



FINGERBOARDS MINERAL SANDS PROJECT

Risk treatment plan:
Airborne and deposited dust

Risk treatment plan: Airborne & deposited dust

Contents

1.	Scope	1
2.	Key sensitive receptors	1
3.	Inherent risk.....	5
4.	Objectives	7
5.	Compliance standards	7
6.	Acceptance criteria	8
7.	Controls to address hazard	9
8.	Residual risk assessment	12
9.	Monitoring	13
10.	Reporting	15
11.	References	15
12.	Kalbar reference documents	16

List of tables

Table 2-1: Sensitive receptors	4
Table 3-1: Summary of inherent risk ratings (airborne and deposited dust)	5
Table 6-1: Acceptance criteria – airborne and deposited dust	8
Table 7-1: Controls and associated performance measures (airborne and deposited dust)	9
Table 8-1: Summary of residual risk ratings – airborne and deposited dust	12
Table 9-1: Proposed monitoring for airborne and deposited particulates	13
Table 10-1: Dust performance and compliance reporting	15
Table 12-1: Kalbar reference documents	16

List of figures

Figure 2.1: Sensitive receptor and suggested meteorological and particulate monitoring locations	2
Figure 2.2: Sensitive receptor locations (horticultural production and water supply)	3

1. Scope

This risk treatment plan is for the control of mining hazards associated with airborne and deposited dust. This plan does not directly address radioactive hazards in airborne dust: management of radiation hazards is addressed in the Fingerboards Radiation Management Plan. A 'mining hazard' means any mining activity that may pose a risk to the environment, to any member of the public or to land, property or infrastructure in the vicinity of work carried out at the Fingerboards mine at any stage of project implementation (construction, operations, decommissioning and closure).

2. Key sensitive receptors

Key sensitive receptors include the environment, any member of the public or land, property or infrastructure in the vicinity of the mine that may be impacted or put at risk by airborne or deposited dust arising from mining activities within the Fingerboard mining licence area. The key sensitive receptors associated with airborne and deposited dust hazards include 49 residential dwellings and the land surrounding them (Figure 2.1 **Error! Reference source not found.**), horticultural production areas of the Lindenow flats, approximately 0.8 km northeast of the mining licence area (Figure 2.2) and the Woodglen surface water storage facility (shown as 'water' in Figure 2.2) and other smaller water storages (farm dams and roof water tanks) on rural properties surrounding the mining licence area.

Kalbar has identified 49 residential locations in proximity to the mining licence area as sensitive receptors (Table 2-1). The properties at locations R2 and R3 are owned by Kalbar and will not be occupied during construction or operations. The property at location R4 is being used by Kalbar as a mine site office.

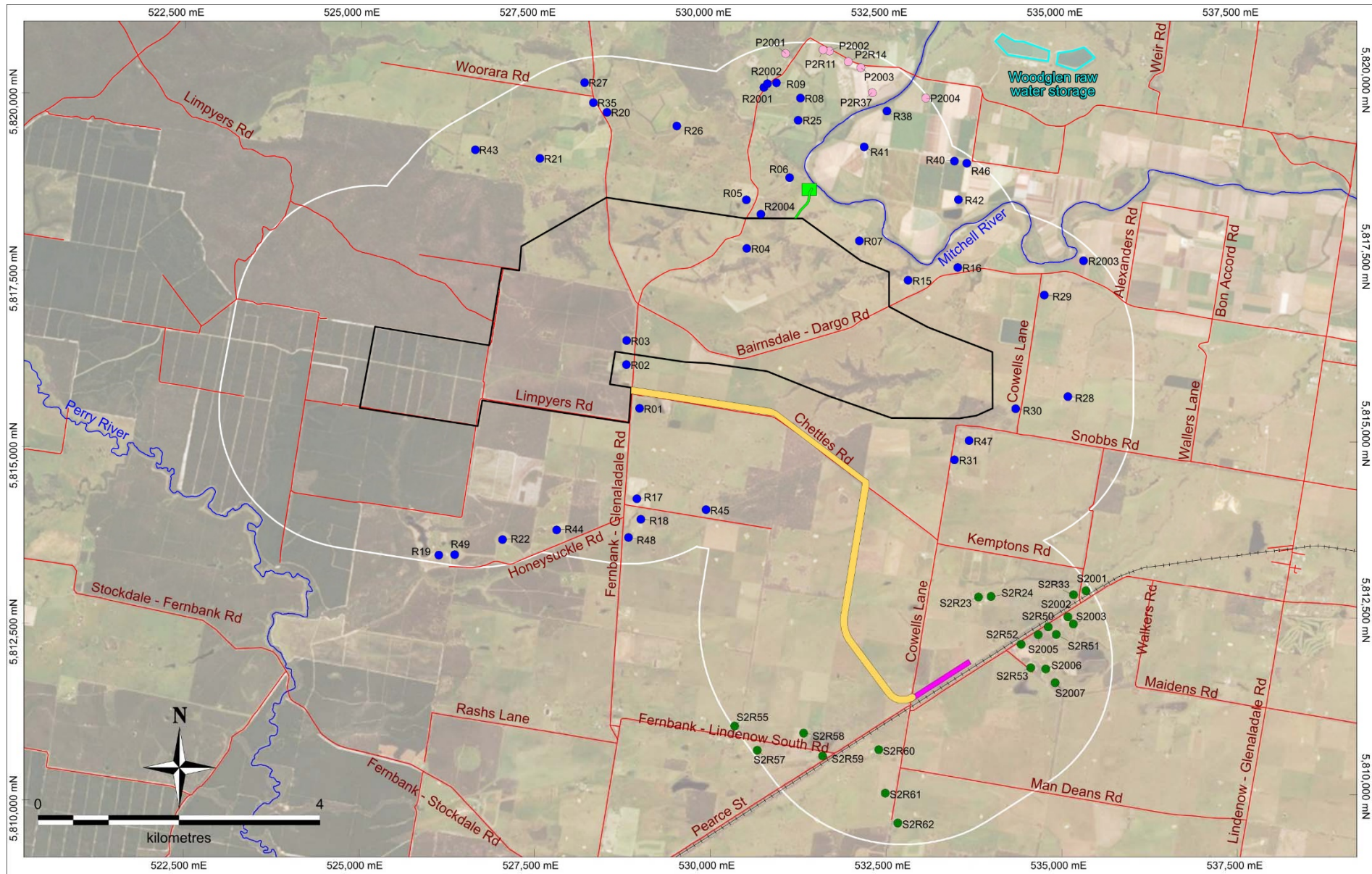


Figure 2.1: Sensitive receptor and suggested meteorological and particulate monitoring locations

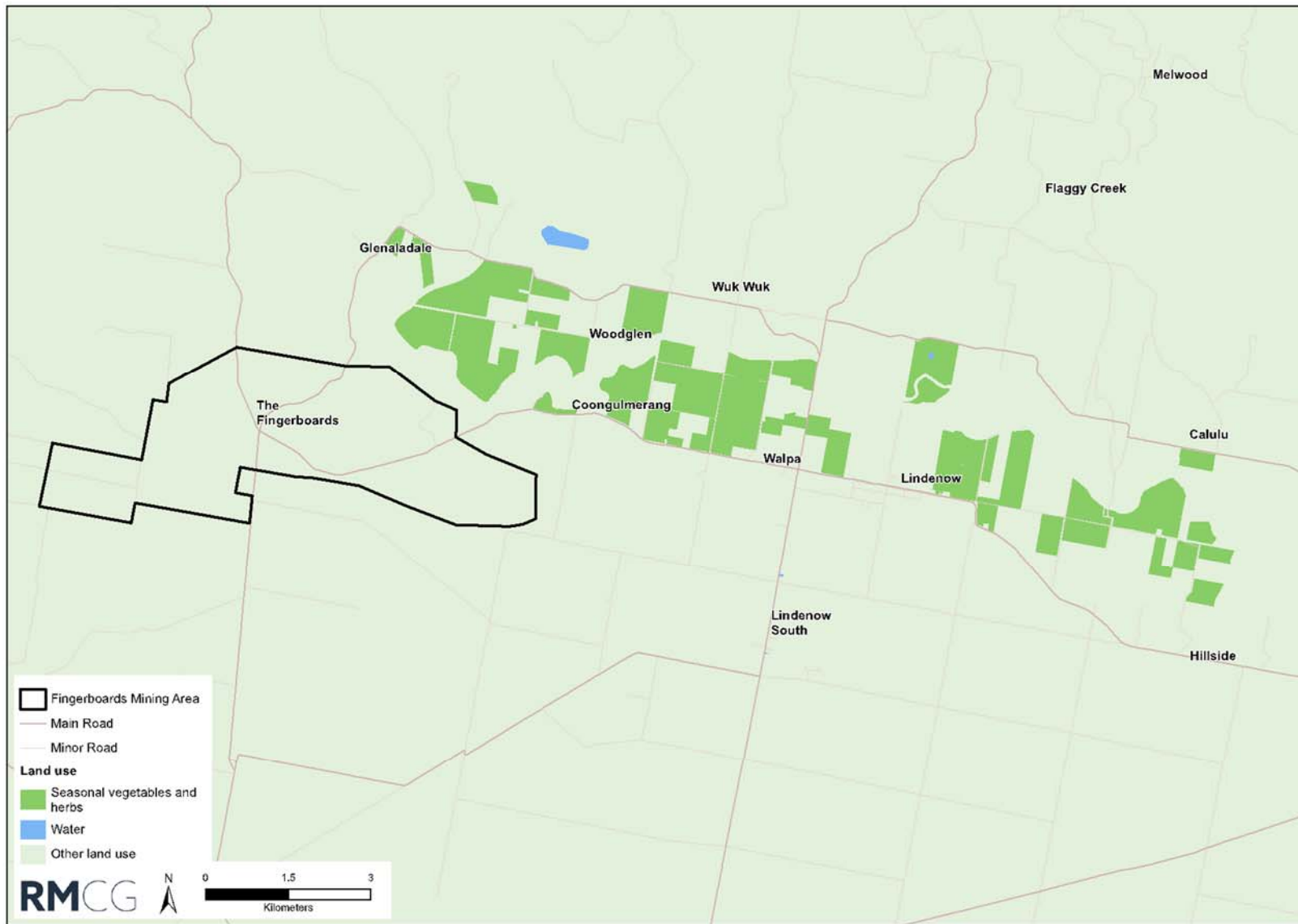


Figure 2.2: Sensitive receptor locations (horticultural production and water supply)

Table 2-1: Sensitive receptors

Receptor	To project area (km)	To mining activity (km)	Description
R01	0.14	0.76	Residence
R02	0.16	0.18	Residence (owned by Kalbar)
R03	0.00	0.00	Residence (owned by Kalbar)
R04	0.00	0.12	Residence (owned by Kalbar)
R05	0.26	0.36	Residence
R06	0.58	0.84	Residence
R07	0.22	0.32	Residence
R08	1.70	1.94	Residence
R09	1.92	2.06	Residence
R15	0.27	0.53	Residence
R16	0.94	1.13	Residence
R17	1.08	2.04	Residence
R18	1.38	2.31	Residence
R19	1.89	1.92	Residence
R20	1.21	1.52	Residence
R21	0.95	1.11	Residence
R22	1.65	1.84	Residence
R25	1.39	1.64	Residence
R26	1.15	1.53	Residence
R27	1.66	1.93	Residence
R28	1.07	1.09	Residence

Receptor	To project area (km)	To mining activity (km)	Description
R29	1.09	1.50	Residence
R30	0.33	0.35	Residence
R31	0.59	0.61	Residence
R35	1.36	1.65	Residence
R36	1.04	1.14	Residence
R38	1.94	2.12	Residence
R40	1.83	2.03	Residence
R41	1.34	1.55	Residence
R42	1.42	1.72	Residence
R43	1.51	1.66	Residence
R44	1.65	2.00	Residence
R45	1.65	2.08	Residence
R46	1.90	2.13	Residence
R47	0.33	0.35	Residence
R48	1.63	2.59	Residence
R49	1.85	1.92	Residence
R2001	1.85	1.95	Residence
R2002	1.91	2.02	Residence
R2003	1.83	2.22	Residence
R2004	0.05	0.30	Residence

3. Inherent risk

In this risk treatment plan 'inherent risk' means the likelihood and consequence of a risk event, assuming that standard controls specified in Attachment A of the Fingerboards draft Risk Management Plan are implemented.

Table 3-1: Summary of inherent risk ratings (airborne and deposited dust)

#	Details of risk event	Phase	Consequence	Likelihood	Inherent risk rating
1	Ground clearing, mining, materials handling, vehicular traffic: exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low
2	Wind erosion from disturbed surfaces and /or stockpiles: Exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low
4	Ore processing: Exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	O	Minor	Rare	Low
5	Wheel-generated dust and lift off from disturbed areas and stockpiles: Contamination of horticultural crops (inert dust)	C, O, CL	Minor	Unlikely	Low
6	Wheel-generated dust and lift off from disturbed areas and stockpiles: contamination of horticultural crops (metals or radionuclides)	C, O, CL	Insignificant	Unlikely	Low
7	Wheel-generated dust and lift off from disturbed areas and stockpiles: impacts on productivity or marketability of horticultural crops	C, O, CL	Insignificant	Unlikely	Low
8	Wheel-generated dust and lift off from disturbed areas and stockpiles: Soiling of surfaces at sensitive receptors	C, O, CL	Insignificant	Unlikely	Low
9	Wheel-generated dust and lift off from disturbed areas and stockpiles: Deposition on rooftops, followed by contamination of rainwater tanks	C, O, CL	Insignificant	Unlikely	Low
10	Wheel-generated dust and lift off from disturbed areas and stockpiles: Aesthetic impacts: reduction in clarity of air	C, O, CL	Insignificant	Unlikely	Low
11	Wind erosion from disturbed surfaces, stockpiles or TSF: exposure of sensitive offsite receptors to airborne toxicants human health guideline values	C, O, CL	Insignificant	Unlikely	Low
12	Ore processing: Exposure of sensitive offsite receptors to airborne toxicants exceeds human health guideline values	O	Insignificant	Unlikely	Low
13	Vehicle emissions: Exposure of sensitive offsite receptors to airborne toxicants exceeds human health guideline values	C, O, CL	Insignificant	Unlikely	Low

#	Details of risk event	Phase	Consequence	Likelihood	Inherent risk rating
14	Scope 1 and Scope 2 GHG emissions: Emissions intensity incompatible with best practice management	C, O, CL	Minor	Possible	Medium
15	Wind erosion from disturbed surfaces, stockpiles or tailings: exposure of sensitive offsite receptors to radionuclides exceeds human health guideline values	C, O, CL	Insignificant	Unlikely	Low
16	Ore processing: exposure of sensitive offsite receptors to radionuclides exceeds human health guideline values	O	Insignificant	Unlikely	Low

Note: 'C' = construction; 'O' = operations; 'CL' = decommissioning and closure

4. Objectives

The objectives of this risk treatment plan are to minimise and manage project-related airborne and deposited dust so as to:

- Protect the health, wellbeing and amenity of residents and local communities, and
- Protect surrounding land uses and prevent contamination of crops and surface water supplies (including water harvested in rainwater tanks),
- Protect the beneficial uses of the air environment as defined in the State Environmental Protection Policy (SEPP) Air Quality Management and
- Maintain compliance with applicable environmental quality objectives specified in the State Environmental Protection Policy Ambient Air Quality (SEPP AAQ) and other relevant policy, guidance and legislation (as described in Section 4).

5. Compliance standards

The compliance standards for this risk treatment plan are:

- EPA Protocol for Environmental Management (PEM) – Mining and Extractive Industries
- State Environment Protection Policy Air Quality Management (SEPP AQM)
- EPA Guideline: Recommended separation distances for industrial residual air emissions.

6. Acceptance criteria

Acceptance criteria are the measures which, if attained, are the basis for concluding that the control measures described in this plan have been effective in achieving the plan objectives. Air quality design criteria specified in the EPA *Protocol for Environmental Management (PEM) – Mining and Extractive Industries* have been used as the basis for defining acceptance criteria for airborne dust, including respirable silica¹. The acceptance criteria for this risk treatment plan are:

- No nuisance dust issues are experienced by pre-existing, nearby sensitive receptors
- Project -related dust emissions do not cause airborne particulate concentrations or deposited dust concentrations to exceed the criteria summarised in Table 6-1.

Table 6-1: Acceptance criteria – airborne and deposited dust

Pollutant	Averaging period	Air quality design criteria	Source
PM ₁₀	24 hours	50 µg/m ³	SEPP AAQ environmental quality objectives for 24-hour average concentrations. Proposed Final ERS.
PM _{2.5}	24 hours	25 µg/m ³	SEPP AAQ environmental quality objectives for 24-hour average concentrations. Proposed Final ERS.
Dust deposition Note 3	Annual	2 g/m ² /month ^{Note 1}	Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (NSW EPA, 2017)
	Annual	4 g/m ² /month ^{Note 2}	
Respirable crystalline silica (as PM _{2.5})	Annual	3 µg/m ³	Protocol for Environmental Management (Mining and Extractive Industries).
Arsenic	Annual	0.003 µg/m ³	EPA Protocol for Environmental Management (Mining and Extractive Industries).
Radionuclides	Annual	ALARA	EPA Protocol for Environmental Management (Mining and Extractive Industries).

Note 1 -Maximum increase in deposited dust level.

Note 2 - Maximum total deposited dust level.

Note 3 - Dust is assessed as insoluble solids as defined by AS 3580.10.1: 2016.

¹ The State Environment Protection Policy (SEPP) (Ambient Air Quality) standards do not apply to individual sources but rather to regional air quality. Accordingly, the SEPP AAQ criteria have not been used as compliance values in this risk treatment plan. RISK TREATMENT PLAN – AIRBORNE & DEPOSITED DUST– VERSION B 8 11 MARCH 2021

7. Controls to address hazard

The controls listed in Table 7-1 will be implemented in order to minimise airborne and deposited dust from activities conducted within the mining licence area.

Table 7-1: Controls and associated performance measures (airborne and deposited dust)

#	Details of controls	Performance measures
AQ01	Areas will be cleared in a staged manner only as required to reduce dust generation by minimising the area of exposed ground surfaces at any one time.	Clearing records; airborne and deposited dust monitoring records. Maximum disturbed area at any given time will not exceed 360 ha.
AQ02	Water or appropriate suppressants will be applied to working surfaces, stockpiles, haul roads, the mine voids and other areas as required to minimise dust generation.	Airborne and deposited dust monitoring records; water cart usage records
AQ03	Drop heights for topsoil and overburden during creation of stockpiles will be minimised as far as practicable to reduce dust generation.	Work instruction; periodic compliance observations
AQ04	Speed limits will be implemented and enforced on unsealed project roads to minimise dust generation	Induction records; signage; periodic audits; tiered vehicle speed limit of 20 km/hr on unsealed project roads in the event of dusty conditions and 50 km/hr under normal conditions.
AQ05	Topsoil stripping will be planned and conducted in consideration of forecast and actual weather conditions to minimise dust generation	Topsoil stripping records; materials inventory; site meteorological records; operations schedule. Topsoil stripping to be suspended under windy conditions (average wind speed ≥ 25 km/hr)
AQ07	The mine void will be progressively backfilled and rehabilitated to minimise the area required for topsoil and overburden stockpiles	Clearing and rehabilitation records; materials inventory.
AQ08	Haul vehicles will travel on designated haul roads only and haul routes will be minimised where possible. Haulage of product will be limited to daytime hours only (11hours a day)	Mine plans; haulage records
AQ09	Suppressants and water will be applied to exposed areas and stockpiles, where rehabilitation is not yet practical, to reduce potential for dust generation. In particular, during drier months when less rainfall is expected	Records of dust suppressant and water use.
AQ10	Ore will be transferred across the project area as a slurry to reduce potential for dust emission	Pipeline as-built report.
AQ11	Ore will be processed as a slurry.	Commissioning report.
AQ12	There will be no crushing or grinding of ore, preventing the potential generation of respirable crystalline silica emissions	Plant design specifications and as-built report.

#	Details of controls	Performance measures
AQ13*	When real-time monitoring indicates that trigger level near key sensitive receptors have been reached, dust generating activities will be ceased at certain times, suspended, slowed or moved to other parts of the mine. This should be done in order of preference as outlined in the trigger action response plan of the AQMP.	Dust monitoring records; site meteorological records; operations records; complaints register. Dust generating activities to be suspended or moved under windy conditions in accordance with the trigger action response plan detailed in AQMP.
AQ14*	Ground-disturbing activities (including cessation of night time operations) and materials handling will be scheduled to avoid excessive dust emissions during forecast adverse weather conditions or at certain time within the mining footprint.	Mining schedules; dust monitoring records; site meteorological records; operations records; complaints register. Dust generating activities to be suspended or moved under windy conditions in accordance with the trigger action response plan detailed in AQMP.
AQ15*	Additional mitigation measures will be implemented and monitored through the proposed environmental management framework. In particular, the development of an air quality risk treatment plan.	Implementation of this plan.
AQ16	Construction of the wear course of internal haul roads will use an optimal size grading of aggregate with road stabilisation and compaction agents.	Design specifications; as-built reports.
GHG01*	Solar photovoltaic technology will be used to supplement electricity requirements for applications such as lighting.	Annual tracking of energy use and greenhouse gas emissions; NGERs reporting
GHG02*	Energy efficient technology will be used where practicable, including low energy lighting (e.g., LEDs).	Annual tracking of energy use and greenhouse gas emissions; NGERs reporting
GHG03	The power factor of mains electricity will be improved by reducing the phase difference between the voltage and the current. The on-site power factor correction will be optimised for grid electricity usage	Annual tracking of energy use and greenhouse gas emissions; NGERs reporting
GHG04	Vehicle diesel consumption will be reduced through equipment selection, load and route optimisation and production scheduling, and minimising idle time.	Annual tracking of energy use and greenhouse gas emissions; NGERs reporting
GHG05	Fuel-burning equipment will be maintained and operated according to manufacturer/supplier guidelines and recommendations.	Maintenance records
GHG06	Generator diesel consumption will be reduced through selecting a flexible configuration that allows for electricity output to be adjusted in line with demand.	Annual tracking of energy use and greenhouse gas emissions; NGERs reporting
RD09a	Engineering controls, such as ventilation, dust control, and appropriate machinery shielding will be provided where required.	Workplace OH&S particulate monitoring results

#	Details of controls	Performance measures
AQ 17	A commitment to conduct continuous visual observation monitoring (e.g. video monitoring) of high dust generation activities if such technology is found to be economically viable.	Implementation of this measure

Note: Mitigation actions followed by an asterisk are 'additional mitigation actions'. All others are 'standard mitigation actions'.

8. Residual risk assessment

The risk ratings for events contributing to airborne and deposited dust hazards – once standard and additional mitigation actions have been put in place – are summarised in Table 8-1.

Table 8-1: Summary of residual risk ratings – airborne and deposited dust

#	Details of risk event monitored	Phase	Consequence	Likelihood	Residual risk rating
1	Ground clearing, mining, materials handling, vehicular traffic: exposure to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) sensitive receptors exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low
2	Wind erosion from disturbed surfaces and /or stockpiles: Exposure to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) sensitive receptors exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low
3	Ore processing: Exposure to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) sensitive receptors exceeds human health guideline values	O	Minor	Rare	Low
4	Wheel-generated dust and lift off from disturbed areas and stockpiles: Contamination of horticultural crops (inert dust)	C, O, CL	Minor	Unlikely	Low
5	Wheel-generated dust and lift off from disturbed areas and stockpiles: Adverse impacts on vegetation health / productivity / marketability	C, O, CL	Minor	Unlikely	Low
6	Wind erosion from disturbed surfaces: Exposure to airborne toxicants at sensitive receptors exceeds human health guideline values	C, O, CL	Insignificant	Possible	Low
7	Wind erosion from stockpiles: Exposure to airborne toxicants at sensitive receptors exceeds human health guideline values	C, O, CL	Insignificant	Possible	Low
8	Wind erosion from TSF: Exposure to airborne toxicants at sensitive receptors exceeds human health guideline values	O	Minor	Unlikely	Low
9	Scope 1 and Scope 2 GHG emissions: Emissions intensity incompatible with best practice management	C, O, CL	Minor	Unlikely	Low
10	Wind erosion from disturbed surfaces and/or stockpiles: Exposure to radionuclides at sensitive receptors exceeds human health guideline values	C, O,CL	Insignificant	Unlikely	Low

9. Monitoring

Monitoring required to check the effectiveness of dust management controls is summarised in Table 9-1. Further details of monitoring parameters and recommended locations is contained in the AQMP (Katestone).

Table 9-1: Proposed monitoring for airborne and deposited particulates

#	Aspect to be monitored	Details of monitoring
1	1-hour average PM ₁₀	Real-time monitoring (1-hour average) of PM ₁₀ concentrations to be conducted at key sensitive receptor locations (whose positions will vary throughout the mining programme) to allow for changes in operation activities and locations that may impact the achievability of the 24-hour average health-based criteria. Assume minimum of 3 real-time PM10 monitors. Management action trigger level for hourly PM10 readings to be set at 80 µg/m ³ (1 hr average reading). EPA will be consulted on the development of the Project's air quality management and monitoring sub-plans.
2	24-hour average concentrations of PM ₁₀ and PM _{2.5}	Continuous monitoring to be conducted during construction and operations at locations representative of sensitive receptors likely to experience the highest particulate concentrations (monitoring locations will change, depending upon the locations of mining activities. Assume network of no fewer than 5 particulate monitoring stations).
3	Weekly analysis of PM ₁₀ and PM _{2.5} filters for respirable crystalline silica, gross alpha and beta radiation and heavy metals.	
4	Meteorological monitoring	At least hourly monitoring and recording of temperature, humidity, wind speed and direction. Alarms to be sent automatically to shift supervisor if average wind speeds exceed 25 km/hr, to trigger management responses, including restricting operations if necessary.
5	Monthly average dust deposition rates.	Continuous dust deposition monitoring upwind and downwind of active mining areas (assume minimum of 3 downwind and 2 upwind locations).
6	Total and dissolved metals and suspended solids in rainwater tanks and dams	<p>Rainwater tanks to be monitored quarterly at a minimum of 13 locations (assuming landholders grant access) prior to construction and during operations to check metals and suspended solids concentrations, relative to pre-mining concentrations. In the event of an incident, or if inspections or monitoring results indicate that performance requirements are not being achieved, corrective actions would be enacted and may include any or all of the following:</p> <ul style="list-style-type: none"> • Immediately stop work where required. • Complete incident report and investigations. • Report to regulatory authorities as required (with notice of proposed corrective actions where relevant). • Investigate cause of exceedance or issue, including review of relevant monitoring data and effectiveness of implemented corrective actions (if any). • Implement corrective actions as appropriate to prevent recurrence. • Undertake maintenance as required. <p>Notify regulatory authorities of corrective actions implemented and outcome as applicable.</p>

7	Complaints	Monitor and document continuously. Respond in accordance with Fingerboards complaints management procedure.
8	Periodic monitoring of deposited dust on nearby crops to validate the assumptions of dust assessments described in the Human Health Risk Assessment.	Local horticultural and agricultural producers and the Environmental Review Committee will be consulted to determine the frequency of this monitoring and the duration of the monitoring program.

10. Reporting

Table 10-1: Dust performance and compliance reporting

#	Aspect being reported	To whom will the information be reported? At what frequency?	How will the information be used?
1	Airborne PM ₁₀ (1-hourly averages)	Continuous real-time reporting: if trigger level exceeded notifications to mine shift superintendent; construction earthworks superintendent.	To guide operational decisions (need to implement additional dust controls, relocate or suspend activities).
2	Airborne PM ₁₀ and PM _{2.5} (24-hour averages)	Weekly review by environmental superintendent; monthly reporting to Fingerboards management team; exceedance of acceptance criteria reported to mine manager within 24 hours of exceedance; quarterly reporting to Community Reference Group; annual reporting to ERR and EPA.	Compliance verification; check effectiveness of dust minimization activities; to assist in operational planning
3	Weekly analysis of PM ₁₀ and PM _{2.5} filters for respirable crystalline silica, gross alpha and beta radiation and heavy metals.	Weekly review by environmental superintendent; monthly reporting to Fingerboards management team; exceedance of acceptance criteria reported to mine manager within 24 hours of exceedance; quarterly reporting to Community Reference Group; annual reporting to ERR and EPA.	Compliance verification; check effectiveness of dust minimization activities; to assist in operational planning
4	Meteorological monitoring	Continuous real-time reporting: if wind speed trigger level exceeded notifications to mine shift superintendent; construction earthworks superintendent.	To guide operational decisions (need to implement additional dust controls, relocate or suspend activities); to assist in responding to complaints.
5	Monthly average dust deposition rates.	Monthly review by environmental superintendent; monthly reporting to Fingerboards management team; exceedance of acceptance criteria reported to mine manager within 24 hours of exceedance; quarterly reporting to Community Reference Group; annual reporting to ERR and EPA.	Compliance verification; check effectiveness of dust minimization activities; to assist in operational planning
6	Total and dissolved metals and suspended solids in rainwater tanks	Quarterly review by environmental superintendent; monthly reporting to Fingerboards management team; exceedance of acceptance criteria reported to mine manager and owners of water tanks within 24 hours of exceedance; quarterly reporting to Community Reference Group (release of individual data subject to consent of tank owners); annual reporting to ERR and EPA.	Compliance verification; check effectiveness of dust minimization activities
7	Complaints	Weekly reporting to Fingerboards management team; complaints statistics reported quarterly to Community Reference Group; annual reporting to ERR and EPA;	

11. References

Environment Protection Authority (NSW), 2016. Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.

EPA Victoria, 2007. Protocol for Environmental Management, State Environment Protection Policy (Ambient Air Quality) Mining and Extractive Industries (PEM), Publication 1191.

Government of Victoria, 2001. State Environment Protection Policy Air Quality Management - Environment Protection Act 1970. Victoria Government Gazette, Special No. S 240 Friday 21 December 2001. Victorian Government Printer.

Katestone Environmental Pty Ltd, 2020. Stage Two Air Quality and Greenhouse Gas Assessment for the Fingerboards Mineral Sands Project, Version 1.4 (final), document number D16070-54, April 2020.

Standards Australia, 2016. AS/NZS 3580.10.1:2016 - Methods for sampling and analysis of ambient air Determination of particulate matter - Deposited matter - Gravimetric method.

Katestone Environmental Pty Ltd, 2021. Air Quality Management Plan (AQMP) for the Fingerboards Project, 0.2 DRAFT, document number D19060-4, April 2020.

RCMG, 2019, Fingerboards Mineral Sands Project Horticultural Impact Assessment, Final Draft Report V2, prepared for Kalbar Resources Ltd, January 2019.

12. Kalbar reference documents

[To be completed when EMS is fully developed]

Table 12-1: Kalbar reference documents

#	Document
1	
2	
3	