Report and recommendations of the Environmental Protection Authority

Keysbrook Mineral Sands Mine - Inquiry
Under Section 46 of the Environmental Protection Act 1986 to Amend Ministerial Statement 810

MZI Resources Ltd

Report 1627
December 2018
Inquiry Under Section 46 of the *Environmental Protection Act 1986*

The Minister for Environment requested the Environmental Protection Authority (EPA) inquire into and report on the matter of changing the implementation conditions in Ministerial Statement 810, relating to MZI Resources Ltd.’s proposal, the Keysbrook Mineral Sands Mine, in order to ensure noise is appropriately regulated and managed.

Section 46(6) of the *Environmental Protection Act 1986* requires the EPA Report to include:

1. a recommendation on whether or not the implementation conditions to which the inquiry relates, or any of them, should be changed
2. any other recommendations it thinks appropriate.

The following is the EPA’s Report and Recommendations to the Minister pursuant to s. 46(6) of the *Environmental Protection Act 1986*.

Dr Tom Hatton
Chairman

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1. Background

The proponent, MZI Resources Ltd (MZI) currently operates the Keysbrook Mineral Sands Mine, which is an open cut mineral sands mine and primary processing plant approximately 70 kilometres (km) south-east of Perth in the Shires of Serpentine Jarrahdale and Murray (Figure 1).

The site is located adjacent to the townships of North Dandalup and Keysbrook, and includes mining operations scheduled 24 hours a day, seven days a week, over an approximate eight year life span. The approved disturbance footprint is 1366 hectares (ha) and the main deposit is displayed in Figure 2.

The land within the development envelope pre-dates the enactment of the Land Act 1898, therefore mineral rights belong to the landowner, and the provisions of the Mining Act 1978 (Mining Act) do not apply. The development envelope spans several privately held, semi-rural properties, with mineral royalties agreed between MZI and individual landowners.

The EPA assessed the proposal at the level of Public Environmental Review (PER), releasing its Report and Recommendations (Report 1269) in October 2007. In this report, the EPA considered the following key environmental factors required detailed evaluation:

- Vegetation (fauna, wetlands and rehabilitation)
- Groundwater
- Noise
- Dust

In applying the EPA Statement of Environmental Principles, Factors and Objectives (EPA 2018a) these factors are now represented by:

- Flora and Vegetation
- Terrestrial Environmental Quality
- Inland Waters
- Social Surroundings

The EPA concluded in Report 1269, that it was likely the EPA’s objectives would be achieved, provided there was satisfactory implementation by the proponent of the EPA’s recommended conditions.

The then Minister for Environment approved the proposal for implementation, subject to the implementation conditions of Ministerial Statement (MS) 810 (19 October 2009).

The EPA recommends that noise emissions from the proposal are managed through an amended Ministerial condition 14, to ensure noise is appropriately regulated and managed for future operations.
Previously approved changes to conditions

There have been several previous modifications to the proposal:

- Attachment 1 of MS 810, approved on 19 June 2011 under Section 46c of the *Environmental Protection Act 1986* (EP Act), to amend a clerical mistake relating to Air Quality and Dust Management (condition 15).

- Attachment 2 of MS 810, approved on 4 February 2013 under Section 45c of the EP Act, the purpose of which was twofold:
  - increase the disturbance footprint to include development of a wet processing plant adjacent to the mining area; and
  - amend the area of vegetation within the development envelope to be protected.

- MS 984, approved on 16 October 2014 under Section 46 of the EP Act, to extend the time limit for proposal implementation, and amend two definitions relating to the Acid Sulfate Soils Management Plan (condition 16).
Figure 1: Regional location
Figure 2: Development envelope
2. Request to inquire into changing conditions

In December 2016, the then Minister for Environment requested the EPA inquire into and report on the matter of changing the implementation conditions of MS 810 for the Keysbrook Mineral Sands Mine, in order to ensure noise is appropriately regulated and managed. This report satisfies the requirements of the EPA’s inquiry.

The EPA has discretion as to how it conducted this inquiry. The inquiry has considered:

- the currency of its original assessment (EPA Report 1269)
- MS 810
- information provided by the proponent
- advice from relevant decision making authorities
- advice from two independent acoustic professionals
- any new information regarding the proposal’s potential impacts on the environment.

These documents are instructive in determining the extent and nature of the inquiry under s. 46 of the EP Act.

EPA policy and procedures


The EPA had particular regard to its Environmental Factor Guideline: Social Surroundings (EPA 2016b), which covers the issue of noise.

Noise Regulations

The Western Australian Environmental Protection (Noise) Regulations 1997 (Noise Regulations) operate as a prescribed standard under the EP Act and sets limits on noise emissions. The Department of Water and Environmental Regulation (DWER) is responsible for administrating the Noise Regulations.

The Noise Regulations (part two) outlines allowable noise emissions in Western Australia, including the prescribed standard for noise emissions (regulation seven) and assigned noise levels in decibels (dB) that may be received at a noise sensitive premises on specific days and times (regulation eight). In line with the Noise Regulations, dB values are here referenced to 20 micro Pascals (dB re 20 µPa).

Noise characteristics such as impulsiveness, modulation or tonality may be intrusive or dominant to receivers. Where noise emissions are found to exhibit those characteristics, regulation nine provides specific decibel adjustments to be imposed...
on the assigned levels. The provision for tonal noise emissions is +5 dB (tonality provisions).

The Noise Regulations note that an emission of noise found in breach of regulation seven (if applicable) is a prescribed alteration of the environment and is likely to be unreasonable, and may be defined as pollution (as per section 3A of the EP Act).

Part two of the Noise Regulations also provides for allowances under regulation 17. If a proponent can demonstrate that its proposal will not reasonably or practicably comply with the regulations, the proponent may apply to the Minister for Environment to allow the emission of noise to exceed or vary from the assigned levels.

Terms used in this report align with the definitions set out in the EP Act and Noise Regulations and should be interpreted as such, unless otherwise stated.
3. Inquiry into conditions

The EPA considered the following key environmental factor relevant to the change to conditions:

- Social Surroundings

3.1 Social Surroundings

The EPA’s environmental objective for this factor is to protect social surroundings from significant harm.

EPA Report 1269 (October 2007)

The EPA’s original assessment identified that noise generated from the proposal had the potential to impact on the amenity of local residents. Of particular concern were residential properties situated to the south of the development envelope, where separation distances ranged from 120 metres (m) to 500 m between proposed mining areas and residents. The EPA noted that night-time mining might be unacceptable based on the information available at that time, and the proximity of the proposal to residences.

The EPA recommended that noise limits should be applicable to operations of the proposal, and allocated specific A-weighted dB (dB(A)) for different times of the day when noise from the proposal was received at locations within 15 m of a noise-sensitive premises. Report 1269 specified noise limits for Day (7am to 7pm), Evening (7pm to 10pm) and Night (10pm to 7am) operational periods, but did not account for differences between weekdays, weekends or public holidays.

The EPA recommended a daytime noise limit of 50 dB(A) $L_{A10}$, exceeding the assigned level prescribed by the Noise Regulations by 5 dB(A). The EPA considered that an increased daytime noise limit was acceptable due to the mobile nature of the proposed mining operations, and expected the provision of increased daytime noise limits would pre-dispose the proponent to operate during the daytime.

EPA recommended that noise emissions for Evening and Night periods align with the assigned levels prescribed by the Noise Regulations, however penalties for tonality, modulation and impulsiveness would not be applicable to the proposal at any time. In making this recommendation, the EPA expected the proponent to initiate agreements with surrounding landowners that may be adversely affected by noise and dust generated from the proposal (Amenity Agreements).

The EPA concluded in Report 1269 that the proposal should proceed only if the proponent could ensure that mining operations met the recommended noise limits, and the conditions set out in draft MS 810 (Appendix 4 of Report 1269).

Appeals

An appeals period ran from 29 October until 12 November 2007, with nine appeals received on the ground of noise emissions.
In its advice to the Appeals Convener, the EPA recommended an amendment to the condition relating to noise; to exclude any mining operations during the Evening, Night and on Sundays and public holidays. The basis of the modified recommendation came from new information the EPA received from the then Department of Environment and Conservation (now DWER) since the finalisation of Report 1269. Namely, the difficult and onerous task of managing noise compliance and public complaints from similar mineral sand mines, operating under comparable parameters, that were generating noise complaints (e.g. Iluka Resources’ Waroona Mineral Sands Mine).

DWER provided technical and regulatory advice to the Appeals Convener, noting that the risks of non-compliance with the noise limits set for the proposal were significant. The advice recommended that operations be initially limited to Day only (Monday to Saturday) with a possible review of Evenings and Sunday operations subject to the proponent establishing that the risks associated with noise emissions could be successfully managed.

The then Minister for Environment released the Appeals Determination Report (OAC 2009) on 27 May 2009, concluding that appeals on the ground of noise emissions should be allowed to the extent that the proposal would be required to comply with the assigned noise levels prescribed by the Noise Regulations, including penalties for tonality, modulation and impulsiveness.

The then Minister for Environment concluded that the proposal could operate during the Evening, at Night, on Sundays and public holidays with the following provisions:

- a 1500 m separation distance is retained between operations and residents
- the requirement for the proposal to comply with the Noise Regulations
- subject to agreement with landowners.

The Appeals Determination Report notes the provision of separation distances would provide incentive for the proponent to actively engage with residents so that Amenity Agreements could be made as compensation for compromised amenity value.

The then Minister for Environment determined that the proponent should submit a comprehensive report on noise monitoring outcomes after the first 12 months of operations to verify its modelling predictions. Should the noise monitoring demonstrate that a 1500 m separation distance was not effective in ensuring the proposal complied with the assigned levels in the Noise Regulations, the Minister for Environment recommended that the proposal should revert to operations during the Day period only (that is Monday to Saturday, excluding public holidays).

In relation to the decisions above, the then Minister for Environment included condition 14 of MS 810 for noise management. Subsequently, MS 810 was finalised to incorporate appeal decisions and was approved on 19 October 2009.

**Compliance**

DWER holds responsibility for monitoring compliance of the proposal with the Noise Regulations and all conditions within MS 810.
The proposal started construction in November 2014, and mining commenced in October 2015.

From April 2015 until March 2017, DWER, the previous Minister for Environment, local government authorities and other Members of Parliament received and responded to a substantial number of complaints relating to noise emissions from the proposal. The complaints came from several residents living adjacent to the southern boundary of the development envelope, outside of the conditioned 1500 m separation distance, and with no Amenity Agreement.

The complaints mainly concerned noise emissions received at residences during the evening, at night and early mornings.

In response to complaints, the Environmental Noise Branch at DWER undertook monitoring investigations at noise-sensitive premises close to the southern border of the development envelope. These investigations identified a number of potential exceedances of the Noise Regulations.

In September 2016, MZI notified DWER of potential exceedances of the Noise Regulations at the southern boundary of the development envelope.

At the request of the proponent, and on advice from DWER, the previous Minister for Environment determined it would be appropriate to initiate an inquiry into the noise conditions contained in MS 810, under section 46(6) of the EP Act.

3.2 Assessment of the proposed change to conditions

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal, for this factor:

- Environmental Factor Guideline – Social Surroundings (EPA 2016b)

For the purposes of the inquiry, and consistent with the EPA’s Environmental Factor Guideline – Social Surroundings (EPA 2016b), the EPA has focused on the impacts of the proposal on social surroundings from noise, separation distances between the proposal and noise-sensitive premises, and impacts from cumulative noise emissions.

As part of the inquiry, the EPA requested further information from the proponent on 22 February 2017 in the form of:

- Noise Monitoring Plan (MZI 2017a) for the purpose of demonstrating whether the proposal currently complies with the assigned levels prescribed in the Noise Regulations;

- Noise Study (MZI 2017b) to include:
  - an analysis of monitoring data for no less than a two-month period during autumn 2017
o noise modelling to determine likely impacts of noise emissions from future implementation of the proposal on neighbouring residential properties

o whether all reasonable and practicable steps had been taken to comply with the Noise Regulations.

- a peer review of the Noise Study by an independent acoustic noise expert agreed to by the CEO of DWER (Burgess 2017)

The EPA notes that the proponent undertook an extensive noise monitoring program as part of this inquiry, and that the noise monitoring data collected and presented in the Noise Study is adequate for the purpose of undertaking this assessment, namely to:

- ascertain the validity of the noise modelling presented in Report 1269
- determine whether the proposal can currently comply with the assigned levels prescribed in the Noise Regulations at all times;
- determine whether the proposal is likely to comply with the assigned levels prescribed in the Noise Regulations at all times in the future
- determine whether the proposal is currently compliant with condition 14 of MS 810, and/or will be capable of compliance with condition 14 of MS 810 in the future.

A technical analysis of the proponent’s Noise Study and monitoring program was undertaken by the Environmental Noise Branch at DWER (the technical analysis) (DWER 2017). The technical analysis considered data provided by the proponent, which was derived through the monitoring program undertaken for this inquiry. The outcomes of the technical analysis are discussed below.

**Complexity of noise monitoring**

The EPA notes that monitoring and interpreting noise from the proposal is complex due to the underlying environmental setting, described as follows:

- Wind generated noise:

  The proposal is located approximately 3 km from the foot of the Darling Scarp on the Swan Coastal Plain. The scarp is considered to influence local wind conditions due to high-speed winds blowing west from the landform towards the Swan Coastal Plain.

  The proponent’s Noise Study notes that unfavourable meteorological conditions can cause high-speed winds and temperature inversions at the proposal site. These conditions enhance the propagation of sound, causing noise emissions to travel increased distances.

  The proponent considered wind generated noise within the Noise Study with the inclusion of modelling and adaptive management measures for both calm wind condition scenarios and worst case wind condition scenarios.
In Report 1269, the EPA considered it would be extremely difficult for the proponent to manage its operations with wind direction, to avoid significant impacts on neighbouring residents, particularly at night time. The EPA has not changed its position in this regard.

- **Ambient rural noise:**

  The proposal is located within a rural setting close to the townships of North Dandalup and Keysbrook. Rural settings typically exhibit low ambient noise levels especially at night time. The low ambient noise is likely to provide a perceived amenity value for residents choosing to live in rural areas.

  Noise emissions generated from the proposal are a relatively new noise source within a low ambient environmental setting, and likely to be considered intrusive to residents surrounding the proposal.

  Further, DWER’s technical analysis examined the results of the proponent’s monitoring program, and identified that noise emissions from the proposal are likely to exhibit tonal characteristics that are likely to be intrusive to residents.

  The perceived intrusive nature of noise emissions from the proposal, provides an explanation as to why DWER received an influx of noise complaints once the proposal became operational. On review of these complaints, the EPA notes that the majority of complaints related to noise emissions received during the evening, at night, and early mornings.

  The EPA also notes that, due to increased refraction of sound from temperature gradients which form overnight, noise emissions from the proposal are likely to travel further distances at night, compared to during the day or evening.

  The EPA concludes that noise emissions from the proposal are likely to be intrusive to residents and their rural lifestyle, particularly at night when ambient rural noise is low, and temperatures are cooler.

  Further, the EPA recognises that prolonged exposure to intrusive noise emissions has the potential to negatively impact the health, welfare and amenity of people (WHO 1999, WHO 2009, and WHO 2018).

  In Report 1269, the EPA considered that noise emissions from the proposal would likely be intrusive to residents, noting that night time mining was likely to be unacceptable in some areas. Further, the EPA recognised that the tonality provisions imposed by the Noise Regulations would likely constrain operations of the proposal during the day, evening and at night. The EPA has not changed its position in this regard.

- **Wildlife noise:**

  A range of noise emitting wildlife can be found nearby and within the proposal area including birds, insects and cattle. The Noise Study suggests that noise from wildlife significantly contributes to the overall noise levels measured by the proponent’s monitoring equipment, and this complicates analysis of the data and causes difficulty in attributing tonal noise emissions to the proposal.
The EPA notes that noise attributable to wildlife adds a layer of complexity to the analysis of the noise monitoring data for the purposes of determining whether the proposal is compliant with the Noise Regulations.

- Other anthropogenic noise:

The Mundijong Pinjarra Railway corridor runs parallel to the east of the proposal (Figure 2). Approximately 30 freight and passenger trains use this rail line each day. The passing trains contribute noise emissions that exhibit tonal characteristics into the environment.

The proposal is also located parallel to South Western Highway which is a major infrastructure route between the South West region and Perth. Vehicles utilising this route also contribute noise emissions into the environment.

The Noise Study suggests that tonal frequencies from passing freight and passenger trains and vehicles are similar to, and occasionally in excess of, the tonal characteristics emitted from the proposal. The proponent asserts that peak tonal noise emissions recorded during the monitoring program are at least partially attributable to freight and passenger trains and vehicle movements.

Noise emissions from trains and vehicles are exempt from the Noise Regulations however, the EPA notes that the presence of noise emissions from trains and vehicles in the vicinity of the proposal adds a layer of complexity to the analysis of the noise monitoring data for the purposes of determining whether the proposal is compliant with the Noise Regulations.

The EPA considers that long-standing anthropogenic noise sources such as trains and vehicles are likely to be accepted by residents. It is likely that residents perceive noise from these sources as less intrusive to their rural lifestyle compared to noise emissions from the proposal, which are a relatively new noise source.

The underlying environmental setting adds a level of complexity in attributing noise emissions and tonal characteristics to the proposal, as the proposal is not the exclusive source of noise in this location.

As per the method provided in Schedule Three of the Noise Regulations and the information provided in the Noise Study, no influencing factor is applicable to the assigned noise levels for the proposal.

The EPA notes regulation seven of the Noise Regulations, which states that noise emitted from any premises must not cause, or significantly contribute to, a level of noise which exceeds the assigned levels. The monitoring program data provided within the proponent’s Noise Study indicated a high likelihood that the proposal significantly contributes to noise levels at nearby noise sensitive premises.

Based on this information, the EPA is of the view that:

- there is a high level of uncertainty that, in its current form, the proposal can meet regulation seven of the Noise Regulations at all times for noise sensitive premises around the active mining areas
- worst case meteorological conditions should be considered in future modelling to compensate for the complexity of the underlying environmental setting and atmospheric conditions

- the tonality provisions, as described in regulation nine of the Noise Regulations, are applicable to the proposal, and should be imposed during the day, evening and at night to further mitigate uncertainty surrounding compliance.

**Current management of noise and operations**

The EPA’s preferred hierarchy for the management of noise and vibration is to:

- avoid the activities that create noise and vibration
- contain emissions within the individual land use site boundary
- manage emissions so there is no unacceptable noise or vibration impacts on nearby land uses and the environment.

To manage noise emissions, the preferred treatment hierarchy is as follows: treat the source to eliminate or limit noise; treat the pathway between the source and the receiver (for example, build noise walls); and treat the receiver (for example, install double glazing in windows).

The proponent’s Noise Study provided a range of mitigation and management measures undertaken to reduce the impact of noise on the surrounding environment, as described in Table 1.

**Table 1: Application of the hierarchy for noise and vibration management**

<table>
<thead>
<tr>
<th>Mitigation Hierarchy</th>
<th>Proponent’s Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid</td>
<td>exclusion of the south-east portion (Southern Satellite Deposit, Figure 2) of the development envelope from the mine plan to reduce the impact of noise on the North Dandalup community; extension of amenity agreements to residents with premises and land outside the currently conditioned 1500 m separation distance; and restriction of some operational activities to day time hours only.</td>
</tr>
<tr>
<td>Contain</td>
<td>substitution of mining equipment with quieter and less tonal equipment; implementation of a noise attenuation program to reduce noise emissions from a range of fixed, semi-fixed and mobile operational equipment, including the Wet Concentrator Plant, Mine Field Unit, and mining vehicle fleet respectively; construction of a 10 m high earth bund to reduce impact of noise emitted from the Mine Field Unit; submersion of the Southern Bore Pump; moving equipment further from noise sensitive premises; and enclosing noise emitting equipment with cladding, sandbags, acoustic curtains, and covers.</td>
</tr>
</tbody>
</table>
**Manage**

- implementation of adaptive management for daily operations, including utilisation of weather forecasts to predict best case or worse case meteorological conditions, and provide detailed analysis of the proposal’s daily noise performance;
- implementation of a Noise Management Plan, as conditioned by MS 810;
- continuous monitoring of noise emissions at multiple off-site locations to assist in determining compliance in the event of a noise complaint; and
- community consultation and complaint management system.

The proponent’s actions, as noted in Table 1, form part of its noise management regime to progressively reduce noise emissions and minimise the impact of noise from operations on the community. The mitigation actions identified in Table 1 were implemented by the proponent prior to, or during the course of this inquiry.

The proponent’s Noise Study notes that, in order to make further meaningful noise reductions, it would be required to substitute current equipment (e.g. the mobile mining vehicle fleet) for smaller and quieter equipment.

The technical analysis undertaken by DWER considered the extent of the proponent’s avoidance, containment and management measures, as well as providing an analysis of the proponent’s monitoring program to evaluate whether the proposal can currently comply with the assigned levels prescribed in the Noise Regulations at all times (regulation eight).

The technical analysis identified:

- a high likelihood that nine residents experienced noise levels above the assigned levels (after the adjustment for tonality) during the 65 day monitoring program; and
- 14 separate nights (22%) where there was a high likelihood that at least one noise sensitive premises experienced noise levels above the assigned levels,

and concluded that, even with the proponent’s current adaptive management approach, it is likely to be impractical for the proponent to manage the noise emissions to comply with regulation eight of the Noise Regulations at all times.

The EPA notes the significant extent to which the proponent has applied the hierarchy for noise and vibration management to reduce noise emissions from the proposal at receiving noise-sensitive premises.

However, the EPA found that even with the extensive avoidance, containment and management measures (Table 1), and the 1500 m separation distance conditioned under MS 810 for mining at night, noise emissions from the proposal remained significant during the proponent’s monitoring programme.

Therefore the EPA is of the view there is a high level of uncertainty that, in its current form, the proposal can meet regulation eight of the Noise Regulations at all times at residences near to the mine.
**Future management of noise and operations**

The proposal is adjacent to the townships of Keysbrook and North Dandalup and falls within the Shire of Serpentine Jarrahdale and the Shire of Murray. Both local government authorities (LGA) are predicted to grow in population size over the next 10 years (WAPC 2015). Given the potential future growth in population, it is likely that the townships of Keysbrook and North Dandalup will expand over time to accommodate new residents, and these would be considered as noise-sensitive premises for the purposes of the proposal.

The proposal is scheduled to operate 24 hours a day, seven days a week, over an approximate eight-year life span, and designed to accommodate a progressive mine front through the relocation of semi-fixed elements, such as the Mine Field Unit, approximately every 12 to 24 months.

Relocation of the Mine Field Unit and subsequent mobile mining fleet is expected to cause variation in noise emissions from the proposal. The EPA considers that the relocation of equipment is likely to cause the impact on noise sensitive premises to change over time, as one mining area is exhausted and another mining area is established, in a different location and proximity.

The Mine Field Unit has been relocated twice since commencement of operations. For the majority of this inquiry, the Mine Field Unit was located in the south-east of the development envelope (Mine Field Unit 2, Figure 2). In November 2018, the Mine Field Unit was moved to a central position within the development envelope, which is the current location (Mine Field Unit 3, Figure 2).

The proponent’s Noise Study included modelling to determine likely impacts of noise emissions from future implementation of the proposal, accounting for the relocation of the Mine Field Unit up to three more times over the remaining life of mine and several different mining areas.

The proponent’s modelling used worst-case conditions, including the assumption of unfavourable meteorology and mining locations (i.e. approved mine areas closest to noise sensitive premises), and presented results with and without tonality provisions. For each mining area, operations during the Night period were assumed to occur 1500 m from the closest noise sensitive premises and with a reduced mine fleet (i.e. a smaller excavator than that used during day time operations).

Results of the modelling found that, under worst-case conditions, at least 16 residences were likely to receive noise emissions in excess of the assigned levels prescribed in the Noise Regulations under future operation scenarios.

Results of the modelling also found that, under worst-case conditions, residences may receive noise emissions:

- up to 9 dB in excess of the assigned levels during the Day
- up to 2 dB in excess of the assigned levels during the Evening
- up to 12 dB in excess of the assigned levels at Night.
The technical analysis undertaken by DWER evaluated whether the proposal is likely to comply with the assigned levels prescribed in the Noise Regulations at all times for future mining activities.

The technical analysis identified a high likelihood that future noise emissions from the proposal would exceed the assigned noise levels and that adaptive management practices would be unable to prevent the exceedances at all noise sensitive premises.

The technical analysis found it would be impractical for the proponent to manage future operations in accordance with the Noise Regulations at all times, and therefore a separation distance (between noise sensitive premises and the mine) is likely to be required for day and evening periods for future operations, in addition to increasing the 1500 m night time separation distance.

Based on the information above, the EPA notes:

- the proximity of the townships of Keysbrook and North Dandalup to existing mining operations;
- potential growth in population in areas adjacent to the proposal;
- scheduled modification of the mine layout; and
- subsequent alteration of noise emissions from the proposal

are likely to pose ongoing issues for the future management of noise and operations of the proposal, specifically whether the proposal would be able to meet regulation eight of the Noise Regulations at all times.

The EPA is of the view that community consultation and genuine engagement with adjacent residents will be critical for future operations of the proposal, and consultation should be undertaken as early as possible, prior to any scheduled modification of the proposal.

**Regulation under Part V of the EP Act**

The EPA recognises the Noise Regulations as the primary instrument to regulate noise emissions within Western Australia, and considers that the monitoring, management and control of noise emissions is more appropriately regulated under Part V of the EP Act.

However, due to the following:

- the complex and largely unpredictable environmental setting (as described above);
- the proponent’s Noise Study, that suggests a high likelihood that the proponent is currently unable to manage noise emissions to comply with the existing Ministerial Conditions or the Noise Regulations; and
• the technical analysis by DWER, that found it would be likely impractical for the proponent to manage future operations in accordance with the Noise Regulations at all times;

The EPA is of the view it is appropriate to retain and strengthen Ministerial condition 14, to ensure noise can be appropriately regulated and managed for future operations.

In relation to Part IV assessments, where proponent believes it cannot reasonably or practicably meet the prescribed standard under the Noise Regulations, the proponent is required to apply under regulation 17 in preference to recommending environmental conditions which may be at variance with the regulations.

For this proposal, the EPA considered regulation 17 within the original assessment and found it would be unsuitable, noting that granting a variance under the Noise Regulations would likely present several difficulties in terms of timing, application and management. The EPA has not changed its view in this regard.

The EPA recommends that noise emissions from the proposal are managed through an amended Ministerial condition 14, to ensure noise is appropriately regulated and managed for future operations.

**Increased separation distances**

The EPA's guidance statement, *Separation Distances between Industrial and Sensitive Land Uses* (GS 3) (EPA 2005), provides guidance regarding separation distances between industrial and sensitive land uses to avoid conflicts between land use.

GS 3 notes that determination of a separation distance (also referred to as a buffer area) may be necessary to avoid or minimise the impact of noise on a noise sensitive premises, and is useful in achieving an acceptable environmental outcome.

GS 3 also states that a site-specific study is required to determine appropriate separation distances. In this regard, the EPA recognises that the proponent has undertaken a site-specific study in the form of a Noise Study, which includes a noise monitoring programme, and consideration of cumulative impacts and non-typical emissions from the proposal.

Condition 14 of MS 810 currently provides a separation distance of 1500 m for Night time mining operations. This separation distance was established as consistent with the proponents original modelling for Evening and Night operations up-wind of a residence, as presented in Report 1269.

The technical analysis undertaken by DWER examined the results of the proponent’s monitoring program to ascertain the validity of the original modelling. The analysis found that noise emissions from the proposal are more significant than what was predicted during the original assessment of the proposal.
Based on the proponent’s Noise Study and subsequent technical analysis undertaken by DWER, the EPA considers that the current separation distance of 1500 m at night is not adequate for future operations, and a separation distance during the day and evening is required to mitigate the impacts of noise emissions for future operations.

The technical analysis used the proponent's data and undertook an analysis for future operating scenarios for each time period (Day, Evening and Night). The purpose of the analysis was to determine the distance required for each time period between operations and residences to ensure the proposal would be compliant with regulation eight of the Noise Regulations at all times.

Based on this analysis, DWER provided a summary of separation distance considerations to the EPA (Table 2). The advice from DWER also noted that the recommended distances should be considered marginally conservative, however the distances provide a level of certainty in the management of noise for the proposal and ensure that future operations comply with the Noise Regulations.

### Table 2: Summary of appropriate separation distances

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Operations Permitted</th>
<th>Recommended Buffer Distance</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
<td>All – at full scale</td>
<td>2 km</td>
<td>With a separation distance of 2 km during the day most residents are unlikely to experience noise emissions in excess of the Noise Regulations.</td>
</tr>
<tr>
<td>Evening</td>
<td>All – at reduced scale¹</td>
<td>2 km</td>
<td>With a separation distance of 2 km during the evening most residents are unlikely to experience noise emissions in excess of the Noise Regulations.</td>
</tr>
<tr>
<td>Night</td>
<td>All – at reduced scale¹ (includes mining operations)</td>
<td>3.3 km</td>
<td>With a separation distance of 3.3 km at night most residents are unlikely to experience noise emissions in excess of the Noise Regulations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This recommended distance may not practical to implement due to the proximity of noise sensitive premises.</td>
</tr>
<tr>
<td>Night</td>
<td>Mineral processing activities only²</td>
<td>2 km</td>
<td>With a separation distance of 2 km at night most residents are unlikely to experience noise emissions in excess of the Noise Regulations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This option would result in the proponent stockpiling during the day and processing at night.</td>
</tr>
</tbody>
</table>

1. Assumes operations as modelled for the night time scenarios with the scale of operations reduced compared to day time operations.

2. Includes operations of the Mine Field Unit, Wet Concentrator Plant, and associated pumps (extraction and haulage prohibited).

The EPA provided the proponent with the above separation distances as part of its preliminary findings, including the technical analysis undertaken by DWER, and
sought a response as to whether the proponent had a preference of the following two options:

1. Authorisation of mineral processing activities at Night (extraction and haulage prohibited) with a 2 km separation distance required, and provision of a 2 km separation distance for both Day and Evening operations.

2. Authorisation of all operations at Night with a separation distance of 3.3 km required, and provision of a 2 km separation distance for both Day and Evening operations.

In making its recommendations the EPA considered the proponent’s response, which expressed preference for option two, to retain the right to undertake mining operations at Night.

The EPA recommends that condition 14 of MS 810 is amended to include separation distances for the Day, Evening and Night periods in accordance with the recommended distances in Table 2 (condition 14-1).

Should the proponent be unable to implement a separation distance of 3.3 km for mining operations at Night, the EPA recommends that the proposal reverts to mineral processing activities only (i.e. no active mining, just use of a processing facility) with a separation distance of 2 km.

The recommended separation distances are likely to provide greater certainty that future operations of the proposal will comply with the Noise Regulations at all times, and that the objective for Social Surroundings can be met.

**Amenity Agreements**

The proponent has actively sought out agreements with individual residents whose amenity has the potential to be impacted by the proposal (Amenity Agreements).

The EPA recognises that lawful amenity agreements between a potentially affected resident and a proponent are standard practice in areas where noise producing industry and noise-sensitive premises occur. However, the EPA is of the view that an amenity agreement should relate to a person’s amenity only and cannot compromise the health of the owner and/or any occupier of a noise sensitive premises.

Based on this position, the EPA recommends that an objective noise level should be in effect for noise levels received indoors at any premises subject to an agreement.

The recommended indoor noise levels align with regulation 19(4) of the Noise Regulations, where noise is measured inside a building a minimum of 10 dB difference is applicable to the assigned noise levels, as defined by regulation eight.

In making its recommendation, the EPA also considered the World Health Organisation’s (WHO) *Guidelines for Community Noise*, April 1999 (WHO 1999), which states that ongoing noise levels received indoors at night, in excess of 30 dB(A) are likely to cause sleep disturbance.
The EPA has considered the continuous nature of noise emissions from the proposal and recommends that noise levels from the proposal as received indoors at any premises subject to an agreement do not exceed 25 dB L_{A10} during the Night period, 30 dB L_{A10} during the Evening period. The EPA has provided condition 14-2 in this regard.

In order to achieve the recommended noise levels, the proponent would be required to undertake a range of management measures to reduce noise levels received inside any premises occupied solely or mainly for residential or accommodation purposes.

The management measures should include standard acoustic treatments to the premises, including but not limited to the following:

- provision of mechanical ventilation/air conditioning systems compliant with Australian Standard AS 1668.2 – *The use of mechanical ventilation and air-conditioning in buildings*, so that occupants can maintain windows and doors closed. Natural ventilation remains a requirement in accordance with the National Construction Code.
- provision of enhanced sound insulation to the building envelope which may take the form of (but not be limited to) insulated glass (double glazing) and improved frames and sealing for windows, solid core doors, and wall, ceiling and roof insulation. Professional advice and feedback from resident(s) is expected in order to determine the most cost effective and acceptable route to such controls.

The EPA is of the view that treatment of a premises should occur in the first instance, and considers that any treatment measures, such as those noted above, should be implemented on the case by case basis. Specific sound attenuation levels would be required at each resident; therefore, acoustic input would be required for the proponent to implement solutions for residents.

In making this recommendation, the EPA has considered a range of literature relating to the health risks associated with long-term noise exposure (NSW EPA 2017, WHO 1999, WHO 2009, and WHO 2018). The literature provided information regarding potential health impacts caused from sleep disturbance (i.e. impacts to the cardiovascular system, physiology and mental health), and potential health impacts to vulnerable groups such as the elderly, chronically ill, individuals with a vision or hearing impairment, pregnant women, and young children. The WHO notes that individuals within vulnerable groups are less able to cope with the impacts of continuous noise exposure and are likely to be at greater risk of potential impacts from elevated noise levels.

The EPA is of the view that compliance with the recommended indoor noise levels would appropriately mitigate the potential impacts to human health from long-term exposure to noise.

**Consideration of the proponent’s request**

The proponent requested the EPA amend condition 14 of MS 810 so that noise from the proposal is:
• exempt from the tonality provisions of the Noise Regulations
• provided with 18 days (representing five per cent) per year when the assigned noise limits may be exceeded
• managed via a Noise Monitoring and Management Plan (NMMP) to be approved by the Chief Executive Officer of DWER and reviewed annually.

Regarding an exemption from the tonality provisions, and the provision of 18 days per year in excess of the noise limits, the EPA is of the view the consequences resulting from these provisions are likely to result in unreasonable noise levels, noise pollution (as defined under section 3A of the EP Act) and continued community complaint. Therefore, the EPA does not support the proponent’s request on these matters.

The EPA also considered the request that noise from the proposal is managed via a NMMP, and concluded that the option should be retained due to the following:
• a NMMP would provide an opportunity for the proponent to details actions to further reduce and manage noise emissions for future operations through continuous improvement
• a NMMP may provide an opportunity for the proponent to reduce the recommended separation distances if it can demonstrate that the reduced distance would remain compliant with the Noise Regulations
• the development and implementation of a NMMP would provide an adaptive management approach for future operations of the proposal and the predicted growth of residents in adjacent townships
• a NMMP is a transparent, legally enforceable document, that will include specific provisions for management actions and targets, monitoring and reporting
• a NMMP can be readily revised, approved and implemented without further changes to the Statement.

As part of this section 46 inquiry, the proponent proposed a ‘noise buffer’ methodology to determine flexible separation distances to those which have been proposed by the Environmental Noise Branch at DWER above, whilst remaining compliant with the Noise Regulations.

The EPA requested that the proponent prepare and submit a technical submission to determine the scientific robustness, and practicability of the proposed ‘noise buffer’ methodology. The proponent submitted the Keysbrook Mineral Sands Mine Section 46 Inquiry: Technical Submission Noise Buffer Methodology (the Noise Buffer Submission) (MZI 2018).

The Noise Buffer Submission proposed management actions, including utilisation of a variable mining fleet for different time periods (Day, Evening and Night), and substitution of quieter vehicles in place of louder vehicles, as the mining front moves in proximity to noise-sensitive premises. The purpose of the proposed management
The approach would be to reduce separation distances, while remaining compliant with the Noise Regulations.

The Environmental Noise Branch at DWER reviewed the Noise Buffer Submission and provided advice for amendments to the proponent.

The EPA commissioned a peer review (Pan 2018) to independently evaluate the proponent’s proposed management approach, as detailed within the Noise Buffer Submission. The peer review provided advice for amendments and concluded that: “MZI has adequately shown that the derivation of the proposed approach is scientifically robust and practically workable.”

The EPA is of the view that the proposed management approach, as presented within the Noise Buffer Submission, has merit and may be captured within a NNMP for implementation.

The EPA considers that, through the use of a NMMP, the proponent may be able to demonstrate that the proposal can remain compliant with the Noise Regulations with reduced separation distances than those proposed.

Based on the information above, the EPA supports the proponent’s request to include a NMMP as part of the change to condition 14 of MS 810, and has provided condition 14-3 as a recommendation in this regard.

The EPA also considers that the NMMP should consider worst case meteorological conditions for noise propagation and tonal characteristics be assumed at all times, and has provided condition 14-4 as a recommendation in this regard.
4. Conclusions and recommendations

In relation to the environmental factors, and considering the information provided by the proponent and relevant EPA policies and guidelines, the EPA concludes that:

- noise emissions from the proposal are higher than were predicted in the original assessment undertaken by the EPA
- the underlying environmental setting adds a level of complexity to attribute noise emissions and tonal characteristics to the proposal
- despite the proponent’s adaptive management approach, there is a high likelihood that assigned noise levels were exceeded during the monitoring program undertaken
- there is a high likelihood the proposal is currently unable to comply with the Noise Regulations
- in its current form, it would be likely impractical for the proponent to manage future operations in accordance with the Noise Regulations at all times
- the currently conditioned separation distance of 1500 m is not adequate for night time operations, and requires an increased separation distance
- a separation distance is required for both day and evening time operations.

Based on these conclusions, the EPA is of the view it is currently impractical for the proponent to manage noise emissions to comply with the Noise Regulations at all times, or condition 14 of MS 810.

The EPA recommends that condition 14 of MS 810 should be amended to provide certainty that future operations of the proposal will be compliant with the Noise Regulations at all times, and that the objective for Social Surroundings (noise in this instance) can be met for future operations.

The EPA considers noise should continue to be regulated under Part IV of the EP Act and has recommended a contemporary condition (condition no. 14) in the attached recommended Statement.

Recommendations

Having inquired into this matter, the EPA submits the following recommendations to the Minister for Environment under s. 46 of the EP Act:

1. While retaining the environmental requirements of the original conditions of Ministerial Statement 810, it is appropriate to change implementation conditions 14, and replace it with new implementation conditions.

2. After complying with s. 46(8) of the EP Act, the Minister may issue a statement of decision to change conditions 14 of Statement 810 in the manner provided for in the attached recommended Statement (Appendix 2).
5. Other Advice

Schedule of defined terms

The EPA has prepared a schedule of defined terms to be included with its recommendations for the amended condition. This schedule will provide assistance with compliance and remove any ambiguity in relation to terms used.

Terms defined include ‘mining activity’, and ‘mineral processing activity’ both of which have meanings specific to this proposal. Terms defined in the schedule have been derived through advice from DWER, and where possible, align with terms defined within the Mining Act, Noise Regulations and EP Act.

Other terms defined include the operational time periods: ‘Day’, ‘Evening’ and ‘Night’. The EPA notes that the meaning of these terms is site specific, and should only be used in relation to this proposal. The EPA further notes that use of these terms within this report, holds the same meaning as defined within the prepared schedule.

The EPA recommends that a schedule of defined terms is incorporated within the amended condition 14 of MS 810.
Appendix 1: References

Burgess, M. for MZI Resources Ltd 2017, Keysbrook Mineral Sands Mine Noise Study: Independent Assessment, University of New South Wales, UNSW, Canberra, ACT.

Department of Water and Environmental Regulation 2017, Keysbrook Mineral Sands Mine Section 46 Inquiry: Technical Analysis, Memorandum from Environmental Noise Branch to EPA Services, unpublished, DWER, Perth, WA.

Environmental Protection Authority 2005, Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses, EPA, Perth, WA.

Environmental Protection Authority 2016a, Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016, EPA, Perth, WA.

Environmental Protection Authority 2016b, Environmental Factor Guideline: Social Surroundings, EPA, Perth, WA.

Environmental Protection Authority 2018a, Statement of Environmental Principles, Factors and Objectives, EPA, Perth, WA.

Environmental Protection Authority 2018b, Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual, EPA, Perth, WA.

MZI Resources Ltd 2017a, Investigative Noise Monitoring Plan (Section 46 Inquiry), Revision 0, MZI, Perth, WA.

MZI Resources Ltd 2017b, Keysbrook Mineral Sands Mine Section 46 Inquiry: Noise Study and Community Consultation Noise Report, MZI, Perth, WA.

MZI Resources Ltd 2018, Keysbrook Mineral Sands Mine Section 46 Inquiry: Technical Submission Noise Buffer Methodology, MZI, Perth, WA.

New South Wales Environmental Protection Authority 2017, Noise Policy for Industry, NSW EPA, Sydney, NSW.


Pan, J. for the Environmental Protection Authority 2018, Peer Review of the Technical Submission on Noise Buffer Methodology by MZI, University of Western Australia, UWA, Perth, WA.


Appendix 2: Identified Decision-Making Authorities and recommended environmental conditions

Identified Decision-making Authorities

S. 44(2) of EP Act specifies that the EPA’s report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA’s recommended conditions and procedures.

S. 45(1) requires the Minister for Environment to consult with decision-making authorities (DMAs), and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified:

<table>
<thead>
<tr>
<th>Decision-making Authority</th>
<th>Legislation (and Approval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Minister for Water</td>
<td>Water extraction licenses, *Rights in Water and Irrigation Act 1914.*</td>
</tr>
<tr>
<td>2. Chief Executive Officer, Shire of Serpentine Jarrahdale.</td>
<td>Extractive industry licences, *Local Government Act 1995.*</td>
</tr>
<tr>
<td>3. Chief Executive Officer, Shire of Murray</td>
<td>Extractive industry licences, *Local Government Act 1995.*</td>
</tr>
<tr>
<td>4. Chief Executive Officer, Department of Water and</td>
<td>Part V works approval and licences, *Environmental Protection Act 1986.*</td>
</tr>
<tr>
<td>Environmental Regulation</td>
<td></td>
</tr>
</tbody>
</table>

Note: In this instance, agreement is only required with DMA no.1 since this DMA is a Minister.
RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT TO AMEND CONDITIONS APPLYING TO A PROPOSAL
(PURSUANT TO THE PROVISIONS OF SECTION 46 OF THE ENVIRONMENTAL PROTECTION ACT 1986)

KEYSBROOK MINERAL SANDS MINE
SHIRE OF SERPENTINE JARRAHDALE AND SHIRE OF MURRAY

Proposal: To develop a mineral sands mine near the Keysbrook township. The proposal involves the excavation and processing of a low-grade heavy mineral sands deposit. The proposal is described further in schedule 1 of Statement 810.

Proponent: MZI Resources Ltd
Australian Company Number 077 221 722

Proponent Address: Level 2, 100 Royal Street
EAST PERTH WA 6004

Assessment Number: 2110

Report of the Environmental Protection Authority: 1627

Previous Assessment Number: 1580, 2020

Previous Report Number: 1269, 1528

Preceding Statement Relating to this Proposal: Ministerial Statement 810

Pursuant to section 45 of the Environmental Protection Act 1986, as applied by section 46(8), it has been agreed that the implementation conditions set out in Ministerial Statement No. 810 (as amended by Ministerial Statement 984) be changed as specified in this Statement.

Condition 14 of Ministerial Statement 810 is deleted and replaced with:

14 Noise Management

Interim Period

14-1A During the period up to 12 months from the date of this statement, the proponent shall manage the proposal as follows:

   (1) Unless otherwise agreed in writing between the proponent and the owner and any occupier of noise sensitive premises:
(a) The proposal must comply with the Noise Regulations at any building associated with a noise sensitive use at any noise sensitive premises; and

(b) Outside the hours 0700 to 1900 Monday to Saturday, Sunday, or on public holidays, no mining activity is to be undertaken within 1,500 metres of any building associated with a noise sensitive use at any noise sensitive premises.

(2) The requirement in condition 14-1A(1) does not apply in respect of noise sensitive premises that are not being used for a noise sensitive purpose.

**Separation Distances**

14-1 After the period up to 12 months from the date of this statement, the proponent shall manage the proposal as follows, unless varied by 14-2 or 14-3:

(1) no Mineral Processing Activity is to be undertaken at any time within two (2) kilometres of a highly sensitive area;

(2) during the Day and Evening periods, no Mining Operations are undertaken within two (2) kilometres of a highly sensitive area.

(3) during the Night period, no Mining Operations are undertaken within three point three (3.3) kilometres of a highly sensitive area.

**Amenity Agreements**

14-2 The requirements in condition 14-1 do not apply in respect of a particular highly sensitive area if:

(1) The proponent and the landowner and occupier of that highly sensitive area have agreed otherwise in writing; and

(2) Notwithstanding any agreement referred to in 14-2(1):

   (a) Noise Emission levels received Indoors during the Evening period do not exceed 30 dB LA10 + Influencing factor (Tonal adjustment is applicable).

   (b) Noise Emission levels received Indoors during the Night period do not exceed 25 dB dBA10 + Influencing factor (Tonal adjustment is applicable).

   (c) The proponent shall ensure that highly sensitive areas have appropriate acoustic attenuation to demonstrate that Noise Emission levels received Indoors can be met at all times.

   (d) The proponent shall assume worst case conditions for modelling and attenuation, to be verified by an Independent acoustic expert, and reported in accordance with condition 14-9.

**Noise Management and Monitoring Plan**

14-3 The requirements in condition 14-1 may be varied or substituted if:

(1) the proponent prepares and submits a Noise Management and Monitoring Plan (NMMP) to the CEO, in accordance with condition 14-4, which demonstrates that reduced distances will achieve compliance with the Noise Regulations;
(2) the CEO approves in writing the NMMP for the purpose of varying condition 14-1; and

(3) the proponent implements the provisions of the approved NMMP.

14-4 A NMMP submitted under 14-3(1) must include:

(1) a calibrated noise model that assumes worst case meteorological conditions for noise propagation and tonal characteristics at all times, that is validated by an independent acoustic expert;

(2) noise monitoring to include noise levels at a location or locations representative of the highly sensitive area closest to the area for which varied distances to those defined in condition 14-1 are proposed to apply;

(3) details of management measures, including but not limited to, any actions undertaken to reduce noise emissions from the proposal, monitoring, and reporting;

(4) community consultation that has been undertaken, including any agreement on implementation of noise mitigation measures with residents; and

(5) the procedure and data reporting to demonstrate compliance in the event of a community complaint regarding operational noise, or at the request of the CEO.

14-5 The proponent shall review and revise the NMMP as and when directed by the CEO.

14-6 Any approved NMMP shall be made available to the public in a manner approved by the CEO.

14-7 Any changes to management measures, including actions, monitoring and reporting in a NMMP must be approved by the CEO in writing, including any scheduled movements of the Wet Concentrator Plant and Mine Field Unit elements of the proposal.

Noise Monitoring and Reporting

14-8 The proponent shall monitor noise and submit annual noise reports to the CEO from the issue of this statement that shall be submitted as part of the proponent’s compliance assessment reporting process, conditioned under 4-6 of Statement 810.

14-9 The report referred to in condition 14-8 shall address operations, noise management, and noise emissions for each time period (Day, Evening, and Night) for the purpose of demonstrating compliance with condition 14-1A and 14-1, 14-2 and 14-3 (as applicable) and shall include the following:

(1) a description of the equipment and methods used for monitoring and modelling of operational noise emissions, to a level of detail that would enable them to be independently reproduced by an acoustic expert;

(2) an assessment prepared by an independent acoustic expert which demonstrates to a reasonable and practical extent (or otherwise
satisfactorily to the CEO) the level of compliance with applicable noise levels at all nearby noise sensitive premises; and

(3) a description of the noise management measures employed during the period.

14-10 In the event of a potential breach of these conditions, the proponent shall investigate the incident(s) and report the exceedance in writing to the CEO within two (2) business days of the breach being identified.

### Table 1: Abbreviations and definitions

<table>
<thead>
<tr>
<th>Acronym or abbreviations</th>
<th>Definition or term</th>
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<tbody>
<tr>
<td>CEO</td>
<td>The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the <em>Environmental Protection Act 1986</em>, or their delegate.</td>
</tr>
<tr>
<td>Day period</td>
<td>Monday to Saturday between the hours of 0700 to 1900 Australian Western Standard Time.</td>
</tr>
<tr>
<td>Evening period</td>
<td>Monday to Saturday between the hours of 1900 to 2200 Australian Western Standard Time; and Sundays and public holidays between the hours of 0900 and 2200 Australian Western Standard Time.</td>
</tr>
<tr>
<td>Highly sensitive area</td>
<td>Has the same meaning as defined by regulation 8(1) of the <em>Environmental Protection (Noise) Regulations 1997</em>.</td>
</tr>
<tr>
<td>Independent acoustic expert</td>
<td>A person qualified and experienced in the area of environmental noise assessment and who by their qualifications and experience is eligible to hold membership of the Association of Australasian Acoustical Consultants. The acoustic expert must be without conflict of interest or any business or financial relationship with the proponent or its associates other than being recompensed for professional services rendered to the proponent.</td>
</tr>
<tr>
<td>Indoors</td>
<td>Locations which reasonably represent human occupation of an enclosed space within a highly sensitive area as defined in regulation 8 of the Noise Regulations, with all windows and doors in their closed position.</td>
</tr>
<tr>
<td>Influencing factor</td>
<td>Determined under Schedule 3 of the <em>Environmental Protection (Noise) Regulations 1997</em>.</td>
</tr>
<tr>
<td>(L_{A10})</td>
<td>Has the same meaning as defined by regulation 8(1) of the <em>Environmental Protection (Noise) Regulations 1997</em>.</td>
</tr>
</tbody>
</table>
| Mineral Processing Activity | Use of equipment in the processing of minerals, which includes:  
  - loading of ore to the Mine Field Unit;  
  - operation of the Mine Field Unit;  
  - associated motors delivering ore from the Mine Field Unit to the Wet Concentrator Plant and movement of tailings and water between the Wet Concentrator Plant and mine void;  
  - operation of the Wet Concentrator Plant; and  
  - fixed equipment associated with the Wet Concentrator Plant (cyclones and thickener). |
| Mining Operations        | Use of equipment in the extraction and haulage of earth bearing minerals, including: |
- the removal of overburden by mechanical or other means and the stacking, deposit, and storage any substance considered to contain any mineral;
- field pumps, including production bores with surface mounted motors/pumps;
- the use of mobile mining fleet (graders, bulldozers, excavators and haul trucks within the disturbance footprint); and
- any works associated with rehabilitation of land disturbed in the extraction and processing of the mineral resource, except land disturbed prior to 31 December 2019.

**Night Period**
Monday to Saturday between the hours of 2200 to 0700 Australian Western Standard Time; and Sundays and public holidays until 0900 Australian Western Standard Time.

**Noise Emissions**
Noise emitted from premises occupied by the Keysbrook Mineral Sands Mine.

**Noise Regulations**
*Environmental Protection (Noise) Regulations 1997.*

**Noise sensitive premises**
Has the same meaning as defined by regulation 2(1) of the *Environmental Protection (Noise) Regulations 1997.*

**Noise sensitive purpose**
Has the same meaning as defined by regulation 2(1) of the *Environmental Protection (Noise) Regulations 1997.*

**Tonal adjustment**
Determined under regulation 9 of the *Environmental Protection (Noise) Regulations 1997.*