KEYSBROOK MINERAL SANDS PROJECT

AIR QUALITY AND DUST ENVIRONMENTAL MANAGEMENT PLAN, KEYSBROOK MINERAL SANDS PROJECT, MS810

DOCUMENT REFERENCE

AIR QUALITY AND DUST ENVIRONMENTAL MANAGEMENT PLAN

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Aug 2022	5	Revised to support S45C submission (Lot 56)	CB
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GLOSSARY

TERM	DEFINITION
AER	Annual Environmental Report
BAM	Beta Attenuation Dust Monitor
CAR	Compliance Assessment Report
DWER	Department of Water And Environment Regulation
DMP	Nephelometer Dust Monitor
EP ACT	Environmental Protection Act 1986
PM_{10}	Particulate Matter less than 10 Micron
TSP	Total Suspended Particulates
$\mu g/m^3$	Micrograms per Cubic Metre

SUMMARY

This Air Quality and Dust Management Plan (AQDMP) has been prepared in accordance with Conditions 15-2,15-3 and 15-5 of Ministerial Statement No. 810 (MS810) for the Keysbrook Mineral Sands Mine (the Project). The proponent for the Project is Keysbrook Leucoxene Pty Ltd (KLPL). KLPL is a 100% owned subsidiary of Doral Mineral Sands Pty Ltd.

Table 1 below presents the environmental criteria to measure achievement of the conditioned environmental outcome that must be met through implementation of this Condition EMP.

TABLE 1: AQDMP SUMMARY

Proposal Name	Keysbrook Mineral Sands Mine	
Proponent Name	Keysbrook Leucoxene Proprietary Limited	
Ministerial Statement Number	MS810	
Purpose of the EMP	Fulfil the requirements of Implementation Condition 15.	
EPA Key Environmental Factor/s, outcome/s and objective/s	**Air Quality:** • To maintain air quality and minimise emissions so that environmental values are protected	
Implementation Condition Clauses	Condition 15-2 to 15-8	
Key Provisions of the Plan	1. Management measures to minimise dust emissions and ensure compliance with National Environmental Protection Measure Standards for particulates, as set in Condition 15-2. 2. Monitoring programme to (i) characterise local dust environment; (ii) inform management measures and (iii) enable assessment of compliance.	
Environmental Criteria		
Trigger Criteria	Total Suspended Particulates (TSP): • 600 µg/m^3 15 minute average	Particulate Matter less than 10 micron (PM_{10}): • 200 µg/m^3 15-minute average • 40 µg/m^3 6 hour rolling average
Threshold Criteria	Total Suspended Particulates (TSP): • 1,000 µg/m^3 15 minute average	Particulate Matter less than 10 micron: • 50 µg/m^3 24 hour average (in excess of five (5) times per year

1. CONTEXT, SCOPE AND RATIONALE

1.1. PROPOSAL

Doral Mineral Sands Pty Ltd (Doral) through its subsidiary Keysbrook Leucoxene Pty Ltd (KLPL), operate a mineral sands mine and primary processing plant (the Project) within an area of rural land near the townships of Keysbrook and North Dandalup, 70 km south of Perth (Figure 1). The Project is within the Shire of Murray and the Shire of Serpentine-Jarrahdale.

The Keysbrook Mineral Sands Mine targets a deposit containing high grade leucoxene. Leucoxene is a fine, granular, weathered titanium mineral used as feedstock for titanium pigment plants. The surface mining operation migrates across the land, and the shallow mine void is backfilled to pre-disturbance contours and generally rehabilitated within two years of mining.

The Project is located on privately owned land, used for grazing and other rural land uses. The currently approved area of disturbance is 1,532ha, within a 3,015ha Development Envelope (Attachment 3, Figure 2 of MS810). Native vegetation approved for clearing ranges in condition from good to degraded. The area of mining approved under MS810, provides for 9 years of mining, which commenced in October 2015.

Based on the current mining schedule, the current ore reserve within the approved mine area as defined in (Attachment 3, Figure 2 of MS810), is due to be exhausted in 2023. In order for the continuation of the mine and workforce, KLPL seeks to amend the Project to include an additional mine are within Lot 63 Hopeland Road under Section 45C of the *Environmental Protection Act 1986* (EP Act). The 'amendment area' is within the existing EPA Development Envelope and includes a disturbance (mine) area of 142.3ha, of cleared pasture (Figure 1). No additional native vegetation clearing is proposed. Mining the amendment area will produce an additional ~65,000 tonnes of heavy mineral concentrate and result in ~18 months additional mining for the Project.

To support the request to EPA to amend the Project under Section 45C, KLPL has updated this Air Quality and Dust Management Plan to demonstrate the amendment poses no significant impact and can be managed in accordance with Condition 15 of MS810.

1.2. KEY ENVIRONMENTAL FACTOR

The key environmental factor relevant to this AQDMP is Air Quality, focussed on airborne dust. Potential sources of dust from the Project are summarised in Table 2.

TABLE 2: POTENTIAL AIR EMISSION PROJECT RISKS

Source	Activity	Potential Pollutants	Inherent Risk
Mining & Exploration	Clearing and grubbing Topsoil removal Excavating Truck loading Heavy and light vehicle movements General materials handling Exposed areas susceptible to wind Land rehabilitation works	Dust TSP, PM_{10}	High
Processing Area	Fixed plant General materials handling Exposed areas susceptible to wind	Dust TSP, PM_{10}	Medium
	Heavy mineral concentrate stockpiling	Dust TSP, PM_{10}	Low
Fuel consumption	Fixed and mobile plant Pumps and compressors Heavy and light vehicles	Exhaust emissions NOx, SOx, CO, VOC's, PM_{10}	Low[1]
Ancillary	Fuel storage (venting)	VOC's, PAH's	Negligible[2]

1.3. CONDITION REQUIREMENTS

The Project was assessed and approved under Part IV of the *Environmental Protection Act 1986* on 19 October 2019, with the issuing of Ministerial Statement 810. Revisions to the Project were approved via Section 46C in June 2011 and Section 45C in February 2013 and October 2019. A Section 46 amendment to extend the time limit for commencement of the Project was made in October 2014. A further request under Section 45C was requested in August 2022 (subject of this AQDMP update).

This AQDMP has been prepared to address the following Conditions in MS810.

[1] This AQDMP focusses on management and monitoring high and medium risk activities only. Impacts from low or negligible risk activities are manageable through standard industry practice, a rigorous equipment maintenance plan and energy efficiency measures implemented by KLPL.

TABLE 3: CONDITION REQUIREMENTS

CONDITION NO.	CONDITION	RELEVANT SECTION OF WDMP
15-1	Prior to the commencement of operations, the proponent shall revise the Air Quality and Dust Management Plan to the requirements of the CEO.	Completed (MZI Resources, 2013)
15-2	The objectives of the Plan are to: a. ensure dust emissions from activities undertaken in implementing the proposal do not cause ambient dust concentration levels outside the boundary of the proposal area that are: i. higher than 1,000 µg/m^3 of Total Suspended Particulates as a 15-minute average; or ii. higher than 50 µg/m3 of Particulate Matter smaller than 10 microns as a 24-hour average, in excess of five times per year; b. identify measures to reduce dust emissions; and c. ensure that dust emissions do not harm or adversely affect environmental values or the health, welfare and amenity of people and land uses.	a) 2.2 b) 2.1 c) 2.1.1
15-3	The Plan shall: a. outline the results of on-site baseline dust monitoring and modelling; b. identify dust management measures for a range of predicted weather forecasts, including avoiding, ameliorating and protecting from dust impacts; c. identify dust management measures according to actual winds experienced at the site; d. identify a plan for each pit, which details the times of day and weather conditions under which parts of the pit could be mined; e. identify a monitoring program, incorporating trigger values for the implementation of management measures to ensure dust emissions from activities undertaken in implementing the proposal do not cause ambient dust concentration levels outside the boundary of the proposal area that are: i. higher than 1,000 µg/m^3 of Total Suspended Particulates as a 15 minute average; or ii. higher than 50 µg/m^3 of Particulate Matter smaller than 10 microns as a 24 hour average, in excess of five times per year; f. identify management measures to ensure dust emissions from activities undertaken in implementing the proposal do not cause	a) 1.4.1 b) 2.2.1 c) 2.1.1, 2.1.4 d) 2.1.4 e) 1.4, 2.2.1 f) 2.1.3, 2.1.5 g) 5.1 h) 2.1.2 and Figure 2

CONDITION NO.	CONDITION	RELEVANT SECTION OF WDMP
	ambient dust concentration levels outside the boundary of the proposal area that are: i. higher than 1,000 ug/m^3 of Total Suspended Particulates as a 15 minute average; or ii. higher than 50 ug/m3 of Particulate Matter smaller than 10 microns as a 24 hour average, in excess of five times per year; g. identify a complaint management procedure; and describe the outcomes of landowner agreements when mining in close proximity to occupied residences.	
15-4	The proponent shall implement the Air Quality and Dust Management Plan.	Refer Annual CARs
15-5	The proponent shall review and revise the Air Quality and Dust Management Plan as and when directed by the CEO.	Section 4
15-6	The proponent shall implement revisions of the Air Quality and Dust Management Plan required by condition 15-5.	Refer Annual CARs
15-7	The proponent shall make the Air Quality and Dust Management Plan (including any revisions) and the results of monitoring publicly available in a manner approved by the CEO.	The approved AQDMP will be available at: www.doral.com.au
15-8	To the extent that the proposal is subject to a license issued under Part V of the Act, that license may impose conditions which are different from, or additional to, the requirements of this Statement.	N/A[2]

1.4. RATIONALE AND APPROACH

1.4.1. BASELINE DUST MONITORING (2007)

Baseline monitoring for particulate matter less than 10 microns in diameter (PM10) was carried out by SKM between 21 February and 17 April 2007. A Tapered Element Oscillating Microbalance (TEOM) fitted with a PM10 inlet was located in an open paddock, with no livestock in the immediate vicinity, south west of the Keysbrook townsite. The unit was located far enough from the South West Highway that vehicle emissions from this road would not be a factor, although it was noted that some local vehicle emissions may still be experienced at the monitoring site.

Readings were taken every five minutes, with these values used to calculate hourly and daily averages.

[2] The Project is licenced by the Department of Water and Environmental Regulation (DWER) under L8918/2015/1 for prescribed Category 6 (Mine Dewatering) and Category 8 (Mineral Sands Mining or Processing – 5.2 mtpa). No licence conditions relating to dust or air quality are applicable.

All averaged 24-hour readings for PM10 were below the NEPM value of 50 micrograms per cubic metre with the highest recording being 37.9 micrograms per cubic metre (79.4% of the NEPM value).

A comparison between dust concentrations and wind speed and direction indicated that the highest dust concentrations occurred with southerly or westerly winds, in contrast with the modelling which predicted easterly winds would generate higher dust concentrations. Additionally, the majority of high concentration readings coincided with wind speeds between 0.9 and 2.3 metres per second, though the highest concentrations were recorded during much higher wind speeds of 4.4 metres per second.

1.4.2. RESULTS OF AIR QUALITY MODELLING (2013)

As part of the initial environmental impact assessment for the Project, modelling of air quality impacts from mining operations at Keysbrook was undertaken using the Victorian EPA's AUSPLUME (Version 6.0) air dispersion model (MZI Resources, 2013). The model used three years of meteorological data to predict potential worst-case ground-level concentrations of particulates and determined that without management and mitigation measures, there was potential for air quality and dust impacts on those residences that are within 300 metres of active mining.

In areas where residences are relatively close to operations, it was recommended that a monitoring network be established between the operations and the nearest residence such that if high dust concentrations occur, an alert is raised and additional management measures can be implemented.

1.4.3. OPERATIONAL AIR QUALITY MONITORING EXPERIENCE

Construction of the project commenced in January 2015 and operations commenced following commissioning in October 2015. Monitoring ambient dust concentrations commenced in May 2015 in accordance with an approved Air Quality and Dust Management Plan (March 2012) as amended through an approved Air Quality and Dust Management Plan Addendum (October 2013).

Monitoring was conducted using three nephelometers (DMP) and one Beta Attenuation Monitor (BAM) each measuring ambient PM_{10} concentrations over a 15-minute averaging period, with the BAM also measuring ambient TSP concentrations over a 15-minute averaging period. The results of the monitoring indicated that no discernible trend was observed between PM10 and TSP concentration and that the ratio of PM10:TSP is dependent on wind conditions and particulate concentration.

Through a review of actual mining activities, processing experience and monitoring data gained since the commencement of operations, a number of opportunities to improve dust management and monitoring practices have been identified and are reflected in this updated Air Quality and Dust Management Plan.

The data confirms that the key predictions in the original modelling remain valid: namely that the highest risk of dust generation is from cleared or active areas exposed to easterly and south westerly winds during dry periods. Monitoring to date has also indicated elevated background dust levels at times above threshold values which is attributed to surrounding agricultural land and activities (i.e. cattle grazing, crop harvesting and strong winds across open paddocks). Appendix A indicates the location of the DMPs.

1.4.4. AUSTRALIAN STANDARDS

Dust monitoring will be undertaken in accordance with the applicable Australian Standards relevant to the technology used, including:

- AS/NZS 3580.1.1:2016 - Methods for Sampling and Analysis of Ambient Air – Guide to Siting Air Monitoring Equipment.

- AS/NZS 3580.9.11:2016 - Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM_{10} beta attenuation monitors.
- AS/NZS 3580.12.1:2015 - Methods for sampling and analysis of ambient air - Determination of light scattering - Integrating nephelometer method.
- AS/NZS 3580.14:2014 - Methods for sampling and analysis of ambient air - Meteorological monitoring for ambient air quality monitoring applications.
- National Environment Protection (Ambient Air Quality) Measure (as amended, 2021), 24-hour PM_{10} goal.

1.4.5. MONITORING EQUIPMENT

Improvements since the commencement of the operations include;

- Selection of real time monitoring equipment to allow for more direct and accurate monitoring of parameters at a frequency and averaging period prescribed in Ministerial Condition 15.
- Monitoring data able to be analysed in conjunction with meteorological data and logs of site activities to investigate potential exceedances and community concerns
- Monitoring equipment is to be solar powered and operates continuously with a target availability of 95% to account for planned servicing and maintenance and unplanned downtime.

TSP and PM_{10} Monitoring

In accordance with MS810, dust monitoring at the Keysbrook Mine is undertaken for Total Suspended Particulates (TSP) and particulate matter smaller or equal to 10 microns (PM_{10}).

KLPL uses three nephelometers operated and maintained in accordance with AS/NZS 3580.12.1:2015 - *Methods for sampling and analysis of ambient air - Determination of light scattering - Integrating nephelometer method*.

The current nephelometers utilised on site are Dust Master Pro's. The nephelometers will be configured to measure PM_{10} concentrations over a 15-minute averaging period.

The e-BAM unit previously in service during the commencement of the operation was struck by lightning hence it is no longer in service.

1.4.6. MONITORING LOCATIONS

The monitoring equipment will be located around the periphery of the Project area (Figure 1), with placement guided by:

- The location of proposed mining and rehabilitation activities;
- Prevailing seasonal wind conditions;
- Proximity of mining activity to sensitive human receptors; and
- An objective of characterising airborne dust concentrations upwind and downwind of the disturbance footprint. The upwind and downwind locations will be based on seasonal wind roses. Wind roses generated from the Bureau of Meteorology (BoM) Mandurah station 9977 are provided as Appendix B.

The locations of the monitoring points will require adjustment in respect of the moving mining operation and may also be adapted in response to ongoing data analysis and community feedback. The fluidity of the monitoring locations is pivotal in maximising the value and reliability of data.

The positioning of instruments will be cognisant of the likelihood of vandalism and theft. Monitoring locations will be chosen based on potential visual obscurity and where public access is minimised. To further minimise the risk of theft, all monitoring equipment will be equipped with anti-theft wheel clamps

1.4.7. TELEMETRY AND ALERTS

Monitoring equipment will be configured to include the following capabilities:

- Automated remote warning system that can send alerts when dust concentrations exceed the trigger values.
- Telemetry system to allow for remote downloading of monitoring data.
- Solar power or high-capacity battery system to provide continuous power.

1.4.8. METEOROLOGICAL MONITORING

An automated meteorological station located in proximity of the processing site, adjacent to the process water dam, provides a more comprehensive suite of weather data valuable for the interrogation of dust data. The equipment is mounted on a 10-metre mast and includes transducers for wind speed, wind direction, relative humidity and rainfall installed to Bureau of Meteorology standards.

1.4.9. MONITORING EQUIPMENT CALIBRATION

All equipment will be subject to a scheduled servicing and maintenance program managed via KLPL's PRONTO scheduling system. Servicing and calibration of dust monitors and the meteorological station will be in accordance with applicable Australian Standards or manufacturer specifications. This will typically occur on at least a quarterly basis by a trained monitoring technician. An annual calibration of all monitoring equipment will also be undertaken with records maintained by KLPL within a calibration register.

1.4.10. RATIONALE FOR CHOICE OF ENVIRONMENTAL CRITERIA

Environmental assessment criteria are prescribed in MS810 Conditions 15-2 and 15-3 and relate to PM_{10} and TSP dust. Accordingly, dust monitoring and the management of potential dust impacts focus on these parameters in order to ensure that environmental criteria are met.

Total Suspended Solids (TSP)

Total Suspended Particulates (TSP) is a measure of all detectable particles in the atmosphere. TSP measurements tend to be skewed by the inclusion of larger more massive particles which by their nature and size are less likely to be inhaled into the lungs. As a result, TSP monitoring is primarily a measure of impact on amenity more so than on health. Examples of amenity values that can potentially be affected by TSP dust include:

- Visual impacts;
- Preventing members of the community from undertaking outdoor activities in comfort;
- Soiling clothing on washing lines;
- Dust build-up on buildings, including roofs and vehicles requiring frequent washing.

Particulate Matter (PM_{10})

Particulate Matter PM_{10}, includes only particles smaller than 10µm in aerodynamic diameter and are considered 'respirable'. These particles may enter through the nose and throat and be deposited in the trachea and bronchia sections of the respiratory tract, and have the potential to lead to adverse health effects.

Heavy deposition of finer particulates has the potential to affect vegetation health by limiting photosynthesis (leaf smothering) and gaseous exchange (blocked stomata). Blocked stomata can reduce the ability of a plant to transpire, thus increasing internal leaf temperature, which can result in a down regulation in photosynthesis (Turner, 2013).

1.4.11. RATIONALE FOR CHOICE OF TRIGGER LEVELS AND THRESHOLD CONTINGENCY ACTIONS

Trigger levels have been determined for short term monitoring parameters to facilitate investigation and pre-emptive preventative measures, where relevant, to minimise dust emissions in the event of an adverse trend and to maintain compliance with prescribed limits defined in Section 1.3.

Internal triggers are defined in Section 3.2 and have been determined through:

- Initial air dispersion modelling data;
- Assessment of monitoring data collated to date;
- Review of verified dust complaints from sensitive receptors;
- Identification of the activities and conditions that had contributed to significant dust events.

Triggers are then set as early response indicators so that significant dust events can be ameliorated where attributable to KLPL operations

2. ENVIRONMENTAL MANAGEMENT PLAN PROVISIONS

2.1. MANAGEMENT APPROACH

The following actions describe the overall management approach for dust control.

- Sowing of a 'dust crop' comprising of rye grass mix to open areas of profiled tails sand as an interim measure prior to the replacement of topsoil;
- Use of 'slime carts' which are modified water carts which allow the spreading of clay fines 'slimes' to open areas and stockpiles in preparation for and during moderate to high-risk weather conditions;
- Identification of activities and meteorological conditions conducive to dust generation;
- Establishment of standard practices to minimise dust generation. These practices reflect the risk of potential dust impacts on residents including their proximity to active mining;
- Use of weather forecasting to refine short term mine planning and associated activities;
- Monitoring of wind speed and direction, TSP and PM_{10} dust emissions from mining activities at selected boundary locations as well as at other locations within the Project area in order to identify and mitigate operational dust emissions;
- Implementation of a proactive consultation and communication procedure to inform residents of proposed mining activities in proximity to their dwellings and/or to respond to complaints efficiently;
- Development and implementation of contingency measures in the event of verified elevated dust events.

2.1.1. MINING ACTIVITIES NEAR RESIDENCES

Based on the result of modelling undertaken by SKM in 2007, an air quality buffer of 300 metres between active mining areas and occupied houses has been established. Mining may occur up to these buffers under any wind conditions. These air quality buffers correspond to the buffers established by noise modelling undertaken to educate the original Noise Management Plan developed for the site.

Under revised MS1089 (February, 2019), Condition 14 governing noise management was revised to extend the buffers for mineral processing and daytime mining to 2km. The revised statement did not apply to areas of the approved mining area that have already been mined.

The revised statement provides relief from the 2km buffer in the form of amenity agreements. Therefore, amenity agreements have been sought with all residences within 2km of the remaining approved mining area, to provide compensation for potential reduced amenity through noise and dust emissions from the project.

While amenity agreements do provide some relief for the Project from imposed noise and air quality restrictions, the project is still required to adhere to the noise emissions levels and air quality exceedance thresholds stipulated in MS810 and MS1089.

Therefore, if mining is to occur within 300m of a residence the following will apply:

- The residence is not occupied. This may be as a result of a commercial agreement between KLPL and the residences owner and occupier; or

- Mining is undertaken during times of wet soil and/or conditions (i.e. winter and autumn). Any such decision to mine within these areas would be based on assessment of the moisture content at the time as this is likely to be highly variable depending on climatic conditions; or
- Mining is undertaken during periods where winds are away from residences. Any such decision would be assessed at the time and would be subject to air quality standards documented in this Plan being complied with; or
- If mining does occur within these areas (i.e. within 300m of a residence), additional dust management measures may be required depending on the weather, wind direction and speed and moisture content of the soil materials.

It is not expected that additional measures will be required during the winter months (May to October) as soil moisture and rainfall will be sufficient to minimise dust lift off. During late spring, summer and early autumn (mid-October to late April) it is expected that soil conditions will be dry with insufficient moisture to prevent dust lift off during windy conditions.

2.1.2. USE OF WEATHER FORECASTS

Weather forecasts will be obtained and used on site as a proactive management tool. While not used as a primary management tool, weather forecasts are considered, in unison with other standard proactive measures, to assist in limiting potential dust generation when scheduling activities. Local weather forecast data for up to 4 days in advance will be accessed via proprietary products which enable easier data integration with site planning tools.

2.1.3. STANDARD DUST CONTROL ACTIONS

The following initiatives will be implemented to reduce the potential for dust impacts during operations:

- Use of weather forecasts to identify potentially high-risk conditions conducive to dust generation, and initiation of proactive dust management practices;
- Restriction of mining within 300m of a residence without agreement with the owner and occupier of the residence. Any mining within 300m of a residence will occur in accordance with the agreement, which will include provisions for minimising dust emissions (such as seasonal mining, appropriate soil moisture conditions, weather conditions and dust suppression);
- Use of water trucks over exposed areas susceptible to dust generation including active mining and rehabilitation areas, topsoil stockpiles, haul roads and access tracks;
- Restricting vehicles to designated roads and tracks;
- Limiting vehicle speeds on unsealed roads and tracks;
- Limit the area open ahead of mining and at the mine front to no more than 30 ha at any one time;
- Progressive rehabilitation to reduce the duration of land exposed and susceptible to dust generation;
- Stabilisation of disturbed areas and topsoil stockpiles using a clay/water slurry (which dries to a thin clay veneer resistant to wind erosion) or other stabilising agents, where possible;
- Growing of temporary ‘dust’ crops to bind soil and decrease wind velocity at ground level where appropriate, where groundworks for rehabilitation are partially completed;

- Regular housekeeping to remove spilled product or materials conducive to dusting;
- Covering heavy mineral concentrate product prior to despatch from site.

2.1.4. MANAGEMENT OF MINING AREAS

Where wind speeds on site are expected to (or actually do) exceed 23km/hr, additional management is required. The Site Manager is responsible for implementing the following hierarchy of management actions:

- Reduce vehicle speeds in the area until wind speeds reduce;
- Where reduction of vehicle speed does not result in decreased dust generation, increase the rate of watering to prevent dust lift off;
- When all other management actions have not resulted in decreased dust generation, cease mining activities within the buffer area and/or move to areas outside of the buffer.

To assist in managing dust impacts, a series of real time dust monitors will be established to provide a warning if dust emissions exceed trigger values outlined in Section 1.4.5. The Mining Superintendent is responsible for implementing additional management measures once an alert is raised. If these measures do not result in a decrease in dust emissions, the Mining Superintendent is responsible for adjusting mining operations until wind conditions abate. Management measures may still be required if conditions are such that wind generated dust lift off creates high dust concentrations in the absence of excavation activities.

2.2. TRIGGER LEVELS

2.2.1. TRIGGER LEVEL ACTIONS

The trigger level and threshold criteria provided in Table 4 have been adopted.

TABLE 4: MONITORING TRIGGER VALUES

Parameter	Trigger Values	
	Trigger Criteria[3]	Threshold Criteria/Limit
Total Suspended Particles (TSP)	600 µg/m^3 15-minute average	1,000 µg/m^3 15-minute average
Particulate Matter less than 10 micron (PM_{10})	40 µg/m^3 6 hour rolling average	50 µg/m^3 24-hour average (in excess of five (5) times per year)

In the event that real time particulate monitoring identifies that ambient TSP or PM_{10} trigger criteria are reached at any monitor, an alert will automatically be initiated to the Mining Superintendent and the site Environmental Officer.

If Trigger Criteria are reached or exceeded, and after review there are grounds, based primarily on wind direction to believe KLPL land or activities are the cause or significant contributor to the elevated dust, the following measures will be implemented to limit the risk of escalation of the dust event:

- A site inspection will be undertaken to identify the source(s) of the elevated results relative to wind conditions, mining activities and/or inactive exposed areas at the time. The presence of non-

[3] Trigger criteria may be revised following collation and review of ongoing monitoring data in 2018

operational dust generating activities will also be checked (such as stock activity, fertilizing, ploughing, harvesting);

- Where dust generation is determined to be attributable to KLPL ongoing activities, implementation of additional dust controls such as increased rate of application of water over the source area;
- Consideration given to ceasing mining activity in relevant areas until prevailing conditions subside and the risk of elevated dust concentrations exceeding threshold criteria is removed;
- Consideration given to liaison with potentially affected residents who may be susceptible to the dust event.

2.3. REPORTING PROVISIONS

2.3.1. ANNUAL REGULATORY REPORTING

KLPL will prepare a Compliance Assessment Report (CAR) for the period 20 July (of the previous year) to 19 July, which outlines performance and compliance in accordance with a Compliance Assessment Plan approved under Condition 4 of Ministerial Statement 810. The report will be submitted within 3 months of the end of the report period (i.e. by 19 October). This report will include:

- Evidence of compliance with Condition 15;
- An assessment of monitoring data collated in accordance with this AQDMP;
- A summary of identified exceedances of threshold criteria and associated mitigation measures;
- Actions undertaken to address potential non-conformances associated with key plan provisions in Table 6 of this AQDMP.

2.3.2. REPORTING ON EXCEEDANCE OF THRESHOLD CRITERIA

Verified exceedance with the threshold criteria defined in Table 5 will be reported to DWER. Verification involves confirming the result is valid (i.e. not caused by smoke or instrument interference) and that there is a reasonable likelihood that KLPL land or activities caused, or significantly contributed to, the elevated dust level.

The number of exceedances of the PM_{10} target per calendar year will be tracked by the Environmental Officer. More than five PM_{10} verified exceedances in a calendar year, or one verified exceedance of the TSP threshold criterion will be reported to DWER as a (potential) non-compliance with Condition 15-3(e) within two business days of verification (as per Condition 4-5).

Dust complaints and remedial actions will be summarised in the Annual Environmental Report (AER) as required under the site Part V EP Act licence.

2.3.3. INTERNAL REPORTING

The Environmental Officer will report to the Environmental Coordinator on a monthly basis or at an alternative agreed interval:

- Summary graphs of TSP and PM_{10} data;
- Number of alert level triggers and regulatory limit exceedances (if any); and
- Circumstances leading to triggers and regulatory limit exceedances.

2.3.4. EMP PROVISIONS

Table 5 provides a summary of the objective based EMP to meet legal requirements of Condition 15 of MS810.

TABLE 5: OBJECTIVE BASED EMP PROVISIONS

MANAGEMENT TARGETS	MANAGEMENT ACTIONS	MONITORING / PERFORMANCE INDICATOR	TIMING/ FREQUENCY OF ACTIONS	REPORTING
Management Target 1	Management Actions 1			
	Use of weather forecasts to identify potentially high-risk conditions conducive to dust generation, and with reference to Table 4, plan mining to suit the potential wind conditions and initiate of proactive dust management practices.	Daily weather report. Supervisor shift report.	Daily	AER
	If wind conditions are in excess of 23km/per hr initiate the following additional management actions: • Reduce vehicle speeds in the area until wind speeds reduce; • Where reduction of vehicle speed does not result in decreased dust generation, increase the rate of watering to prevent dust lift off; and, • When all other management actions have not resulted in decreased dust generation, cease mining activities within the buffer area and/or move to areas outside of the buffer.	Current wind conditions.	Annual	CAR
	No mining within 300m of a residence without the agreement of the owner and residents.	Mining footprint in relation to residences.	Annual	CAR
	Regular use of water trucks during dry periods.	Supervisor shift report. Site rainfall records.	Ongoing	Monthly reporting

MANAGEMENT TARGETS	MANAGEMENT ACTIONS	MONITORING / PERFORMANCE INDICATOR	TIMING/ FREQUENCY OF ACTIONS	REPORTING
	Limit area open ahead of mining and at the mining front to no more than 30ha at any one time. Stabilisation of trafficable open areas post mining through full rehabilitation or interim stubble crop	Mining footprint (surveyor), monthly updates. Annual areas of rehabilitation and stabilisation seeding.	Monthly Feb-Oct	AER CAR CAR
Management Target 2 Monitoring program to: (i) characterise local dust environment; (ii) inform management measures; and (iii) enable assessment of compliance.	**Management Actions 2** Maintain a network of automated dust monitoring stations. Regularly assess data in relation to land and weather conditions and report. Report potential exceedances of threshold criteria.	PM_{10} continuously measured a minimum of 300 days/year (including period October – June) at minimum of 2 sites around project boundary TSP continuously measured a minimum of 300 days (including period October – June) at higher risk downwind site by one monitor Monthly report. Threshold criteria • TSP - 1,000 µg/m^3 15-minute average. • 50 µg/m^3 24-hour average (PM_{10}) in excess of five (5) times per year	Ongoing Ongoing As necessary	Monthly report (internal) CAR CAR CAR AER DWER (potential non-compliance report).

3. RESPONSIBILITY AND ACCOUNTABILITY ALLOCATION

The Mine Manager has overall accountability and responsibility for management of operations of the site and is therefore responsible for the implementation of this AQDMP.

The Environmental Coordinator has responsibility for ensuring implementation of the AQDMP, auditing and reporting environmental performance, and periodic reviews to of the plan to ensure its ongoing effectiveness.

The Environmental Officer has responsibility for implementing the monitoring, data review and reporting elements of this plan.

Responsibilities and accountability allocation are defined in the following table.

TABLE 6: ROLES AND RESPONSIBILITIES

ROLE DESCRIPTION	RESPONSIBILITY
Allocation of resources to implement AQDMP	Mine Manager
Assessment of dust generation potential relative to short and medium mine plan, proximity to sensitive receptors, forecasted meteorological conditions.	Mine Manager Environmental Officer
Implementation of dust controls during mining activities.	Mining Superintendent
Implementation of contingency measures in the event that monitoring triggers are reached or a validated complaint is received.	Mining Superintendent Environmental Officer
Coordination of dust monitoring program	Environmental Officer
Review and analysis of monitoring data.	Environmental Officer
Internal reporting of dust incidents and complaints.	Mining Superintendent
External reporting to regulatory agencies.	Environmental Officer
Community and stakeholder liaison.	Environmental Officer
Training of personnel on aspects of this AQDMP relevant to their role	HSEC Advisor
Annual review of this AQDMP	Environmental Officer

4. ADAPTIVE MANAGEMENT AND REVIEW OF AQDMP

Adaptive management is a structured, iterative approach for improving the efficacy of actions and quality outcomes. It aids ongoing decision-making by reducing uncertainty over time through monitoring, analysis and interpretation and adaption both to environmental, economic and social changes.

The key steps of the approach applied by Doral and embodied in the Environmental Management System are illustrated and explained below.

- Define & Plan: Technical assessment, modelling and analysis based on key characteristics to determine the range of possible outcomes and impact scenarios. Through an assessment process the strategic approach is developed; identifying goals, objectives and performance indicators to guide the project through operation.
- Implement & Monitor: Work plans and procedures are developed and implemented. Monitoring, auditing and compliance reporting are progressively undertaken.
- Analyse: Data acquired is assessed to determine if the operating strategy remains consistent with project and approval objectives.
- Adjust: Adaptions at strategic and operational levels as appropriate in response to analysis conclusions, changes in regulatory framework and stakeholder feedback.
- Share: Communicating performance and learnings within Doral, key matters of interest with the community, and reporting performance and compliance with regulatory agencies in conformance with approval and statutory obligations.

4.1. REVIEW OF AQDMP

The AQDMP will be reviewed annually or in the event of a significant change to the dust emission risk. The plan may also be revised on the instruction of the CEO of DWER in accordance with Condition 15-5.

The review of the AQDMP will consider:

- Any change in relevant standards, codes of practice or regulatory limits;
- Monitoring data including trends and anomalies;
- Applicability of adopted trigger criteria;
- Effectiveness of management measures, documented procedures and equipment to ongoing operations and control of environmental risks;
- The ability of the AQDMP to achieve defined objectives and targets;
- The efficacy in achieving compliance with Condition 15;
- Maintenance of records of monitoring data and dust incidents, and follow-up action that had been implemented; and
- Outcomes of inspections.

5. STAKEHOLDER ENGAGEMENT

Stakeholders who have been identified as having an interest in the environment surrounding the proposed amendment within Lot 63 have been consulted and will continue to be consulted and informed through the approvals phase. KLPL has been engaging with all stakeholders since project commencement in 2012 and startup of operations in 2015. This consultation has been in the form of regular community updates (every 6 – 12 weeks), newsletters and meetings as required for specific development or operational updates. Communications and meetings with key stakeholders specific to the proposed amendment has been undertaken subject to environmental and landholder approval.

The existing stakeholder communications database and register has been utilised for the Lot 63 amendment, including the continued documentation of stakeholders issues/ concerns raised and the outcome of the consultation.

A summary of stakeholder engagement is outlined in the following table.

TABLE 7: STAKEHOLDER ENGAGEMENT

STAKEHOLDER	DATE	TYPE OF CONSULTATION	RELEVANT DISCUSSION POINTS/KEY ISSUES	COMMENTS RECEIVED / OUTCOMES
Shire of Serpentine-Jarrahdale CEO and Planning Manager	23/02/2023	In person meeting. Receives copies of landholder updates and newsletters	45c proposal and Shire Development Application and timings	Development Application to be considered once EPA decision advised. Crossing of Elliott Road, subject to Traffic Management Plan. Query on road condition post mining completion. Commitment to ensure road condition in line with Shire's standards. Supportive of application, Council deputation planned for mid 2023.
Shire of Murray CEO and Director Planning	26/04/2023	In person meeting. Receives copies of landholder updates and newsletters	45c proposal and Shire Development Application and timings	Lot 63 sits within Shire of Serpentine Jarrahdale, conversation more broadly around future extensions into the Shire of Murray. New Councillors and staff to visit site October 2023. Supportive of project.
Hugh Jones MLA, Member for Darling Range	07/11/2022	In person meeting. Receives copies of Community Update letters and newsletters	Extension proposals	Supportive of expansion plans, noted any community feedback received would be provided

STAKEHOLDER	DATE	TYPE OF CONSULTATION	RELEVANT DISCUSSION POINTS/KEY ISSUES	COMMENTS RECEIVED / OUTCOMES
Robyn Clarke MLA, Member for Murray Wellington	07/11/2022	In person meeting. Receives copies of Community Update letters and newsletters	Extension proposals	Supportive of expansion plans and general community support to date, noted any community feedback received would be provided to Doral.
Landcare SJ	Ongoing since 2012	In person and via discussions around commercial tree planting arrangements	Regular discussion regarding revegetation planning and planting. Annual monitoring of artificial Black Cockatoo hollows.	Active involvement in the Keysbrook revegetation and fauna habitat creation
Peel Development Commission	23/03/2023 Ongoing since 2012	In person meeting. Receives copies of Community Update letters and newsletters	Discussion around expansion proposal both Lot 63 and broader extensions.	Supportive of project and expansion, keep PDC informed of any extension plans in and around the Keralup vicinity.
Keysbrook Community Consultative Group (inc Shire and community representatives)	Held quarterly since 2012	Group meeting in person Lot 63 mine plan and broader western extension provided at 3 May 2023 meeting Copy of Lot 63 and western extension proposal letter dated 4 April 2023 sent	TBA	Supportive, interested in neighbour community engagement outcomes. Advised consultation undertaken with all close proximity neighbours and highlighted concerns raised to date and mitigation measures.
Lot 701, Morgan	04/04/2023	Letter + phone call	Summarised letter, meeting planned for week commencing 8 May 2023 to discuss in further detail.	Landholder amenity agreement signed, concerns predominantly around dust. Meeting in progress to discuss mitigation measures to address.
Lot 12, Stewart	04/04/2023	Letter + text message	Summarised letter, meeting planned for 3	Landholder amenity agreement signed, concerns predominantly around dust. Meeting in progress to

STAKEHOLDER	DATE	TYPE OF CONSULTATION	RELEVANT DISCUSSION POINTS/KEY ISSUES	COMMENTS RECEIVED / OUTCOMES
			May 2023, to discuss in further detail.	discuss mitigation measures to address.
Lot 700, Allspell Nominees	04/04/2023	Letter + phone conversation	Residence is a rental	Occupant Deed signed by tenant, owners signed amenity agreement, Lot 700 is the closest residence to Lot 63. Discussion around proximity and timing, no concerns raised, agreed to discuss in August 2024, when more certainty around timing and if the tenants remain the same.
Lot 503, Elliott Road			House is vacant, owner resides in Malaysia.	Currently ascertaining ownership details through neighbours, borderline 2km distance.
Lot 501, Elliott	04/04/2023 14/04/2023	Letter plus in person meeting	Water and dust.	Sits outside of 2km, interested landholder, concerns around water ad dust. Environmental Manager met with landholder on 13 April 2023 to discuss mitigation measures and address concerns.
Lot 20, Doral owned property	04/04/2023	Letter	Mine life	Doral owned property, signed Occupant Deed. Queries around length of mining and term of tenancy. Communications ongoing. No further comments.
Lot 211, Doral owned property	04/04/2023	Letter	-	Doral owned property, signed Occupant Deed. No comments.
Linga Holdings (Rob Guira)	04/04/2023 29/04/2023	Letter plus in person meeting	One on one tour with Mine Manager on 29/04/2023	Landholder amenity agreement signed. No comments.
Lang	04/04/2023	Letter	Meeting planned for week commencing 8 May to discuss in further detail.	Currently in consultation in regard to common drain on Doral owned Lot 211, meeting in progress to discuss Lot 63 expansion in further detail. Amenity agreement required, borderline 2km distance.
Letter to closet neighbours **42 neighbours in total**	04/04/2023 Near neighbours – within 2km zone – letter	Letter to all neighbours within 2km distance, detailed Company's	Letter includes offer to meet and discuss, follow up with landholders who wish to meet. Letter also more broadly referred to western	No feedback received at this time.

STAKEHOLDER	DATE	TYPE OF CONSULTATION	RELEVANT DISCUSSION POINTS/KEY ISSUES	COMMENTS RECEIVED / OUTCOMES
	specific to Lot 63, Section 45c approval	plans to submit a 45c to extend mine life in relation to Lot 63	extension. Detailed mitigation measures around noise, dust, water and approvals process.	
Closest neighbours **85 neighbours in total**	14/04/2023 Ongoing since 2012, issued every 10 – 12 weeks,	Community mailing list, ~ 85 neighbours within 3km – 4km radius	Targeted information in relation to Keysbrook mining operations, letters specifically referred to Lot 63 Section 45c application and broader extension proposal.	Site contact details provided for community feedback specific to extension proposal. No feedback received at this time.
Interested community and closest neighbours	Bi-annually	Newsletter Mailing list ~ 300	General Information, next edition planned for June 2023, will include Lot 63 and broader extension information.	Site contact details provided for community feedback specific to extension proposal. No feedback received at this time.

5.1. COMPLAINTS MANAGEMENT

KLPL has established internal protocols to receive, investigate and respond to community complaints. On being notified of a concern or complaint, the call or interaction is logged by KLPL personnel using the Stakeholder Interaction Report Form (SIRF) (Appendix B).

The matter of each contact is investigated and where appropriate measures are taken to rectify substantive issues as soon as possible., with actions recorded. Initial feedback will be provided to the complainant within a 24-hour period. This may be to advise the matter has been rectified, or to advise that the matter continues to be being investigated. The aim is to close out all investigations and provide notice in writing within 5 working days.

Analysis of feedback and complaints will be reviewed as required to identify trends and possible concentration of complaints and target areas of improvement.

6. CHANGES TO AN EMP

The following minor changes have been made to the AQDMP to support the submission of the Section 45C request.

TABLE 8: CHANGES TO EMP

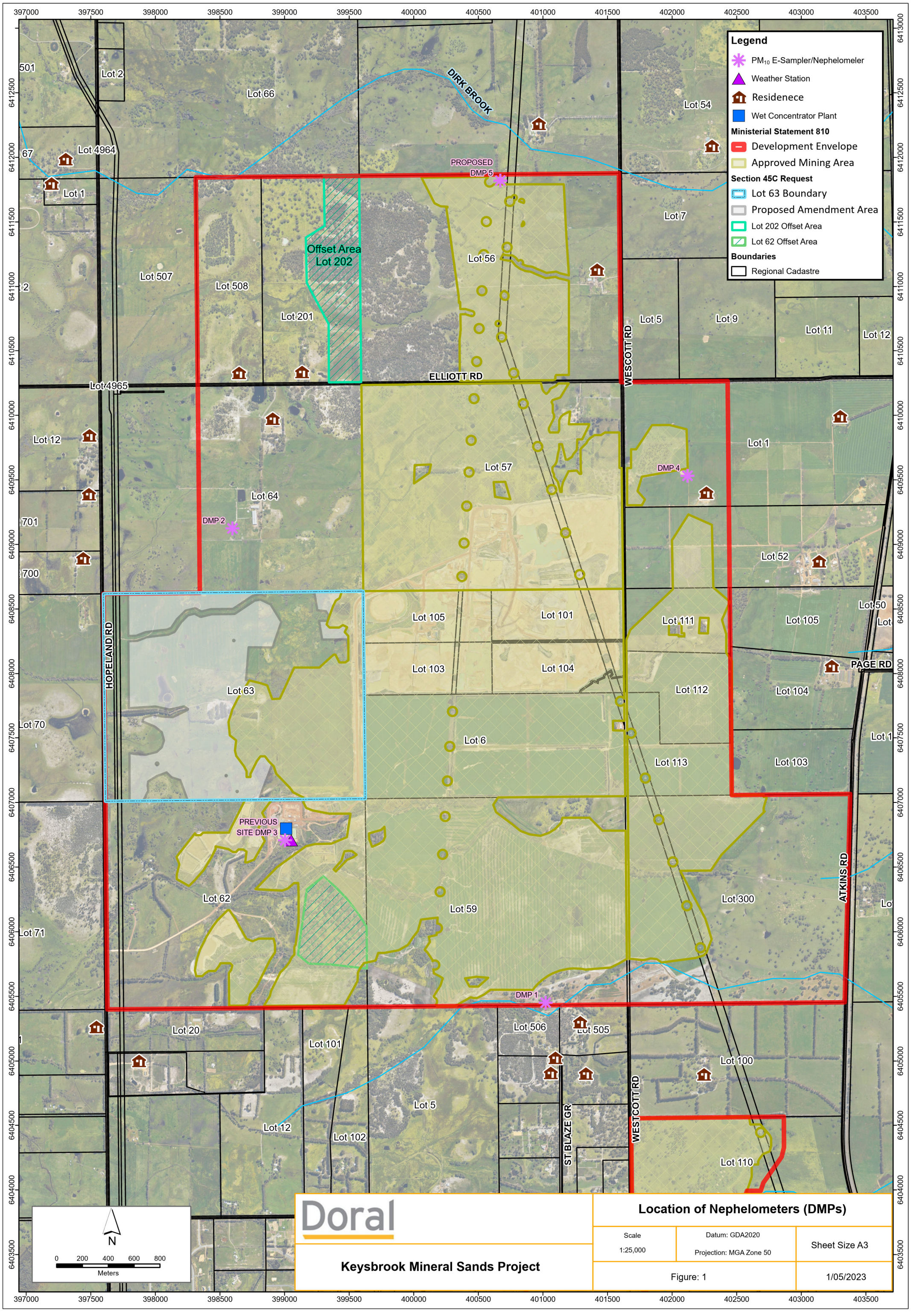
COMPLEXITY OF CHANGES		MINOR REVISIONS ✓	MODERATE REVISIONS	MAJOR REVISIONS
NUMBER OF KEY ENVIRONMENTAL FACTORS		One ✓	2-3	>3
DATE REVISION SUBMITTED TO EPA		Apr 2023		
PROPONENT'S OPERATIONAL REQUIREMENT TIMEFRAME FOR APPROVAL OF REVISION		<1 month	<6 months ✓	>6 months
ITEM NO.	EMP SECTION NO.	EMP PAGE NO.	SUMMARY OF CHANGE	REASON FOR CHANGE
1	Section 1.1	1	Updated to include proposed S45C details for Amendment Area (Lot 63)	Update EMP to include proposed Amendment Area to support submission of S45C
2	Section 1.3	2	Updated wording to include proposed S45C details for Amendment Area (Lot 63)	Update EMP to include proposed Amendment Area to support submission of S45C
3	Section 2.4.3	16-17	Table updated to conform with EPA EMP guidance	Previous table not consistent with EPA EMP guidance Rationalised management targets/actions to conform with EMP guidance
4	Section 5	20	Updated Stakeholder Consultation	Updated Stakeholder Consultation required for S45C request
6	Section 6	22	Table of Changes to EMP	As required by EMP guidance

7. REFERENCES

MZI Resources. (2013). Air Quality & Dust Management Plan Addendum. Perth, WA.

Turner, G. F. (2013). 'Vulnerability of Vegetation to Mining Dust at the Jack Hills, Western Australia', pp. 8-9. Master of Science Thesis, School of Plant Biology, University of Western Australia.

FIGURE 1: SITE LOCATION AND MONITORING LOCATIONS


Legend
PM10 E-Sampler/Nephelometer
Weather Station
Residenece
Wet Concentrator Plant
Ministerial Statement 810
Development Envelope
Approved Mining Area
Section 45C Request
Lot 63 Boundary
Proposed Amendment Area
Lot 202 Offset Area
Lot 62 Offset Area
Boundaries
Regional Cadastre
DIRK BROOK
PROPOSED DMP 5
Offset Area Lot 202
ELLIOTT RD
WESCOTT RD
HOPELAND RD
PAGE RD
ATKINS RD
ST BLAZE GR
WESTCOTT RD
DMP 4
DMP 2
PREVIOUS SITE DMP 3
DMP 1
Lot 1
Lot 2
Lot 4964
Lot 66
Lot 54
Lot 7
Lot 56
Lot 507
Lot 508
Lot 201
Lot 5
Lot 9
Lot 11
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Lot 4965
Lot 57
Lot 64
Lot 52
Lot 105
Lot 101
Lot 111
Lot 50
Lot 103
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Lot 63
Lot 6
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Lot 59
Lot 300
Lot 20
Lot 506
Lot 505
Lot 100
Lot 102
Lot 110
Lot 70
Lot 71
N
0 200 400 600 800
Meters
Doral
Keysbrook Mineral Sands Project
Location of Nephelometers (DMPs)
Scale 1:25,000
Datum: GDA2020
Projection: MGA Zone 50
Sheet Size A3
Figure: 1
1/05/2023

APPENDIX A: SEASONAL WIND ROSES (BOM STATION 9977 MANDURAH)

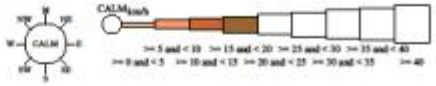
Rose of Wind direction versus Wind speed in km/h (25 Oct 2001 to 30 Sep 2010)

Custom times selected, refer to attached note for details

MANDURAH

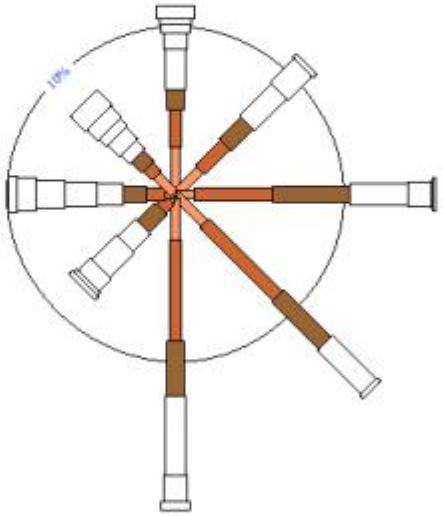
Site No: 009577 • Opened Oct 2001 • Still Open • Latitude: -32.5219° • Longitude: 115.7119° • Elevation 3m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



9 am Spring
793 Total Observations

Calm 1%



TCZ9428260 Page 1

Rose of Wind direction versus Wind speed in km/h (25 Oct 2001 to 30 Sep 2010)

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MANDURAH

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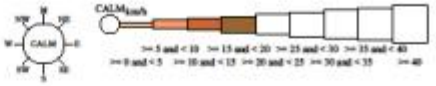
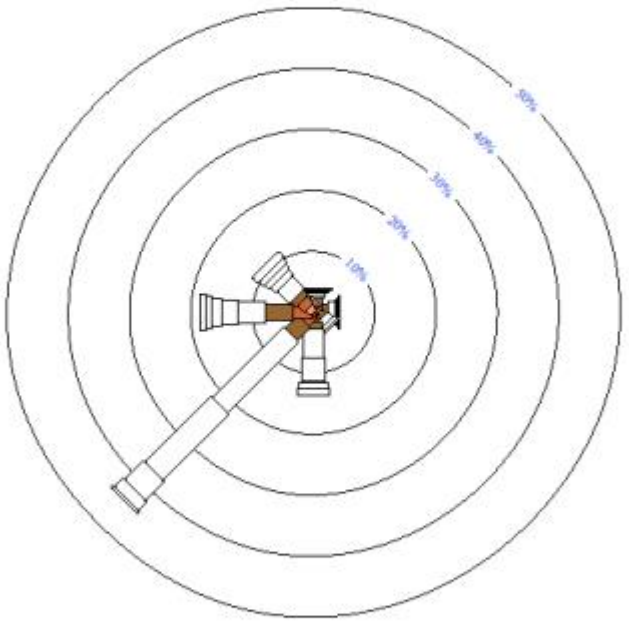


3 pm Spring
791 Total Observations

Calm *



TCZ9428260 Page 1

Rose of Wind direction versus Wind speed in km/h (25 Oct 2001 to 30 Sep 2010)

Custom times selected, refer to attached note for details

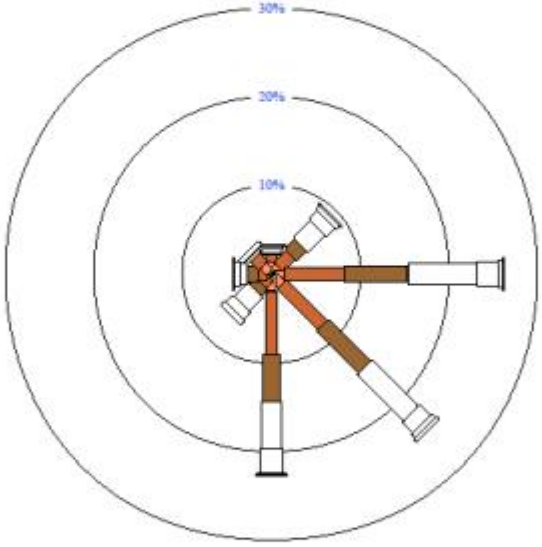
MANDURAH

Site No: 009977 • Opened Oct 2001 • 9am Open • Latitude: -32.6219° • Longitude: 115.7119° • Elevation 3m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.

9 am Summer
812 Total Observations

Calm *



TCZ9425260 Page 1

Rose of Wind direction versus Wind speed in km/h (25 Oct 2001 to 30 Sep 2010)

Custom times selected, refer to attached note for details

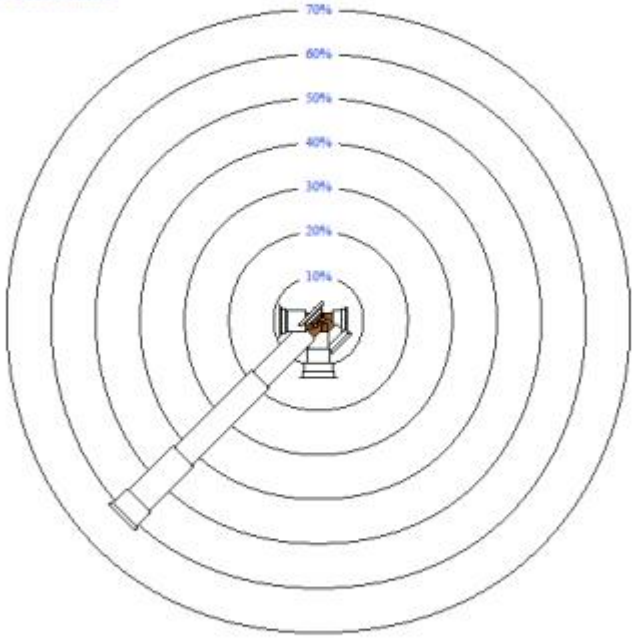
MANDURAH

Site No: 009977 • Opened Oct 2001 • 9am Open • Latitude: -32.6219° • Longitude: 115.7119° • Elevation 3m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.

3 pm Summer
811 Total Observations

Calm *



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Rose of Wind direction versus Wind speed in km/h (25 Oct 2001 to 30 Sep 2010)

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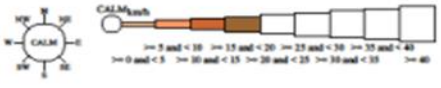
MANDURAH

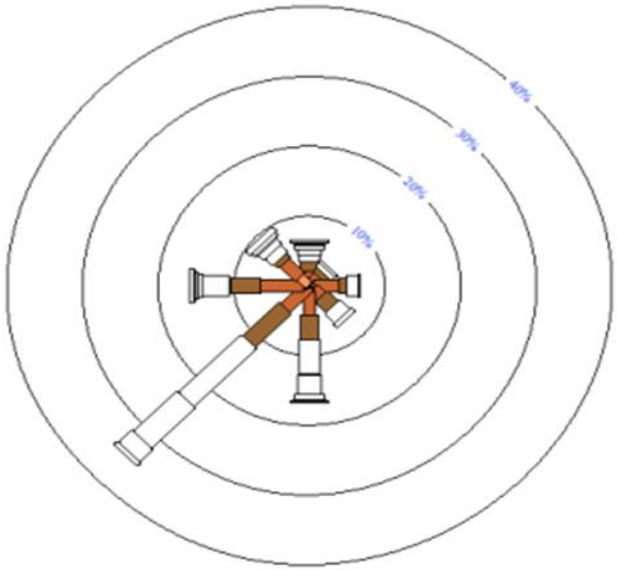
Site No: 009977 • Opened Oct 2001 • Still Open • Latitude: -32.5219° • Longitude: 115.7119° • Elevation 3m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



3 pm Autumn
828 Total Observations

Calm *



TCZ9428260 Page 1

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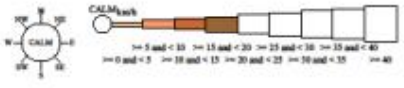
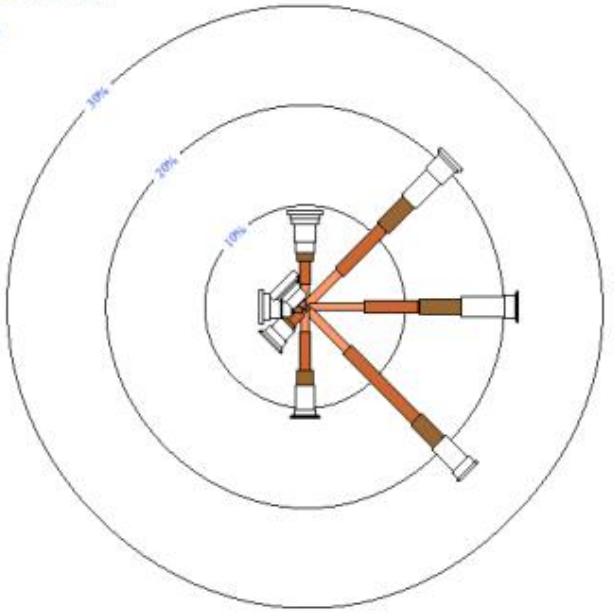


9 am Autumn
826 Total Observations

Calm 1%



TCZ9428260 Page 1

Rose of Wind direction versus Wind speed in km/h (25 Oct 2001 to 30 Sep 2010)

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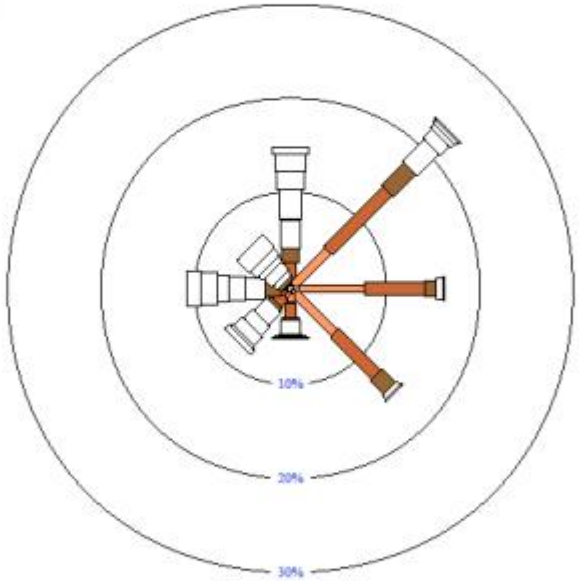
MANDURAH

Site No: 009977 • Opened Oct 2001 • Still Open • Latitude: -32.5219° • Longitude: 115.7119° • Elevation 3m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.

9 am Winter
826 Total Observations

Calm 1%



TCZ9425260 Page 1

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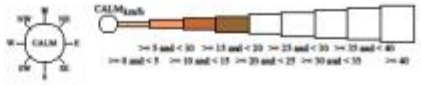
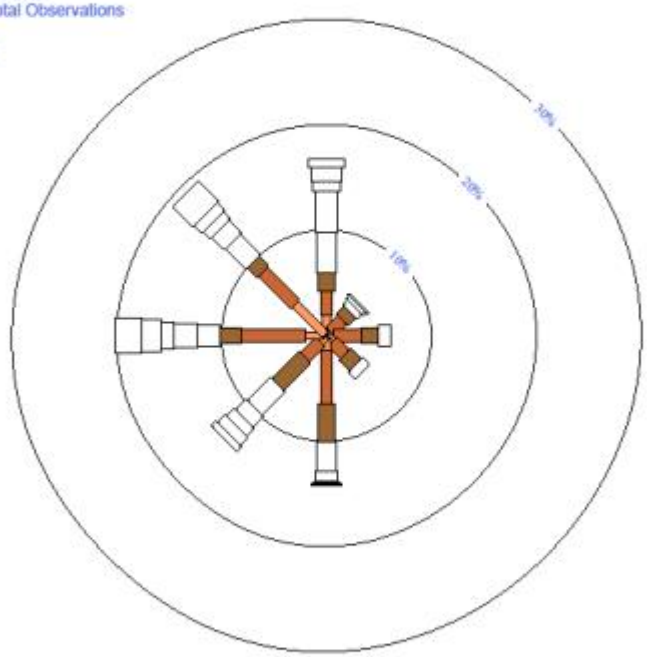


3 pm Winter
822 Total Observations

Calm *



TCZ9425260 Page 1

APPENDIX B: STAKEHOLDER INTERACTION FORM

KLPL STAKEHOLDER INTERACTION REPORT FORM *Note: Stakeholder responded to within 24 hours, written close out within 5 business days*		
DOCUMENT NO		
Date: **Time:**	**Call taken by:**	
Stakeholder Name:		
Phone Number:		
Address:		
Subject of contact: *i.e. environmental (dust, noise, water, light), economic, social etc.*		
Details: *effects, frequency, time of event, location etc.*		
# Action taken *(if any)* **#** Take immediate action to rectify matter if reasonable and practical to do so, let stakeholder know what you have done		
Action Completed by: *(KLPL personnel)*	**Phone Number** **Date**	
Email this form to: *community@klpl.com.au*		
Company investigation / stakeholder feedback / close out action:		
Response to stakeholder: *(KLPL personnel with 5 business days)*	**Date**	**Time**
Signed by: *(KLPL personnel)*	**Date**	**Time**
Logged as a complaint?	Yes / No	
Logged in Radix and Consultation Manager: *(by MZI Administration Assistant)*	**Date**	**Reference**

ADDITIONAL NOTES IF REQUIRED:

Prepared by:

ABEC ENVIRONMENTAL CONSULTING PTY LTD

2/17 Inverness Avenue, Dunsborough WA 6281

admin@abecenv.com.au

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For and on behalf of:

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ACN 096 342 451
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