / minor injuries requiring medical treatment, but does not lead to restricted duties. Typically a medical treatment.	Reversible injury or moderate irreversible damage or impairment to one or more persons. Typically a lost time injury.	Single fatality and/or severe irreversible damage or severe impairment to one or more persons.	Multiple fatalities or permanent damage to multiple people.
Human health and safety	Health	Reversible health effects of little concern, requiring first aid treatment at most.	Reversible health effects of concern that would typically result in medical treatment.	Severe, reversible health effects of concern that would typically result in a lost time illness.	Single fatality or irreversible health effects or disabling illness.	Multiple fatalities or serious disabling illness to multiple people.
Radiation	Occupational exposure	<1 mSv/y Measurable increase in radiation dose with outcomes below public dose limit.	<5 mSv/y Measurable increase in radiation dose with outcomes remaining below dose constraints.	>5 mSv/y and <20 mSv/y Measurable increase in radiation dose with outcomes between dose constraint and dose limit (averaged over five years).	>20 mSv/y and <50 mSv/y Measurable increase in radiation dose with outcomes between dose limit (averaged over five years) and maximum annual dose.	>50 mSv/y Measurable increase in radiation dose with outcomes greater than the maximum annual dose.
Radiation	Public exposure	No change from background. Dose not discernible above natural background.	<0.3 mSv/y Measurable increase in radiation dose with outcomes below public dose constraint.	>0.3 mSv/y and <1 mSv/y Measurable increase in radiation dose with outcomes between dose constraint and dose limit (averaged over five years) for public.	>1 mSv/y and <5 mSv/y Measurable increase in radiation dose with outcomes between dose limit (averaged over five years) and maximum annual dose for public.	>5 mSv/y Measurable increase in radiation dose with outcomes greater than the maximum annual dose for public.
Radiation	Environmental impact	ERICA RQ < 0.1	ERICA RQ >0.1 and <1.0	ERICA RQ >1.0 plus justification	ERICA RQ >1.0 and no justification	ERICA RQ > 10.0

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Socio-economic	Community	Local, small-scale, easily reversible change on social characteristics or values of the communities of interest or communities can easily adapt or cope with change.	Short-term recoverable changes to social characteristics and values of the communities of interest or community has substantial capacity to adapt and cope with change.	Medium-term recoverable changes to social characteristics and values of the communities of interest or community has some capacity to adapt and cope with change.	Long-term recoverable changes to social characteristics and values of the communities of interest or community has limited capacity to adapt and cope with change.	Irreversible changes to social characteristics and values of the communities of interest or community has no capacity to adapt and cope with change.
Socio-economic	Visual and landscape	Almost imperceptible or no visual change from sensitive receptors or places of cultural and natural value. No loss of / or change to features or characteristics of the landscape.	Minor visual change from sensitive receptors or places of cultural and natural value. Minor loss or alteration to key landscape characteristics, or introduction of elements that may be visible but not uncharacteristic.	Moderate visual change from sensitive receptors and places of cultural and natural value. Discernible changes in the landscape due to partial loss or change to characteristics of the landscape.	Significant visual change from sensitive receptors and places of cultural and natural value. Discernible change which is out of scale with the landscape, at odds with landform and will leave an adverse impact.	Catastrophic visual change from sensitive receptors and places of cultural and natural value. A substantial change to the landscape due to total loss of elements or characteristics, causing the landscape to be permanently changed and its quality diminished.
Transport	Traffic and transport operations and conditions	Negligible adverse impact on traffic and transport conditions. No perceptible deterioration of road integrity.	Detectable adverse changes in traffic and transport condition (decrease in Level of Service) at one or two locations at any one point in time during the construction period or at a single location during operations. Seasonal, local deterioration of road integrity.	Detectable adverse change in traffic and transport conditions (decrease in Level of Service) at multiple locations. Short term, local deterioration of road integrity.	Traffic and transport congestion and delays exceed acceptable levels at multiple locations. Short term, regional deterioration of road integrity.	Traffic and transport congestion and delays severely restrict the safe operation and efficiency of the transport network. Long term, regional deterioration of road integrity.

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Transport	Road safety	No increase in vehicle incidents along relevant haulage routes above historical baseline trend.	An increase in vehicle incidents along relevant haulage routes of five per cent above historical baseline trend.	An increase in vehicle incidents along relevant haulage routes of ten per cent above historical baseline trend.	An increase in vehicle incidents along relevant haulage routes of twenty per cent above historical baseline trend.	An increase in vehicle incidents along relevant haulage routes of greater than twenty per cent above historical baseline trend.
Water	Surface water	Minimal contamination or change with no significant loss of quality.	Local minor short term reduction or change in water quality. Local contamination or change that can be immediately remediated.	Local minor long term or widespread minor short term or local major short term reduction or change in water quality. Local contamination or change that can be remediated in long term.	Widespread (regional) major short term reduction or change in water quality. Local contamination or change that cannot be remediated in long term. Widespread contamination or change that can be remediated.	Regional long term reduction or change in water quality. Widespread contamination or change that cannot be immediately remediated.
Water	Groundwater	Negligible change to groundwater regime, quality and availability.	Changes to groundwater regime, quality and availability but no significant implications.	Changes to groundwater regime, quality and availability with minor groundwater implications for a localised area.	Groundwater regime, quality or availability significantly compromised.	Widespread groundwater resource depletion, contamination or subsidence.

Table A2 Likelihood Description

Likelihood	Rare	Unlikely	Moderate	Likely	Almost Certain
Description	The event may occur only in exceptional circumstances. This event is not expected to occur except under exceptional circumstances (up to once every 100 projects of this nature).	The event could occur but is improbable. This event could occur up to once every 10-100 projects of this nature.	The event could occur but not expected. This event could occur up to once every 10 projects of this nature.	The event will probably occur in most circumstances. This event could occur up to once during a project of this nature.	The event is expected to occur in most circumstances. This event could occur at least once during a project of this nature.
Chance of Occurring (%)	0 - 1%	2 - 10%	11 - 50%	51 - 90%	> 91%

Table A3 Risk Matrix

		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Almost Certain	Medium	High	High	Extreme	Extreme
	Likely	Medium	Medium	High	High	Extreme
	Possible	Low	Medium	Medium	High	High
	Unlikely	Low	Low	Medium	Medium	High
	Rare	Low	Low	Low	Medium	Medium

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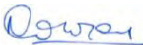
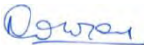
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