KEYSBROOK MINERAL SANDS PROJECT ENVIRONMENTAL LICENCE AMENDMENT APPLICATION L8918/2015/1

PREPARED FOR:

KEYSBROOK LEUCOXENE PTY LTD

AUGUST 2016

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KEYSBROOK MINERAL SANDS PROJECT
ENVIRONMENTAL LICENCE AMENDMENT

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1. INTRODUCTION

1.1 BACKGROUND INFORMATION

Keysbrook Leucoxene Pty Ltd currently operate the Keysbrook Mineral Sands Project located near to North Dandalup about 70 km south of Perth (Figure 1). The project involves mining and primary processing of ore to produce a Heavy Mineral Concentrate (HMC). Access to the project is off Hopelands Road.

Operations are conducted in compliance with Ministerial Statement 810 (MS 810) and Environmental Licence L8918/2015/1 with operations commencing in November 2015. The project was constructed in accordance with Works Approval 5386/2013/1 with compliance certificates submitted to the Department of Environmental Regulation (DER) on 23 October 2015. The Environmental Licence issued on 19 November 2015 allows mining or processing of ore for up to 5,250,000 tonnes per annum.

The primary emissions and discharges from the premises relate to noise and fugitive dust from continuous (24 hours per day) mining operations, in addition to discharge of excess process water to surface water during the winter months.

1.2 OWNERSHIP

The project is wholly-owned by Keysbrook Leucoxene Pty Ltd (ACN 137091297).

All compliance and regulatory requirements regarding this assessment document should be forwarded by email, fax, post or courier to the following address:

Name: Marc Morris
Company: Keysbrook Leucoxene Pty Ltd
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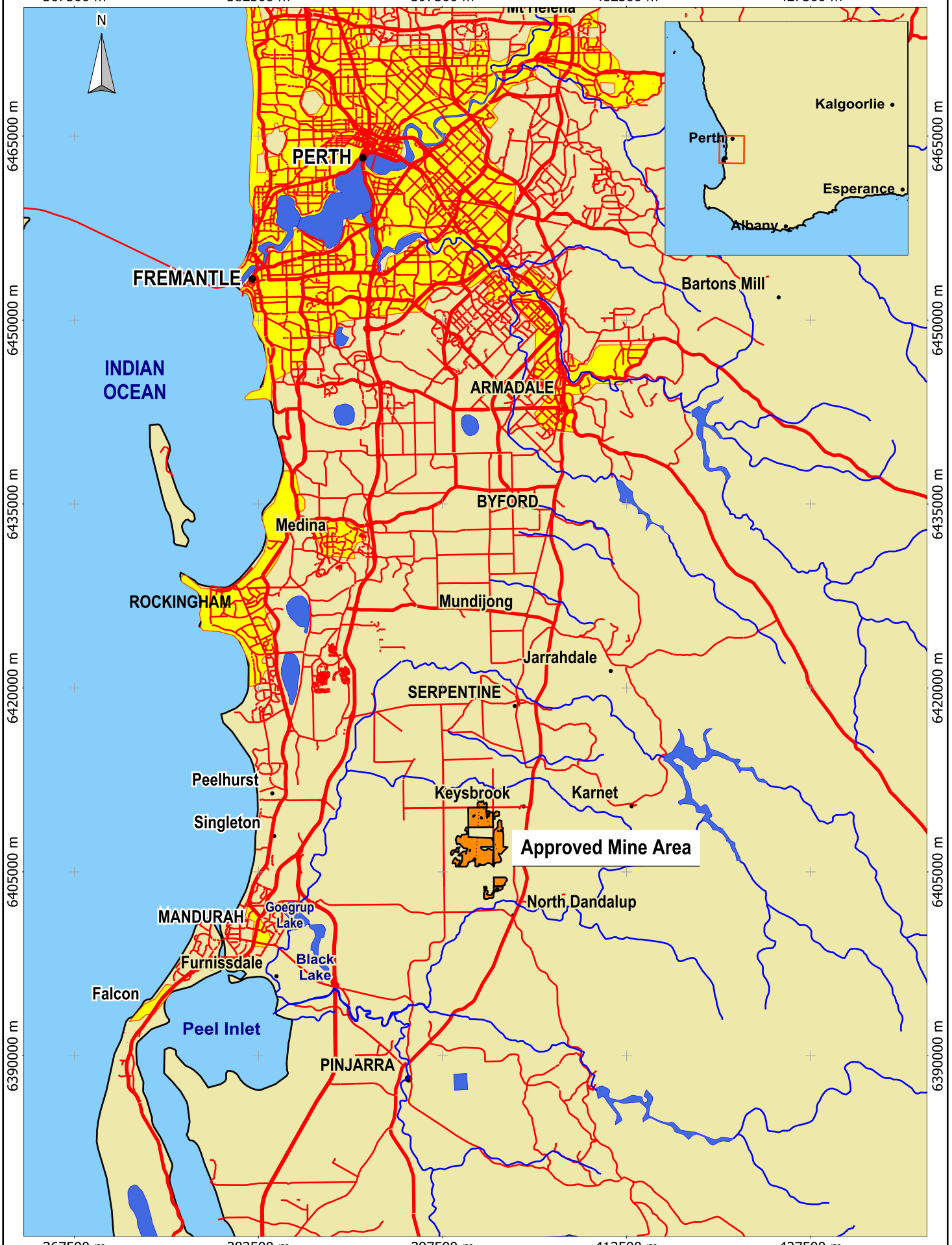
EAST PERTH WA 6892

Phone: [redacted]
Email: [redacted]

1.3 PURPOSE

This Licence amendment application provides details of the proposed minor changes to infrastructure within the heavy mineral separation plant (Concentrator) currently operating at the project. Additional infrastructure is being constructed to improve resource recovery.

Information presented in this document aims to assist DER in assessing the adequacy of pollution prevention and control measures proposed, to ensure adverse environmental impacts are prevented or minimised to levels where appropriate environmental standards can be complied with.



Scale: 1:400000 Original Size: A4 Grid: Australia MGA94 (50) 0 10 km	MZI Resources Limited Keysbrook Mineral Sands Project	**Figure 1** **Location Plan**	Martinick Bosch Sell Pty Ltd 4 Cook St West Perth WA 6005 Ph: (08) 9226 3166 Fax: (08) 9226 3177 info@mbsenvironmental.com.au www.mbsenvironmental.com.au MBS ENVIRONMENTAL

W:\Matilda Zircon\Keysbrook\03. Drawings\Location Plan\LocationPlan.map 4/08/2016 F1 Location Plan Layout

1.4 PRESCRIBED PREMISE CATEGORIES

Environmental Licence L8918/2015/1 currently lists two Prescribed Premise Categories according to Schedule 1 of the *Environmental Protection Regulations 1987* (Table 1). The proposed amendment to the Concentrator will not require changes to the categories or thresholds on the current Licence.

Table 1: Prescribed Premises Category from Schedule 1 of the *Environmental Protection Regulations 1987*

Category No.	Category Description	Prescribed Premise Threshold
6	Mine dewatering: premises on which water is extracted and discharged into the environment to allow the mining of ore.	50,000 tonnes or more per year
8	Mineral sands mining or processing: premises on which mineral sands ore is mined, screened, separated or otherwise processed.	5,000 tonnes or more per year

1.5 STRUCTURE OF SUBMISSION

The information outlined within this document applies to the amendments proposed to be undertaken to increase the efficiency of mineral recovery within the existing Concentrator. This Works Approval application is structured into four sections as follows.

Section 1 is the introduction and purpose of this application and provides background details about the project and proposed changes to infrastructure.

Section 2 summarises the existing environmental aspects in relation to the project area.

Section 3 provides detail on the proposed changes to infrastructure within the Concentrator.

Section 4 provides a risk assessment and describes pollution control measures as they apply to noise emissions detailing pollution control devices and measures to prevent or mitigate adverse environmental impacts and the predicted residual environmental risk.

The commitments made in this Licence amendment application are listed in Appendix 1.

2. EXISTING ENVIRONMENT

2.1 REGIONAL SETTING

The project is situated along the eastern edge of the Swan Coastal Plain, about 70 km south of Perth and 4 km west of the small township of Keysbrook. The area for mining is 1,234 hectares, located on privately-owned land.

Ninety five percent of the mine area has been completely cleared or parkland cleared for grazing activities. The remaining 5% of remnant vegetation consists of trees with a partially intact understorey.

The topography of the mine area is flat to very gently undulating plain. The lowest elevations are in the south-west of the mine area at about 22 m AHD, gradually sloping to about 48 m AHD in the northeast.

2.2 CLIMATE

The Keysbrook area experiences a Mediterranean climate characterised by cool wet winters and warm to hot dry summers. The project area lies between the 1,000 and 1,100 mm rainfall isohyets (Heddle *et al.* 1980).

The meteorological monitoring station at Wokalup, 80 km south of Keysbrook, has an annual rainfall of 964 mm and an average annual evaporation rate of about 1,800 mm which exceeds the precipitation rate by a factor of about two to one.

2.3 NOISE

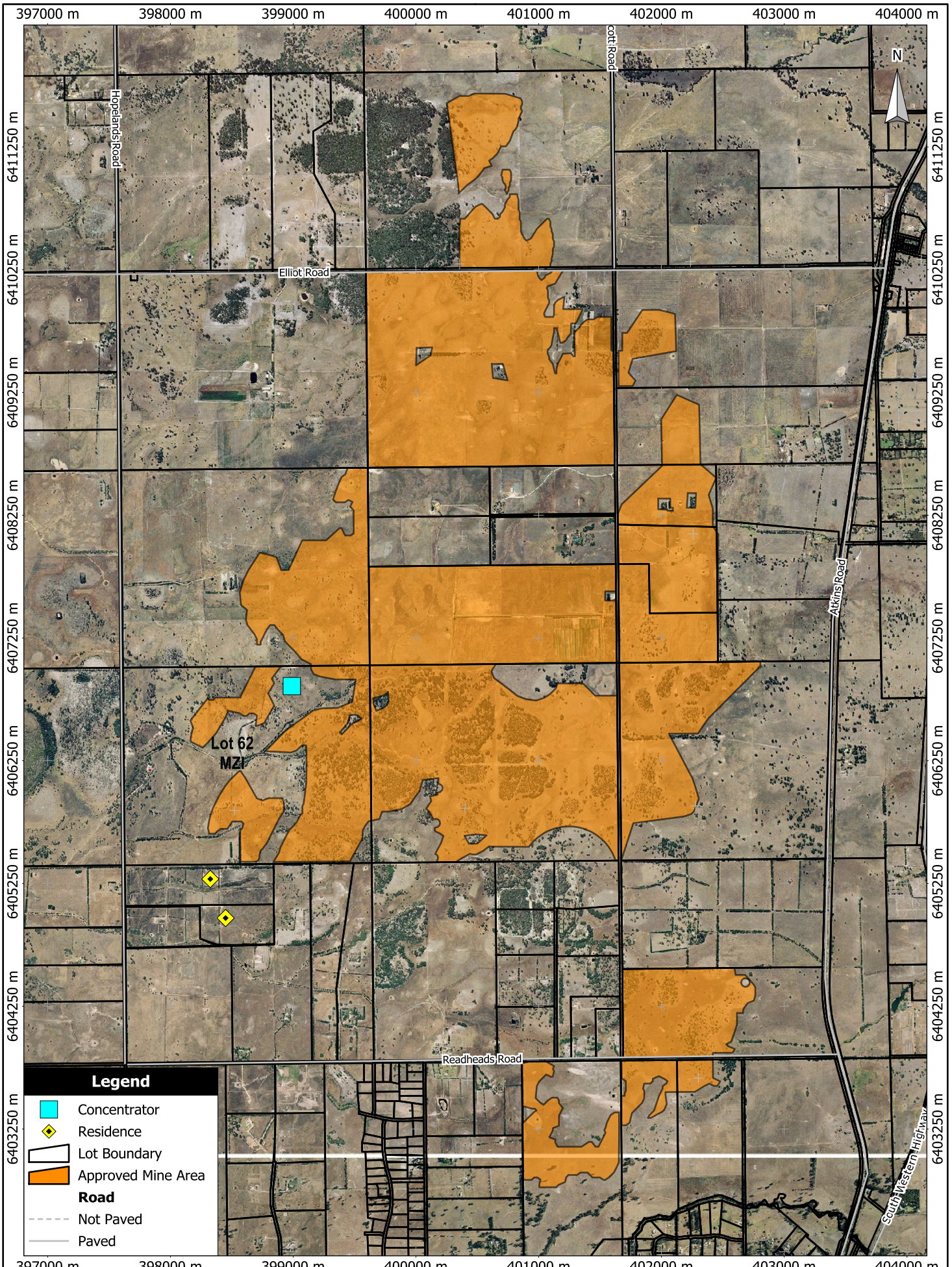
Noise assessment modelling has been undertaken for the project. This modelling was determined that a distance of about 1 km between sensitive receptors and the Concentrator was required in order to achieve a noise level of 30 dB LA_{10}.

2.4 SOCIAL ENVIRONMENT

The Peel region incorporates the geographical boundaries of five local municipalities; the City of Mandurah together with the Shires of Boddington, Murray, Serpentine Jarrahdale and Waroona. The project is situated in both the Shire of Murray and Shire of Serpentine Jarrahdale. The Concentrator is located in the Shire of Serpentine Jarrahdale.

The Peel region has an estimated population of 124,463 (mostly within the City of Mandurah), and continues to be one of the fastest growing regions in Western Australia and Australia. The population increased by 44,000 residents at an average rate of 4.5% per year over the decade to June 2013 (WA Government 2016).

The project area is rural and the project is located on farming properties with a number of residences located close to the mining boundary. Two residences are located within 2 km of the Concentrator and none are located within 1 km (Figure 2).



Scale: 1:40000
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Grid: Australia MGA(50)
0 1 km

MZI Resources Limited
Keysbrook Mineral Sands Project

Figure 2

Residences within 2 km of the Concentrator

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3. PROPOSED PROJECT CHANGES

3.1 PROPOSED INFRASTRUCTURE CHANGES

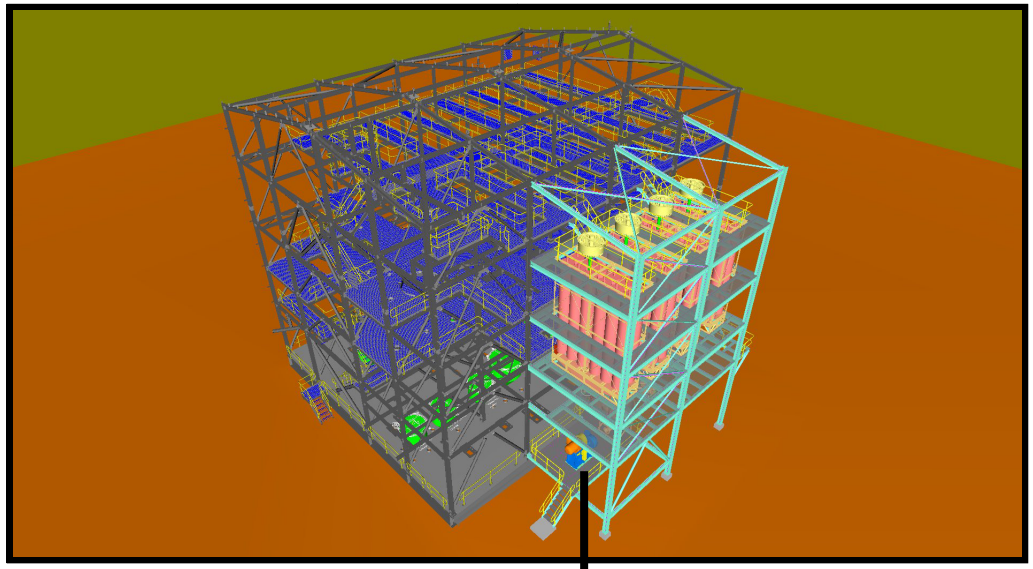
The proposed infrastructure changes include installation of an additional spiral stage to the existing Concentrator and will include the following:

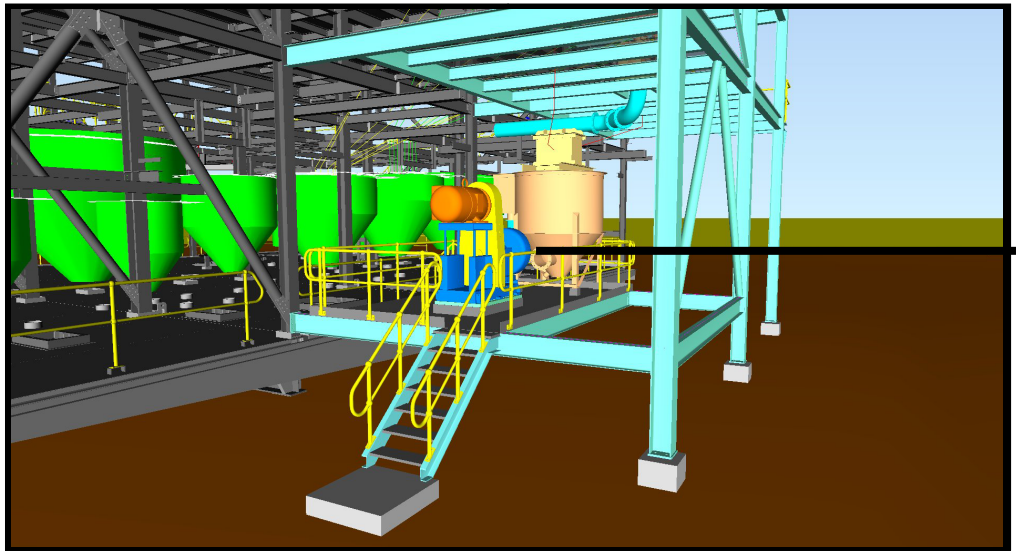
- Installation of four complete banks of 12 MG12 spirals, including sub frame, launders and distributors.
- Installation of a new 200WBH Weir Warman pump complete with sub frame and TECO 132kW motor.
- Construction of a new 3.6 m^3 sump.
- Installation of a new four way pressure distributor to split the feed to the four spiral banks.
- Construction of a building annex to be placed adjacent to the existing Concentrator building and utilising the external members as support structures. The new building will include walkways stairs and handrails to provide access to the various levels.
- Minor excavation and pouring of three new footings to support the annex external column line.
- Installation of an additional sump which will become the new re-cleaner spiral feed. The current cleaner spiral pump (PP005) will be re-located to perform this duty. Existing piping will be utilised wherever possible, but new piping will be installed to direct the flow to the existing cleaner spirals.
- Replacement of the existing cleaner spiral pumps to cater for the increased duty requirements. This will include modifying the mounting frame, new suction piping and discharge piping to the new spiral bank.
- Installation of purlins and girts above the first floor level of the annex. The existing purlins, girts and wall sheeting will be removed from the building at the new opening and used on the outside wall of the annex. New sheeting will be installed on the side walls of the new annex. A roof will be placed over the annex, with a corresponding roof line that aligns with the existing roof pitch.
- Installation of launder piping (including rubber cuffs) from the new spiral banks to gravitate the concentrate, middlings and tails to the required sumps. This will require pipe supports and clamps.
- Installation of a new Variable Speed Drive (VSD) in the existing switch room to drive the new pump. Power supply cable for the new VSD will be run from the switch room along existing cable trays to the termination point on the motor.
- Installation of a flow meter on the new spiral line and instrument cabling (utilising existing cable routes) in the nearest IJB.
- Installation of new lighting in the annex. New cabling will be routed to existing power cables where a junction box will be installed to provide distribution of supply.

The proposed additional annex to the existing Concentrator building will have a footprint of about 6 x 12 m (72m^2). All additional infrastructure described above will be located within the annex or existing Concentrator building. Figure 3 provide an illustration of how the infrastructure will be set out within the annex and how the annex will relate to the existing Concentrator.

Existing Concentrator

Proposed Annex





Proposed Pump

Original Size: A4	MZI Resources Limited Keysbrook Mineral Sands Project	**Figure 3** **Concentrator Infrastructure Layout**	4 Cook St West Perth WA 6005 Ph: (08) 9226 3166 Fax: (08) 9226 3177 info@mbsenvironmental.com.au www.mbsenvironmental.com.au MBS ENVIRONMENTAL

W:\Matilda Zircon\Keysbrook\05. Licences Permits Approvals\Environmental Licence\Amendment application Aug 2016\Drawings\Environmental Licence Amendment.map 4/08/2016 F3 Concentrator Infrastructure Layout

3.2 PROJECT TIMELINE

The construction activities are anticipated to be completed within a three to four week period. Construction is scheduled to commence 14 September 2016.

Construction shall occur only during daylight hours (7am to 7pm) apart from a 24 to 48 hour period near completion of construction works to allow tie in of existing and new Concentrator components. The Concentrator will not be operational during the tie in period.

3.3 PROPOSED LICENCE CONDITION CHANGES

The proposed amendment to the Concentrator will not require changes to the current prescribed premises categories or conditions on Environmental Licence L8918/2015/1.

4. POLLUTION CONTROL

4.1 NOISE EMISSIONS

4.1.1 Sources

Potential sources of noise associated with the proposed changes to the Concentrator include:

- Construction of a building annex and installation of associated features.
- Operation of a new electric pump and spiral circuit.

4.1.2 Sensitive Receptors

The sensitive receptors of noise will be residences. There are two sensitive receptors within 2 km of the Concentrator. These are the closest occupied sensitive receptors to the Concentrator and are about 1.7 and 1.9 km to the southwest.

4.1.3 Potential Impacts

The potential impacts from noise emissions as a result of the proposed changes to the Concentrator are:

- Short-term increase in noise emissions during construction (3 to 4 weeks).
- Minor increase in noise emissions from the new pump and motor.

4.1.4 Control Measures

The project operates in compliance with a Noise Monitoring Plan approved by the EPA as per Condition 14-4 of Ministerial Statement 810.

Project design has considered exposure to noise in order to minimise adverse impacts. The following management measures will be implemented:

- All construction activities will be restricted to daytime operations only (between 7am and 7pm).
- Construction work will be carried out in accordance with Regulation 13 of the *Environmental Protection (Noise) Regulations 1997*, namely following the guidelines of AS2436-1981 where practicable and using the quietest reasonably available equipment.
- New infrastructure will incorporate noise attenuation features such that no net increase in noise will result from the operation of the upgrades. As part of the works, additional attenuation measures shall be undertaken to ensure a net reduction in total plant noise to the south west direction.
- Additional infrastructure will be located within an enclosed annex.

4.1.5 Predicted Residual Environmental Risk

The Works will ensure that noise emissions from the Concentrator will not increase as a result of the proposed changes. This is a result of:

- The only piece of equipment that has potential to generate noise is a single electric pump and associated motor.
- The pump will be enclosed within appropriate noise attenuating materials to ensure it minimises emissions for employees within the work area and emissions to the environment outside of the work area.

- The new infrastructure proposed to be constructed and integrated into the existing Concentrator will be located within an enclosed structure (annex) that will have wall insulation applied.
- The Concentrator is located a significant distance from sensitive receptors. The closest sensitive receptor is about 1.7 km to the southwest.

4.2 EMISSIONS TO AIR

Dust emissions may be generated during construction, specifically development of the annex footings and sump. Any such emissions can be readily mitigated with local dust control measures such as hosing down with water. The footings and sump will be developed in an existing disturbed area, thus stripping of topsoil will not be required. Given the small project footprint (72 m^2), short duration of land disturbance (<5 days), and distance between the proposed works and nearest receptor (1.7 km), emissions are not considered significant or likely to cause adverse impacts on health or amenity.

There will be no changes to emissions from air as a result of the changes proposed to be made to the Concentrator. The new pump will be connected to the site electrical circuits which are supplied by mains power. Increases in power usage as a result of installation of the additional pump will be minor. Movement of ore through the spirals is a wet process and thus particulate emissions will not occur.

4.3 DISCHARGES TO LAND, SURFACE WATER AND GROUNDWATER

There will be no additional or different discharges to land, surface water or groundwater as a result of the proposed changes to the Concentrator. The pump will move slurried ore materials through a closed circuit system that allows separation of valuable heavy minerals from waste materials. Any spillages from this circuit will be captured by the existing containment infrastructure.

4.4 RISK ASSESSMENT

A risk assessment was undertaken for the proposed changes to the Concentrator (Appendix 1) and the following risk matrix was used (Table 2).

Table 2: Risk Assessment Matrix

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

Based on assessment of potential impacts and consideration of the current noise emissions from the Concentrator, it is considered that changes to the Concentrator present a low risk of increased impacts to health of residents at nearby receptors.

4.5 REFERENCES

Heddle, E. M., Loneragan, O. W. and Havel, J. J. 1980. Vegetation Complexes of the Darling System, Western Australia. In *Atlas of Natural Resources, Darling System, Western Australia*. Perth: Department of Conservation and Environment.

Government of Western Australia. 2016. *Peel people.* http://www.peel.wa.gov.au/wp-content/uploads/2014/10/PEEL-PEOPLE.pdf (accessed 4 August 2016).

APPENDICES

APPENDIX 1: RISK ASSESSMENT

Keysbrook Leucoxene Pty Ltd
Keysbrok Mineral Sands Project
Environmental Risk Assessment

Component/ Category	Potential Impact	Pathway	Receptor	Inherent Likelihood on Receptor	Inherent Consequence on Receptor	Inherent Risk	Proponent Controls and/or Management Measures	Residual Likelihood on Receptor	Residual Consequence on Receptor	Residual Risk
Category 8 Mineral Sands Mining or Processing	A decrease in human health and amenity through increased dust emissions during construction of footings and sump.	Dust/Air → Humans	Employees and contractors of the Keysbrook Mineral Sands Project.	Possible	Insignificant	Low	- Personal Protective Equipment (PPE) will be used as required. - Land disturbance will be kept to the minimum necessary for construction of the annex. - Dust control measures will be implemented. - Vehicles will keep to defined roads. - Vehicles will keep to defined roads, will be required to travel at safe operating speeds.	Unlikely	Insignificant	Low
	Reduction in local air quality from an increase in mobile equipment emissions from engine exhausts including particulates, carbon monoxide, carbon dioxide, sulfur dioxide and nitrous oxides during construction.		Residences, which are all located more that 1 km away from the Keysbrook Mineral Sands Project.	Possible	Insignificant	Low		Unlikely	Insignificant	Low
	A decrease in human health through increased noise during construction.	Noise → Humans	Employees and contractors of the Keysbrook Mineral Sands Project.	Possible	Minor	Moderate	- Personal Protective Equipment (PPE) will be used as required. - Construction work will be carried out in accordance with Regulation 13 of the Environmental Protection (Noise) Regulations 1997, namely following the guidelines of AS2436-1981 where practicable and using the quietest reasonably available equipment.	Rare	Insignificant	Low
			Residences, which are all located more that 1 km away from the Keysbrook Mineral Sands Project.	Possible	Insignificant	Low	- All construction activities will be restricted to daytime operations only (between 7am and 7pm) over a 4 to 6 week period. - Construction work will be carried out in accordance with Regulation 13 of the *Environmental Protection (Noise) Regulations 1997* , namely following the guidelines of AS2436-1981 where practicable and using the quietest reasonably available equipment.	Unlikely	Insignificant	Low
	A decrease in human health through increased noise during operation.		Employees and contractors of the Keysbrook Mineral Sands Project.	Unlikely	Insignificant	Low	- New pump infrastructure will incorporate standard noise attenuation features. - New infrastructure will be located within an enclosed annex.	Rare	Insignificant	Low
			Residences, which are all located more that 1 km away from the Keysbrook Mineral Sands Project.	Unlikely	Insignificant	Low		Rare	Insignificant	Low
	Contaminate land and groundwater due to spillages of chemicals and hydrocarbons during construction.	Hydrocarbons → Land Chemicals → Land	- There are no defined rivers, creeks or watercourses within close proximity to the construction area. - There is no vegetation within the proposed construction area.	Possible	Insignificant	Low	- Minor spillage occurring as a result of accidents or breakdowns will be addressed and reported through the incident report procedure. - Spill kits are located at strategic locations throughout the project area and employees trained in their use. - All chemical reagents are stored within tanks in appropriately bunded facilities whereby 110% of the largest vessel is contained and 25% of the total volume is contained according to Australian Standards 1940 and AS1692. - Safety Data Sheets are available and accessible where hazardous materials are stored and used. - Appropriate safety signage will be erected within the construction area.	Unlikely	Insignificant	Low