



## Application for a licence amendment

### Division 3, Part V *Environmental Protection Act 1986*

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<b>Licence Number</b>	L8918/2015/1
<b>Licence Holder</b>	Keysbrook Leucoxene Pty Ltd
<b>ACN</b>	137 091 297
<b>File Number</b>	DER2015/001866
<b>Premises</b>	Keysbrook Mineral Sands Mine 1391 Hopeland Road NORTH DANDALUP WA 6207 Legal description – Lot 1 on Diagram 8916, Lot 6 on Diagram 52395, Lot 52, 59, 62 & 63 on Plan 739, Lots 111 – 113 on Diagram 94183 and Lot 100 on Diagram 31012
<b>Date of Report</b>	6 April 2020
<b>Decision</b>	Amendment granted

## Amendment description

This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend the licence issued under the EP Act for a prescribed premises as set out below. Notice of amendment is hereby given under section 59B(9) of the EP Act.

The guidance statements which have informed the decision made on this amendment are listed in Appendix 1.

## Purpose and scope of assessment

The licence holder has applied to change the existing controls for water discharges from the Premises.

### Background

The licence holder operates the Keysbrook Mineral Sands Mine near the townships of Keysbrook and North Dandalup, approximately 70 km south of Perth. It has been predominantly operated as a standalone mining operation, with the heavy mineral concentrate (HMC) produced transported off-site for toll treatment and export through the Port of Bunbury.

The mine is subject to Ministerial Statement 810 and is spread over a number of rural properties, which combined total around 1,532 hectares and comprises several private freehold lots with multiple landowners. The land within the mine area is on pre-1989 titles, where ownership of the mineral rights is with the landowner and not the State; as such the provisions of the *Mining Act 1978* do not apply.

The mining and processing operation incorporates conventional dry mining followed by wet screening and gravity separation, to produce a HMC that is rich in leucoxene, rutile and zircon (115,000 tonnes per annum). A number of pits are mined to a basement level that is below the watertable, therefore dewatering is required to facilitate dry mining conditions. Dewatering water is used as part of the mine water supply and to supplant water required from other sources. Where the volume of water exceeds the site's water holding capacity, excess water is allowed to flow over a lined spillway into an adjacent natural drainage channel (Balgobin Brook South). Mine voids are backfilled progressively throughout the life-of-mine by the co-disposal of mine tailings.

### Proposed amendments

The licence holder has requested the following:

- increase in the annual limit for the controlled discharge of process water from the Premises, from 150,000 to 250,000 tonnes; and
- approval for emergency discharge locations on the western boundary of Lot 57.

Further detail on these requested changes is provided below:

#### Increasing the controlled discharge of process water

Controlled water discharge is undertaken to ensure a safe working mine environment and to limit the risk of uncontrolled discharge from the mine area. The requirement for controlled discharge of process water is determined by rainfall and the catchment of the active mine area, which determines the volume of localised water runoff required to be contained.

The volume of water discharged in 2017 was 82,374 kilolitres (kL) following 657 mm of rainfall during May – October. In 2018 to date, 127,255 kL was released with 733 mm of rainfall during May – October, which coincided with a mine footprint that intersected a number of drainage lines within the Premises.

All on-site water storage was used in 2018 to minimise the volume of water discharge, which included several redundant solar drying ponds. Water stored in these ponds was recovered into the process water circuit once the site water balance moved to a deficit (typically

November – April in each year) to supplant the need for abstracting ground water.

The licence holder engaged consultant AQ2 to review the surface water hydrology and surface water model (AQ2, 2020), which identified the original surface water models for the project had been underestimated, and that the current prescribed discharge limit of 150,000 kL/yr is insufficient during worst case operating scenarios (see below).

#### Emergency discharge locations

AQ2 (2020) identified that a portion of surface water flows from Lot 57 and Lot 1 currently flow to the northern tributary of Nambellup Brook, therefore to keep any emergency discharge returning to the same tributary as per the existing hydrological regime, a series of staged emergency discharge points have been proposed on this tributary (refer to figure below).

## Modelling data

### Surface water runoff

The licence holder has conducted a desktop surface water assessment to support the proposed increase in discharge volumes (AQ2, 2020).

#### Background

The existing licence requires the containment of any surface water runoff from disturbed (non-rehabilitated) surfaces within the Premises, which the licence holder manages as part of the process water circuit.

Based on surface water assessments for the original project (MBS, 2006; GRM, 2014), it was expected the site's water holding capacity would only be exceeded during prolonged rainfall events. For this reason a contingency provision was included in the initial licence to allow low volumes of surplus water to overflow from the process water dam to a tributary of the Balgobin Brook. Based on modelling at the time, which assumed only active mining areas as being 'disturbed' (maximum 30 ha), a nominal upper discharge limit of 150,000 kL/yr was prescribed.

However in the four years of active mining, the site has contained (and managed as part of the mine water circuit) a significantly higher volume of water from surface runoff than expected, due mainly to the surface area of the actual disturbance footprint being an order of magnitude greater than that used in the original modelling (the licence holder estimates a maximum disturbance footprint of around 150 ha in any given year).

#### Mine catchment runoff

Based on the site water balance (GRM, 2014), the monthly process supply requirements vary over the year, from 139,000 kL mid-winter to 166,000 kL mid-summer. Any deficit in supply due to lack of runoff is made up with groundwater. With a disturbance footprint of 30 ha the average runoff was estimated at 154,000 kL/yr and required bore make up volume being around 1.3 GL/yr.

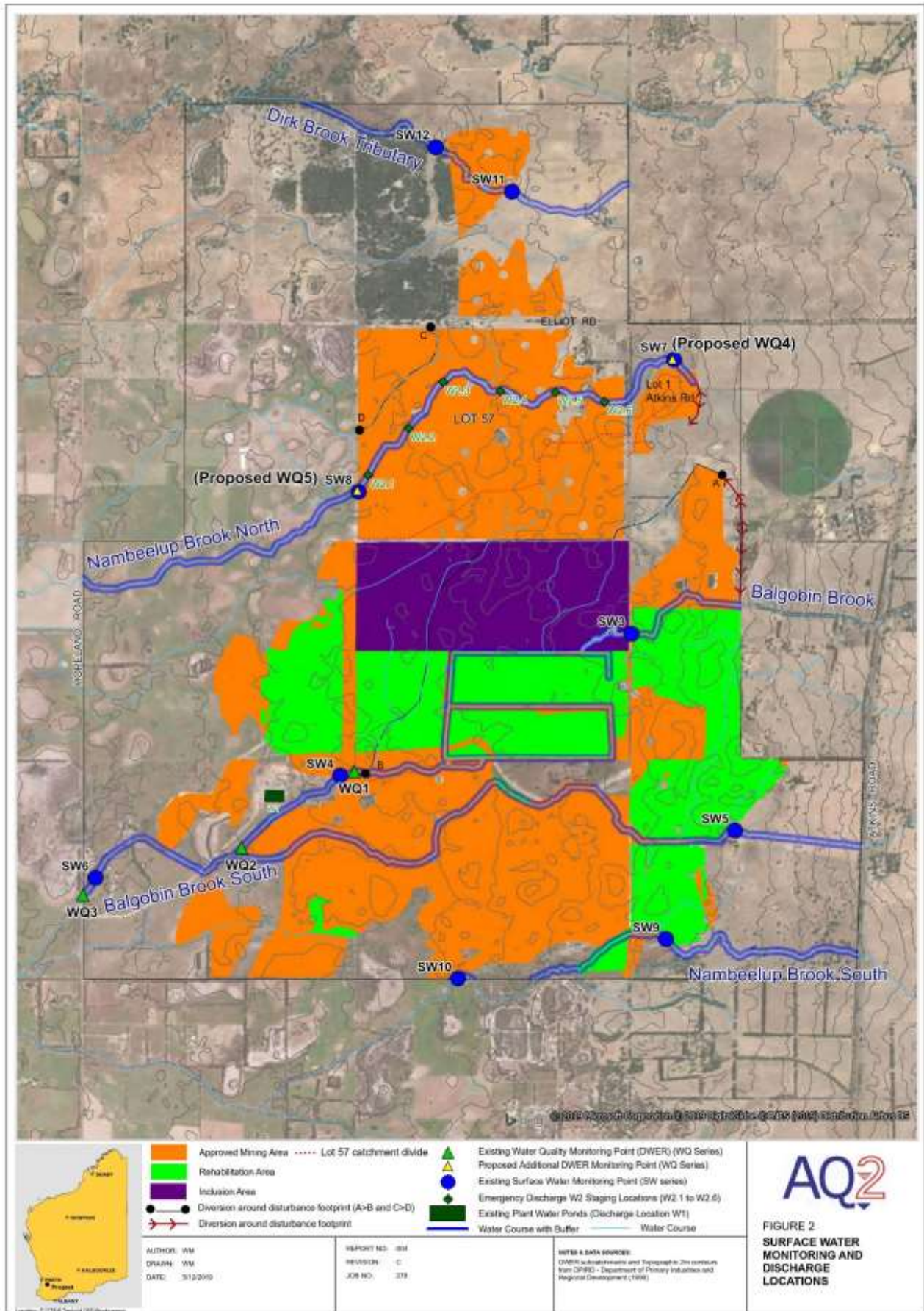
Based on a revised disturbance area of 150 ha and an annual rainfall of 950 mm, the standard case runoff is estimated at 844,000 kL/yr, which results in water surpluses of around 148,000 kL/yr during the 3 wettest months of the year. During worst case conditions this runoff increases to 1.229 GL/yr and surpluses increase to 512,00 kL over the 4 wettest months. These volumes will exceed the capacity of the process water dam, and some or all of this will need to be discharged from site.

The 1:100 year, 72 hour rainfall event has a runoff volume of 226,000 kL and in combination with a standard case surplus (154,000 kL/yr), gives a total potential surplus of 380,000 kL/yr.

#### Emergency discharge

To keep any emergency discharge returning to the same tributary as per the existing hydrological regime, an emergency discharge is proposed on the Nambeelup Brook North tributary.





Runoff from Lot 57 and Lot 1 disturbed areas will be captured in a return water settling pond, prior to being pumped via the dewatering system to be harvested and stored in the process water dam. If a rainfall sequence causes runoff from Lots 57 and 1 to be in excess of water demand requirements, pumping to local emergency discharge locations on Nambeelup Brook North is proposed instead.

The mining front is proposed to move in stages across Lots 57 and 1, where the return water settling pond and associated emergency discharge locations are staged to move from W2.1 through to W2.6 (refer to above figure). Water will be allowed to settle to reduce suspended solids prior to discharge, and unlike the existing system which allows surplus to overflow from the process water pond, excess water would be pumped from the return water settling pond in a controlled manner to the nearest relevant W2.1 to W2.6 location, with temporary erosion control measures if required at the outlet.

### DWER technical review

DWER's review of the surface water assessment (AQ2, 2020) identified the following:

- it is noted the previous estimates by MBS (2006) adopted very high runoff rates and maximum 3 monthly rainfall totals at the nearby 'Dog Hill' rainfall gauge have not exceeded the 533 mm adopted. The same assumptions/simple modelling has been adopted for the proposed additional release over the larger disturbed area. Given the previous predicted inflows to the process water system have been lower than observed over the 4 years of active mining it may not be appropriate to apply this same methodology without additional justification of the source of the discrepancy between the model and the observed; and
- the Water Management Plan (MBS, 2015) states the process water pond will be managed at all times to have sufficient freeboard to contain a 1:100 year, 72 hour storm event. However according to AQ2 (2020) the runoff volume during such an event is estimated to be around 226,000 kL, which is over 3 times the capacity of the process water dam system (74,000 kL). AQ2 (2020) considers this volume too large to safely retain on site and to do so would pose a greater risk as a result of uncontrolled release to the environment.

#### **Key finding:**

1. The proposed discharge to Nambeelup Brook North is not expected to detrimentally impact the existing flooding regime, noting that any discharges will only occur when a rainfall sequence causes runoff in disturbed areas in excess of water demand requirements.

## **Risk assessment**

The below table describes the risk events associated with the amendments consistent with the *Guidance Statement: Risk Assessments*. The table identifies whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

## Risk assessment

Risk Event				Consequence rating <sup>1</sup>	Likelihood rating <sup>1</sup>	Risk <sup>1</sup>	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities	Potential emissions	Potential receptors, pathway and impact	Licence holder controls					
<b>PROPOSED AMENDMENTS</b>								
Increase annual discharge limit to 250,000 kL due to increased disturbance footprint (150 ha)	Discharge of surplus process water/ contained surface water runoff	Balgobin Brook Sth and Nambeelup Brook Nth, causing flooding, erosion or contamination	Upstream catchments have been diverted. Most surface water runoff contained on the Premises is managed as part of the mine water circuit – surplus is only discharged during wetter months when inflows exceed the holding capacity of the mine infrastructure. The process water ponds are designed to promote settlement of solids. Water quality within the process water pond is monitored in accordance with existing licence conditions, and must meet discharge criteria. Surplus water is allowed to overflow and traverses a rock-lined spillway to the brook. Water quality sampling is conducted upstream and downstream of the discharge point, with water quality triggers.	Mid-level on-site impacts, low level off-site impacts on local scale <b>Moderate</b>	Not likely to occur in most circumstances <b>Unlikely</b>	<b>Medium</b> Acceptable, subject to regulatory controls	Based on DWER's review of the surface water assessment (AQ2, 2020) and analysis of internal surface water records, the delegated officer does not expect there to be a material change in the risk of impacts from increasing the discharge of process water to 250,000 kL/yr. Existing controls are in place to ensure there are no impacts to the downstream environmental and water quality from the discharge activity.	Table 5 Process water disposal requirements table – updated to include a series of emergency discharge locations W2.1 to W2.6 on Nambeelup Brook Nth Discharge limit increased to 250,000 tpa
Discharge through emergency locations W2.1 to W2.6	Discharge of surplus water (collected surface water runoff) contained within settling ponds	Nambeelup Brook Nth, causing flooding, erosion or contamination	Local emergency discharge locations are proposed on the Nambeelup Brook Nth tributary, where pumping runoff from Lots 57 & 1 to the process water dam would cause levels to rise above normal operating levels. A temporary 'return water settling pond' and associated emergency discharge locations are staged to move from W2.1 to W2.6 as the mining front progresses. Discharge in emergency situations will be done in a controlled manner, i.e. pumping, to the nearest relevant discharge location, with temporary control measures if required at the outlet. This is to keep any emergency discharge returning to the same tributary as per the existing hydrological regime. Water quality sampling will be conducted upstream and downstream of the discharge point, with water quality triggers.	Mid-level on-site impacts, low level off-site impacts on local scale <b>Moderate</b>	Not likely to occur in most circumstances <b>Unlikely</b>	<b>Medium</b> Acceptable, subject to regulatory controls	Noting that discharges to Nambeelup Brook Nth will only occur when a rainfall sequence causes runoff from disturbed areas to exceed mine water demand requirements, the delegated officer does not expect any such discharges to detrimentally impact upon the existing flooding regime. Controls will be imposed on the licence to include the additional authorised discharge locations. Additional surface water monitoring of Nambeelup Brook Nth will also be added.	Table 6 Mine dewatering monitoring table – updated to include monitoring of water quality during discharge to Nambeelup Brook Nth  Table 8 Surface water monitoring table – updated to include 2 additional monitoring locations on Nambeelup Brook Nth (one upstream, one downstream)

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Guidance Statement: Risk Assessments (DER, 2017a).



## Decision

The delegated officer has considered the licence holder's proposal to increase the annual upper limit for discharges of process water off the Premises, and has determined that an additional release of 100,000 kL/yr is unlikely to detrimentally impact the existing flooding regime of local surface water tributaries.

This determination is based on the following:

- surface water runoff from disturbed areas within the Premises will continue to be harvested and transferred to the process water pond;
- the majority of harvested water is to be used as process water or otherwise stored on the Premises;
- during the wetter months when the volume of water exceeds the holding capacity of the Premises, excess water will be allowed to overflow the process water pond via a lined-spillway to Balgobin Brook South;
- during mining of the northern section of the Premises, surface water runoff will be collected and contained within a temporary 'return water settling pond', prior to being transferred to the process water pond. However if a rainfall sequence causes runoff from the northern lots to be in excess of water demand requirements, excess water will be pumped to the nearest emergency discharge location on Nambeelup Brook North;
- monitoring of water quality within the process water pond will continue, to ensure only water meeting criterion in the existing licence can be discharged. Monitoring of water quality within the temporary 'return water settling pond' will also be undertaken; and
- monitoring of water quality, both upstream and downstream, of the discharge location will continue as per the existing licence. Monitoring of the Nambeelup Brook North will also commence under the new arrangement.

## Consultation

The licence holder was provided with drafts of the amended licence and this report on 27 March 2020 and waived the consultation period with no comments.

## Conclusion

This assessment of the risks of activities on the premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this amendment report (summarised in Appendix 1).

Based on this assessment, it has been determined that a licence amendment will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

## Summary of amendments

The below table provides a summary of the proposed amendments and will act as a record of implemented changes. All proposed changes have been incorporated into the revised licence as part of the amendment process.

Condition no.	Proposed amendments
Assessed production capacity	Increase to 250,000 tonnes per annual period
Table 2	'Northern return water settling pond' added to authorised infrastructure table, requirement to install flow metering device on pump
Table 5	Emergency discharge locations W2.1 to W2.6 added
	Discharge limit increased to 250,000 tonnes per annual period

Table 6	'Northern return water settling pond' added as an emissions monitoring point
Table 8	Two additional surface water monitoring locations added for Nambeelup Brook North, upstream and downstream of discharge locations
Premises map	Map updated to include emergency discharge locations on Nambeelup Brook North (W2.1 to W2.6)
Monitoring locations map	Map updated to include surface water monitoring sites on Nambeelup Brook North (WQ4, WQ5)

**Tim Gentle**  
**MANAGER, RESOURCE INDUSTRIES**  
**REGULATORY SERVICES**

*An officer delegated by the CEO under section 20 of the EP Act*



## Appendix 1: Key documents

Document title	In text ref	Availability
KLPL, February 2020. Keysbrook Mineral Sands Mine – Proposed amendments to Licence L8918/2015/1	Application	DWER records (A1878825)
AQ2, January 2020. Memo – Surface water assessment for the proposed Keysbrook Heavy Mineral Sands Project. Prepared for Doral by AQ2.	AQ2, 2020	DWER records (A1878826)
MBS, March 2006. Surface Hydrology Report, Keysbrook Mineral Sand Project. Prepared for Olympia Resources Limited by MBS Environmental.	MBS, 2006	DWER records (A630555)
MBS, September 2015. Water Management Plan, Keysbrook Mineral Sands Project. Prepared for MZI Resources by MBS Environmental	MBS, 2015	DWER records (A1878841)
GRM, 2014. Water balance and water supply assessment, Keysbrook Mineral Sands Project. Prepared for MZI Resources by Groundwater Resource Management.	GRM, 2014	DWER records (A1878841)
DER, July 2015. <i>Guidance Statement: Regulatory principles</i> . Department of Environment Regulation, Perth.	DER, 2015a	accessed at <a href="http://www.der.wa.gov.au">www.der.wa.gov.au</a>
DER, October 2015. <i>Guidance Statement: Setting Conditions</i> . Department of Environment Regulation, Perth.	DER, 2015b	
DER, February 2017. <i>Guidance Statement: Risk Assessments</i> . Department of Environment Regulation, Perth.	DER, 2017a	
DER, February 2017. <i>Guidance Statement: Decision Making</i> . Department of Environment Regulation, Perth.	DER, 2017b	
Licence L8918/2015/1 – Keysbrook Mineral Sands Mine.	Existing licence	accessed at <a href="http://www.der.wa.gov.au">www.der.wa.gov.au</a>

## Attachment 1: Amended Licence L8918/2015/1

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