



Application for Licence Amendment

Part V Division 3 of the *Environmental Protection Act 1986*

Licence Number	L9195/2019/1
Licence Holder	Kirkalocka Gold SPV Pty Ltd
ACN	626 160 816
File Number	DER2018/001608
Premises	Kirkalocka Gold Mine Part of Mining Lease M59/233 and Mining Lease M59/234 DAGGAR HILLS WA 6638 As defined by the coordinates in Schedule 1: Figure 1 of the Revised Licence
Date of Report	29 September 2021
Proposed Decision	Revised licence granted

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REGULATORY SERVICES

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Table of Contents

1. Decision summary	3
2. Scope of assessment	3
2.1 Regulatory framework	3
2.2 Application summary	3
2.3 Proposed changes to Category 5 operations	4
2.3.1 Management of future other EOS	4
2.4 Proposed changes to the WWTP	5
3. Risk assessment	7
3.1 Source-pathways and receptors	7
3.1.1 Emissions and controls	7
3.1.2 Receptors	8
3.2 Risk ratings	9
4. Risk assessment – processing other EOS at the Kirkalocka mill.	15
4.1 Description of risk event	15
4.2 Identification and general characterisation of emission	15
4.3 Potential impacts from the emission	16
5. Consultation	16
6. Conclusion	17
6.1 Summary of amendments	17
References	20
Appendix 1: Summary of Licence Holder’s comments on risk assessment and draft 21 conditions	21
Appendix 2: Application validation summary	22

1. Decision summary

Licence L9195/2019/1 is held by Kirkalocka Gold SPV Pty Ltd (Licence Holder) for the Kirkalocka Gold Mine (the Premises), located at Mining Lease M59/234 and Part of Mining Lease M59/233, Daggar Hills Western Australia.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during operation of the Premises. As a result of this assessment, Revised Licence L9195/2019/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

2.2 Application summary

On 2 October 2020, the Licence Holder submitted an application to the department to amend Licence L9195/2019/1 (Licence) under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act) for:

- processing of two additional External Ore Sources (EOS) at the Kirkalocka Processing Plant; and
- a process for self-assessment of EOS to allow such ores to be processed at the Kirkalocka Processing Plant (Plant) without future license amendments. The department advised the applicant that this aspect of the proposal will be assessed separately to avoid delay to approval for the two additional EOS.

On 23 November 2020, the applicant sought approval for a third additional EOS which was incorporated into the amendment application.

The department decided to split the application into two separate assessments. Part 1 for the assessment of three additional EOS to be processed at the Plant, and part 2 to assess a method proposed by the Licence Holder for the self-assessment of any new additional other EOS to be processed at the Plant without the need for a further licence amendment.

A revised licence was granted on 22 December 2020 for part 1 which allowed for the inclusion of three additional EOS at the Plant feed, resulting in a total of six specified EOS sites approved by the licence (Cue sands, A-Zone mine site, Golden Grove Oxide (Crown), Mixy, Golden Grove Pyrite (Amity) and Geko Gold Project). The six specified EOS are blended with Kirkalocka-oxide-ore during processing and the Licence Holder expects this will continue over the next 1-2 years.

This amendment only considers the risks associated with deposition of other EOS into the TSF1, the installation of tertiary infrastructure at the Wastewater Treatment Plant 'Tristar Water Solutions' Sequence Batch Reactor (WWTP), and updates following the submission of compliance documentation by the Licence Holder. An increase in throughput at the Premises has not been requested by the Licence Holder as part of this amendment process. DWER notes that Adaman has also submitted a works approval application for the construction of an additional TSF (TSF2) which will be assessed separately to this licence amendment.

On 9 September 2021, the applicant submitted an application to transfer ownership of the Licence from the previous owner Adaman Resources Pty Ltd. The transfer of the Licence to Kirkalocka Gold SPV Pty Ltd (the applicant) has been completed as part of this Licence

amendment process.

2.3 Proposed changes to Category 5 operations

2.3.1 Management of future other EOS

The Licence Holder proposes to source additional other EOS from a variety of locations in the Mid-West region within a radius of approximately 150 km from the Kirkalocka operation as shown in Figure 1 below. Also shown below in Figure 1 is the locations of the Specified EOS authorised in the existing Licence.

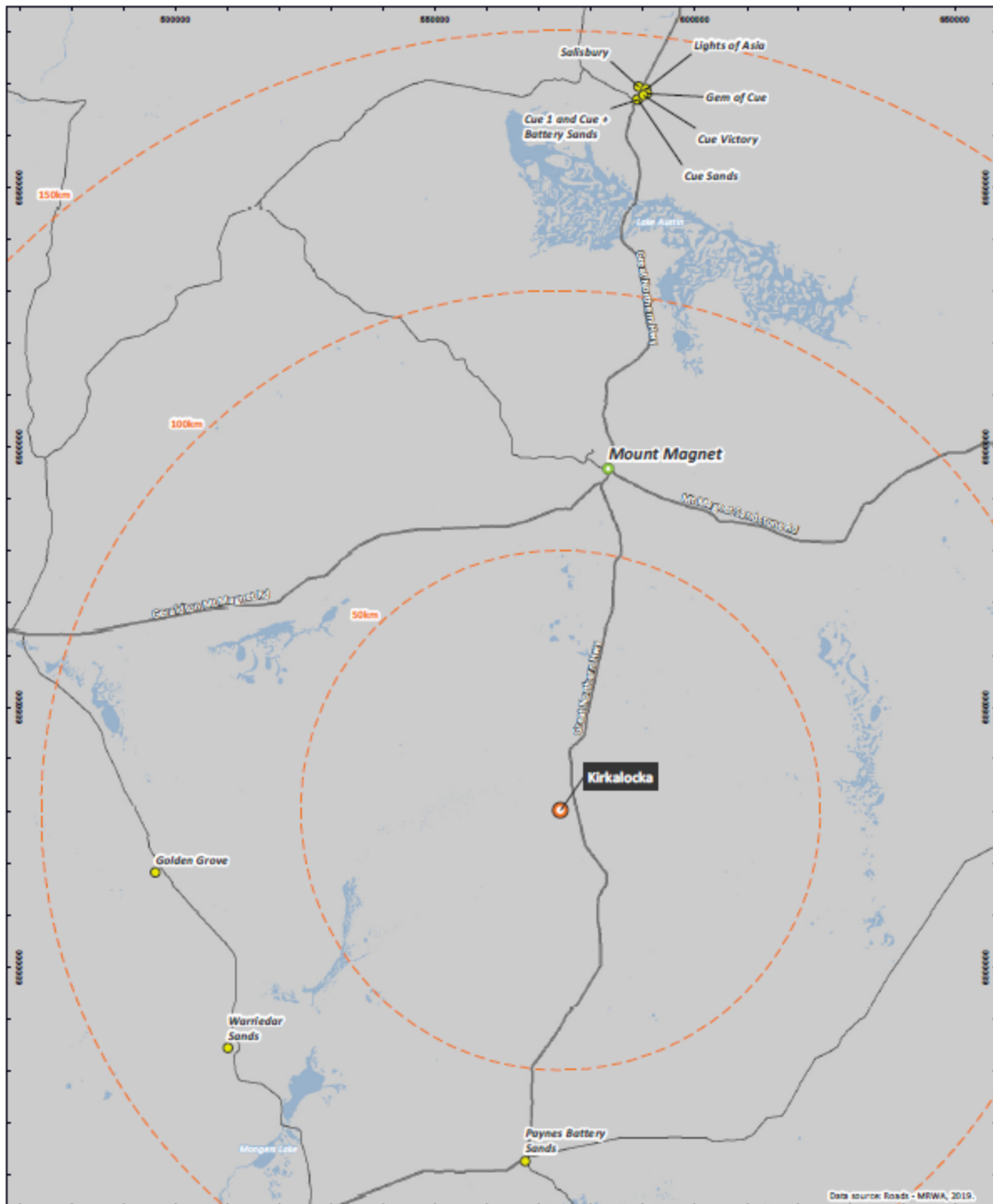


Figure 1: Potential source area for future other EOS

The Licence Holder proposes that all future other EOS will:

- Be subject to the same requirements as for Specified EOS with an assessment of the geochemical characteristics and then compared with a set of threshold limits. This will occur at the source location;
- If found suitable will then be transported to the Premises by road train with loads covered;
- Be stored on the Kirkalocka ROM pad according to geochemical and physical characteristics to minimise any detrimental effects on the environment;
- Be processed through the Kirkalocka mill with the tailings deposited into TSF1; and
- Be combined with the Specified EOS materials, which will contribute to less than 5% of the 2,500,000 t/pa throughput at the Kirkalocka mill, and for grade control purposes, will be blended at a maximum instantaneous rate of up to 15% of the mill feed at any one time.

2.4 Proposed changes to the WWTP

The Licence Holder has identified that during commissioning of the WWTP, the commissioning limits set in the licence were not achieved for all parameters. To achieve compliance with the WWTP discharge Licence limits, the Licence Holder now proposes to install additional tertiary infrastructure known as the 'Tristar tertiary Ultra filtration system' (UF system).

The proposed UF system is located within a 6 m long airconditioned container which is connected to a 50 kiloliter (kL) buffer tank and a 50 kL treated water tank (see Figure 2 below). The buffer tank will be connected to the existing WWTP sequence batch reactor irrigation tank acting as a collection point for the UF system to draw from. The feed pump will draw from the buffer tank and through a multimedia filter installed to filter out any suspended solids greater than 10 microns in size. The wastewater is then feed through a 5 micron rated cartridge to capture further solids prior to entering the UF membrane for a final filtration of the wastewater. The wastewater is then pumped to the 50 kL treated water tank. The treated water will then be circulated through the tank and dosed with sodium hypochlorite before discharge. The system will be fully automated and will be fitted with remote monitoring functions.

Treated wastewater from the WWTP is discharged to a 2.88 ha spray field area which is already authorised under the Licence. The Licence Holder now proposes to also discharge a portion of the treated wastewater from the WWTP to the HDPE lined process water pond for reuse in the Kirkalocka processing plant and for dust suppression at the Premises.

The Department of Health (DoH) granted the Licence Holder on 8 April 2021 'in principal approval' for the UF system and for the use of the treated wastewater for industrial processing and for dust suppression. The Licence Holder will still require a 'permit for use' from DoH following the installation of the UF system. The DoH has imposed the following compliance values, Table 1, for the discharged wastewater which also reflect the limits imposed in the Licence.

Table 1: DoH discharge parameters limits for treated wastewater.

Potential End Uses	Parameter	Compliance Values – Validation monitoring 6 samples	Compliance Values – Continual monitoring
Dust suppression	<i>E.coli</i>	< 10 cfu/100 mL	< 10 cfu/100 mL
Firefighting Industrial use with potential human exposure	Biochemical oxygen demand (BOD)	< 20 mg/L	-
	Total suspended solids (TSS)	< 30 mg/L	-
	pH	6.5 – 8.5	6.5 – 8.5
	Turbidity	< 5 NTU (95%)	< 5 NTU (95%)
	Disinfection	Chlorine 0.2 – 2.0 mg/L	Chlorine 0.2 – 2.0 mg/L

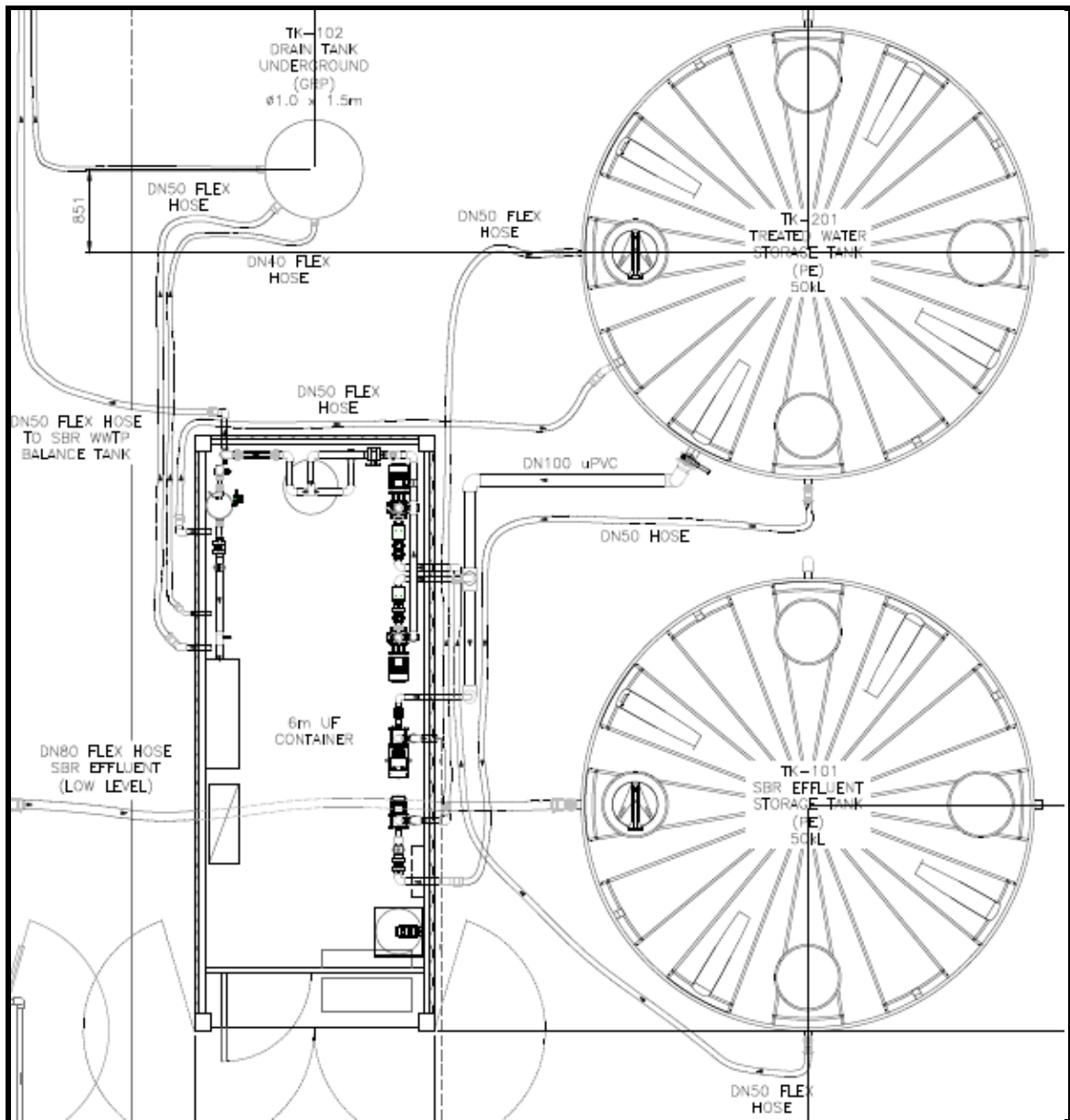


Figure 2: UF system layout

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DER 2017).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this amendment report are detailed in Table 2 below. Table 2 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 2: Licence Holder controls – processing of other EOS

Emission	Sources	Potential pathways	Proposed controls
Leachate/runoff	Stockpiling	Direct discharge	<p>Assessment of the geochemical characteristics of each EOS and comparison of these to a set of threshold limits (APPLICANT TO PROVIDE LIMITS) prior to transport to the Premises.</p> <p>Store all EOS on the Kirkalocka ROM Pad according to geochemical and physical characteristics to prevent any detrimental effects on the environment.</p> <p>EOS ores located in a bunded area at the ROM if required.</p>
Dust	Movement of ore through screens, crushers, conveyors, and storage at stockyards	Air / wind dispersion	<p>Water sprays will be utilised on conveyers, transfer points, tipping areas, stockpiles and crushing and screening stations</p> <p>Biodegradable stabilising agents may be used to minimise dust lift-off from the stockpiles.</p> <p>Weather conditions will be monitored and additional water applied in preparation for high risk conditions (e.g. high winds).</p> <p>Opportunistic visual inspections will be carried out and if visible dust present, the source will be investigated and additional water, or alternative treatments, applied.</p>
Contaminated stormwater	Ore storage at stockyards	Direct discharge to land and surface water	<p>Assessment of the geochemical characteristics of each EOS and comparison of these to a set of threshold limits (APPLICANT TO PROVIDE LIMITS) prior to transport to the Premises.</p> <p>Store all EOS on the Kirkalocka ROM Pad</p>

Emission	Sources	Potential pathways	Proposed controls
			<p>according to geochemical and physical characteristics.</p> <p>EOS ores located in a banded area at the ROM if required.</p>
<p>Seepage from the TSF with a potential increased level of chemical constituents of concern.</p>	<p>Processing of Kirkalocka ore with tailings waste deposited into TSF1.</p>	<p>Infiltration through ground.</p>	<p>Assessment of the geochemical characteristics of each EOS and comparison of these to a set of threshold limits (APPLICANT TO PROVIDE LIMITS) prior to transport to the Premises.</p> <p>Ore from the specified and other external ore sources will contribute to less than 5% of the annual throughput at the Kirkalocka mill, and for grade control purposes, will be blended at a maximum instantaneous rate of 15% of the mill feed.</p> <p>Tailings associated with the EOS blended materials will be discharged so it forms a narrow band over existing consolidated Kirkalocka tailings which will then be capped at closure by a dedicated layer of 100% Kirkalocka tailings.</p> <p>Rotating spigot discharge to encourage consolidation of tailings.</p> <p>Decant return infrastructure and water continually removed from the surface of the tailings.</p> <p>Decant water pond maintained centrally and as small as possible.</p> <p>Interceptor drain around the TSF to capture seepage.</p> <p>Two groundwater recovery bores approved for construction.</p>

3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the Licence Holder's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 3 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guidance Statement: Environmental Siting* (DER 2016)).

Table 3: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
N/A	N/A (none within 12 km)
Environmental receptors	Distance from prescribed activity
<p>Vegetation – Mulga trees (<i>Acacia aneura</i>) Mulgas are shallow rooted (typically < 5m). Vegetation condition rated as excellent by Ecologica (2019). Mulga groves play an important role as water and nutrient sinks, creating fertile patches in generally nutrient poor landscapes (Ecologica, 2019)</p>	Adjacent to TSF1 and processing area
<p><u>Watercourses/ waterbodies</u> Ephemeral creek lines. Kirkalocka Creek Riparian vegetation. In general, these surface water types are dryland water courses, dry for a majority of the time and only experience short period flows during extreme rainfall events from cyclonic or winter fronts. The area is used for pastoral purposes, and water within creeks may be utilised by stock.</p>	<p>An ephemeral creek-line (minor drainage line) is adjacent to TSF1 at the east embankment and north of the mine pit and TSF1. The drainage line drains north west towards Kirkalocka Creek which is located approximately 6 km north-west of the premises.</p>
<p><u>Groundwater values</u> Water is used onsite for industrial and domestic purposes. Groundwater in the regional area may be used for stock watering. Groundwater monitoring indicates the groundwater quality is considered fresh to saline (TDS range of 840 to 3,500 mg/L). The lower salinity levels were observed in groundwater monitoring bores upstream of the TSF. Two privately owned bores nearby the premises (based on available GIS dataset – WIN Groundwater Sites): Curara Well; and Callaloo Well.</p>	<p>Groundwater generally flows in a north-east west direction towards the mine pit. Curara Well is 1.3km south of TSF; and Callaloo Well is 4.2km north of TSF1.</p> <p>Prior to deposition of tailings in 2019, depth to groundwater was approximately 7 to 15 mbgl at TSF1, reaching depths of 35 m closer to the mining pit. Since deposition commenced at the TSF1, groundwater levels were observed rising in the southern area of the TSF1. However, over the last three months these levels have dropped below the licence limit of 5 mbgl except for monitoring bore TDP8 (3.99 mbgl).</p>
RIWI Act East Murchison Groundwater Area.	Activities located within the Area

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for those emission sources which are proposed to change and takes

into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the Licence Holder has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Licence Holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the Licence Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 4.

The Revised Licence L9195/2019/1 that accompanies this Amendment Report authorises emission associated with the operation of the Premises i.e., category 5, 6, 85 and 89 activities.

The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 4: Risk assessment of potential emissions and discharges from the Premises

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for regulatory controls additional to Licence Holder controls
Source/Activities	Potential emission	Receptors and pathway	Potential impact	Licence Holder's controls				
Construction and Operation of the UF system at the WWTP								
Construction/installation of the UF system at the WWTP	Dust from vehicle movements during earth moving activities.	Nearby vegetation (Mulga trees) rated as excellent by Ecologica (2019). Air/windborne pathway	Smothering of vegetation resulting in reduced photosynthesis.	Use of water carts at the Premises to control dust. Limited vehicle movement during high winds.	C = Slight L = Possible Risk = Low	Y	Condition 1	Infrastructure is constructed at the location depicted in the Licence.
Sewage treatment at the UF system.	Spills, leaks of sewage, sludge and treatment chemicals at the WWTP.	Direct discharge to soils and infiltration to groundwater	Contamination of soils and groundwater with raised nutrient levels.	Daily inspections of infrastructure. UF system located within a container. A bund will be constructed around the perimeter of the container and storage tanks as per existing infrastructure. Routine maintenance undertaken. Any spills removed and disposed at the landfill. Chemicals	C = Minor L = Unlikely Risk = Medium	Y	Conditions 1, 2, <u>5</u> and 6	Infrastructure is located as depicted in the Licence. Routine inspections for visual integrity and leak detection.

Licence: L9195/2019/1

Risk Event					Risk rating ¹	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for regulatory controls additional to Licence Holder controls
Source/Activities	Potential emission	Receptors and pathway	Potential impact	Licence Holder's controls	C = consequence L = likelihood			
				stored within sealed containers.				
Sewage treatment at the UF system.	Discharge of wastewater to the spray field area with nutrient levels above licence limits	Direct discharge to soils and infiltration to groundwater	Contamination of soils and groundwater with raised nutrient levels.	Effluent expected to be treated to Class C standards. The spray field area is almost twice the size as recommended for the expected nutrient loading. The system is fully automated with continuous monitoring of nutrient loads and dosing requirements.	C = Slight L = Unlikely Risk = Low	Y	Conditions 1, 2, 3, 5 , 6, 10, 11, 12, 13, 14, 19, 23, 24, 25, 26, 27, 29, 31, 32, 33, 34, 35, 36 and 37.	Undertake daily visual integrity and leak detection inspections to ensure equipment is functioning as designed. Commissioning conditions to confirm plant will operate as expected. Routine monitoring of wastewater discharge to confirm plant is continuing to operate as expected and complying with Licence limits.
Processing of Other External Ore Sources (from sites within 150 km of Kirkalocka premises)								
Storage of Other EOS on the ROM and movement of ore at the processing plant.	Dust	Air wind dispersion. No residences in proximity. Great Northern Highway 2km east. One priority fauna recorded at the premises.	Potential suppression of photosynthetic and respiratory functions.	Refer to Section 3.1.	C = Minor L = Unlikely Risk = Medium No change in risk rating	Y	Condition 4	Infrastructure is located as depicted in the Licence.

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for regulatory controls additional to Licence Holder controls
Source/Activities	Potential emission	Receptors and pathway	Potential impact	Licence Holder's controls				
Storage of Other EOS on the ROM	Contaminated stormwater/leachate from the ROM	Direct discharge to land and surface water. Surface water & vegetation adjacent to processing and storage areas. Ephemeral creek within the boundary discharges to Kirkalocka Creek 6km away.	Reduced water quality within surface water systems. Contamination of surrounding soils with cyanide, salts, and dissolved metals.	Refer to Section 3.1.	C = Minor L = Possible Risk = Medium Risk rating increased to Medium.	Y	Conditions <u>4, 5 and 25</u>	EOS are historical tailings from other premises and therefore may contain oxidized metals and dissolved solids which could impact the surrounding environment Additional requirements for the types of ore stored on the ROM pad, stockpile storage requirements and the recording of the source/s, volumes processed, and any data collected from materials characterisation assessments. The provisions of the <i>EP (Unauthorised Discharges) Regulations 2004</i> also apply.
Processing of Kirkalocka Oxide Ore with Other EOS deposited into the TSF1.	Seepage from the TSF embankments and the base which potentially contains harmful chemical constituents.	Direct discharge-infiltration through ground Groundwater Vegetation (Mulga)	Contamination of surrounding soils with cyanide, salts, and dissolved metals. Contamination of groundwater	Refer to Section 3.1.	C = Moderate L = Possible Risk = Medium	Y	Conditions <u>4, 5, 6, 8, 9, 12, 13, 14, 15, 16, 20, 21, 22, 23, 24, 25, 26, 27, 28</u> and 29.	Refer to section 4 for detailed risk assessment.

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for regulatory controls additional to Licence Holder controls
Source/Activities	Potential emission	Receptors and pathway	Potential impact	Licence Holder's controls				
		Ephemeral creek within the boundary discharges to Kirkalocka Creek 6km away.	of beneficial use (stockwatering). Death of vegetation in the vicinity of the TSF caused by increased dissolved salts.					

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

Note 2: Proposed Licence Holder's controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

4. Risk assessment – processing other EOS at the Kirkalocka mill.

4.1 Description of risk event

Processing of other EOS at the Premises may increase the level of potentially harmful chemical constituents within seepage waters, which may impact an ephemeral creek line and vegetation (mulga) bordering the TSF1.

4.2 Identification and general characterisation of emission

Up to 2.5 million tonnes per annum (Mtpa) of ore which will consist of Kirkalocka oxide ore mined at the Premises and EOS will be put through the Carbon In Leach (CIL) processing plant. The resultant tailings slurry (40-50% solids) is discharged to TSF1.

The EOS (including other self-assessed EOS) will contribute to less than 5% of the annual throughput at the Kirkalocka mill (i.e. 125,000 tonnes), and for grade control purposes, will be blended at a maximum instantaneous rate of 15% of the mill feed. The other self-assessed EOS will be sourced from premises located within a 150 km radius of the Premises and mainly consists of historical tailings.

The report that was prepared by Talis Consultants indicated that the following testing had been carried out to characterise the Specified EOS (known sources) and blends with Kirkalocka tailings materials:

- Chemical analysis to determine the contents of potentially harmful metals and metalloids in the materials;
- An assessment of the mineralogy of the materials;
- Determining the sulfur content and acid-base accounts of solid materials;
- Determining the chemical characteristics of pore-water in the TSF; and
- Establishing trigger levels for the sulfur, arsenic and copper levels to determine the suitability of EOS materials for processing at the Kirkalocka site.

When assessing the potential effects of different blends of different lithologies on the chemical composition of tailings pore-water and of seepage from the TSF at the Premises, it should be recognised that this will probably change over time in the following manner:

- (i) During the current phase of active tailings deposition in the TSF, the tailings will be mostly saturated throughout the full thickness of the facility. The chemical composition of the tailings pore-water and of seepage through the base and toe of the TSF is likely to be of similar composition of water in the decant pond;
- (ii) When active tailings deposition ceases, drainage from the upper part of the tailings pile will allow some oxygen ingress. This factor, together with the high concentrations of nitrate that will be present in residual pore-water (due to the oxidation of cyanide and ammonium ions), would trigger the oxidation of sulfide minerals in the upper part of the tailings materials. Although this material has been determined to be non-acid forming (NAF), there is a significant risk that elevated concentrations of some metals and metalloids that are mobile under circum-neutral pH conditions would be released into tailings pore-water during this phase. Investigations on similar tailings materials at other sites (see Hekkinen et al., 2009; Lindsay et al., 2009) has indicated that elevated concentrations of the following potentially harmful elements can be released from NAF tailings into pore-water under circum-neutral pH conditions: nickel, cobalt, zinc, antimony and thallium. During this phase, seepage from the upper part of the tailings deposit that discharges to the toe of the TSF may have a completely different chemical composition to seepage that takes place through the base of the facility (refer to Fig. 10 in Hekkinen et al., 2009); and

- (iii) Eventually, the tailings would drain and become fully oxidised. Seepage from the TSF would only take place if there is an intense (i.e. cyclonic) rainfall event, and so this would cease to be a significant pathway for transporting chemical constituents of concern into the environment. However, vegetation and soil fauna that have colonised the structure may continue to transport metals into local food-webs if they are directly exposed to oxidised tailings materials.

4.3 Potential impacts from the emission

The geochemical testing that is reported in the Talis report mostly considers the immediate impacts of seepage from the TSF at the Kirkalocka site (i.e. dot-point (i) above) and does not adequately assess how the environmental risk posed by the disposal of tailings from different lithologies would change over time. To do this effectively would require lengthy kinetic testing of the range of blended tailings materials that are likely to be disposed of in the TSF.

However, such testing is not considered to be necessary in the short term at the Kirkalocka site, as the immediate environmental risks associated with seepage from the TSF would be more effectively and rapidly managed by reducing the current rate of seepage from the facility.

The most immediate environmental impacts caused by seepage are likely to be due to groundwater mounding and the effects of saline water on vegetation near the TSF. It is therefore important that the current rate of seepage from the TSF is assessed by undertaking a detailed water balance of the facility. This would enable management options to be assessed to reduce the rate of seepage. These management options could include:

- Increasing the density of the tailings slurry;
- Increasing the rate of water recovery from the TSF; and
- Increasing the recovery of seepage water.

The Licence Holder has recently submitted the *Kirkalocka Gold Project, Groundwater Monitoring Strategy and Seepage Management Plan, June 2021* (Seepage Plan). DWER's assessment of the Seepage Plan is that it does not adequately address the issue of seepage at the TSF1. The Seepage Plan did not provide:

- a detailed water balance for the Premises to determine the current seepage rate. This would enable suitable management options to reduce the seepage rate to be assessed and implemented;
- a detailed description of the existing geological and geophysical information for the Premises that confirms the existing groundwater monitoring bores at the TSF1 are located on structural features that are likely to be significant conduits for groundwater flow;
- an assessment on the use of shallow groundwater monitoring bores at the TSF1 to determine whether a perched aquifer is forming in regolith above bedrock, and to assess the potential impacts of groundwater mounding on vegetation near the TSF1.

5. Consultation

Table 1 provides a summary of the consultation undertaken by the department. The amendment is deemed acceptable subject to the existing conditions imposed in the Licence, and new conditions requiring the resubmission of the seepage management plan which sets out required action, and new inspection and reporting conditions.

Table 1: Consultation

Consultation method	Comments received	Department response
Application referred to the Department of Mines, Industry Regulation and Safety (DMIRS) on 27/01/21	No comments received.	N/A
Application referred to the Shire of Mount Magnet on 27/01/21	No comments received.	N/A
Application referred to the Shire of Yalgoo on 27/01/21	No comments received.	N/A
Licence Holder was provided with draft amendment on 19/7/2021	11/08/2021. Refer to Appendix 1	Refer to Appendix 1

6. Conclusion

Based on the assessment in this Amendment Report, the Delegated Officer has determined that a Revised Licence will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

6.1 Summary of amendments

Table 2 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 2: Summary of licence amendments

Existing condition/Table no.	Proposed amendments
Not applicable	<p>Transfer of ownership of Licence. Licence transferred from Licence Holder 'Adaman Resources Pty Ltd' to the new Licence Holder 'Kirkalocka Gold SPV Pty Ltd'.</p> <p>ASIC search (9/09/2021) identified Kirkalocka Gold SPV Pty Ltd was registered as a company on 15 May 2018. ASIC extract also provided by the applicant.</p> <p>Submitted copies of DMIRS documentation indicates Kirkalocka Gold SPV Pty Ltd is the proprietor of the Kirkalocka Gold Mine.</p>
Condition 1, Table 1	<p>Removal of groundwater monitoring bores TDP2 and TDP12 construction requirements.</p> <p>Redundant - compliance docs have been submitted and DWER response letter sent.</p>

Condition 1, Table 1	Removal of vegetation monitoring quadrat construction requirement. Redundant - compliance documents submitted and DWER response letter sent.
Condition 1, Table 1	Removal of Tristar WWTP and Spray field construction requirements. Redundant - compliance docs submitted and DWER response letter sent.
Condition 1, Table 1	New design and construction condition for the WWTP Tristar tertiary Ultra filtration system.
Condition 4, Table 2	Condition updated to include new operational requirements at the Ore Handling Plant for the additional external ore sources.
Condition 4, Table 2	Removal of operational requirements for the WWTP infiltration area as this area has now been decommissioned and has been replaced by the new spray field area.
Condition 5, Table 3	Deletion of the inspection requirements for the now decommissioned WWTP infiltration area and include new inspection requirements for the new WWTP and spray field area, and new inspection requirements for the Kirkalocka ROM pad storage area for EOS.
Condition 10, Table 7	Table updated by removing the infiltration area as a discharge point and inclusion of new discharge point location for the WWTP spray field area.
Condition 11, Table 8	Table updated to include emission limits for the new WWTP spray field area. Emission limits were carried over from the commissioning limits set in Table 16. Emission limits for the previous infiltration area have been removed as this area is no longer used for the disposal of treated effluent.
Condition 19, Table 12	Removal of monitoring requirements for the now decommissioned infiltration area. Spray Field location details updated.
Condition 20, Table 13	Addition of ammonia as a groundwater monitoring parameter at the TSF1 groundwater monitoring bores.
Condition 21	Removal of the requirement for the Licence Holder to determine the volume of wastewater discharged from the decommissioned WWTP.
Condition 22	Requirement for the resubmission of the seepage management plan (SMP). The purpose for the submission of a SMP was for the Licence Holder to address the issue of observed groundwater levels increasing at the TSF1 due to seepage. DWER's assessment of the Seepage Plan is that it does not adequately address this issue. The Seepage Plan did not provide: <ul style="list-style-type: none"> a detailed water balance for the Premises to determine the current seepage rate. This would enable suitable management

	<p>options to reduce the seepage rate to be assessed and implemented;</p> <ul style="list-style-type: none"> • a detailed description of the existing geological and geophysical information for the Premises that confirms the existing groundwater monitoring bores at the TSF1 are located on structural features that are likely to be significant conduits for groundwater flow; and • an assessment on the use of shallow groundwater monitoring bores at the TSF1 to determine whether a perched aquifer is forming in regolith above bedrock, and to assess the potential impacts of groundwater mounding on vegetation near the TSF1.
Previous condition 23	<p>Removal of the requirement to remove dewater discharge Point A and report to the CEO within 7 days of the removal occurring.</p> <p>Redundant – the department was notified as required within 7 days that the discharge point had been removed by the due date.</p>
Condition 25 Table 14	<p>Removal of the requirement to report on data collected in accordance with previous condition 21. Redundant as condition 21 has been deleted from the Licence.</p>
Condition 25 Table 14	<p>New requirement for the reporting on monitoring data collected from conducting geochemical characteristic assessments on each External Ore Source processed at the Kirkalocka Mill. The Licence Holder committed to undertake these assessments.</p> <p>New requirement also for the reporting of the % of external ore source processed at the Kirkalocka Mill along with the type and the location of the source.</p>
Condition 32, Table 15	<p>Removal of the Tristar WWTP commissioning requirements.</p> <p>Redundant – Commissioning of the WWTP commenced on 9 November 2020</p> <p>Include commissioning of the new WWTP Tristar tertiary Ultra filtration system.</p>
Condition 33, Table 16	<p>Update table by including commissioning of the new WWTP Tristar tertiary Ultra filtration system.</p>
Schedule 1 Maps	<p>Figure 2 map updated to show the new Tristar WWTP and spray field area, and the decommissioned infiltration area.</p> <p>Figure 6 - new map to show the location of the identified External Ore Sources.</p>
Schedule 2: Site Plans	<p>Removal of Site Plan 4. Location of the new Tristar WWTP and Spray Field is now shown in Schedule 1: Figure 2.</p>
Schedule 2: Site Plan 5	<p>New map detailing the Tristar WWTP Ultra Filtration System.</p>

References

1. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
2. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
3. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Department of Water and Environmental Regulation (DWER) 2019, *Industry Regulation Guide to Licensing*, Perth, Western Australia.
5. Ecologica, December 2019, *Adaman Resources Kirkalocka Gold Mine Baseline Vegetation and Mulga Health Monitoring* (Revision 1), Osborne Park, Western Australia.
6. Talis consultants, October 2020. *Kirkalocka Gold Project External Ore Sources – Application for Licence amendment*.
7. Adaman Resources, June 2021. *Kirkalocka Gold Project Groundwater Monitoring Strategy and Seepage Management Plan, Tailings Storage Facility – Associated Impacts*.
8. EOS Environmental Procedure, *Procedure to inform on the environmental requirements for using external ore sources at Kirkalocka*, Adaman Resources, version 2 September 2020.
9. Adaman Resources, 22 March 2021. Response to DWER Request Further Information letter dated 22 February 2021.
10. Kirkalocka Gold Project, *Groundwater Monitoring Strategy and Seepage Management Plan, Tailings Storage Facility – Associated Impacts, June 2021*.
11. Hekkinen, P.M., Räsänen, M.L., and Johnson, R.H., 2009. Geochemical characterisation of seepage and drainage water quality from two sulphide mineral tailings impoundments: acid mine drainage versus neutral mine drainage. *Mine Water and the Environment*, **28**, 30-49. The paper is available from web site https://www.researchgate.net/profile/Paeivi_Kauppila/publication/227305419_Geochemical_Characterisation_of_Seepage_and_Drainage_Water_Quality_from_Two_Sulphide_Mine_Tailings_Impoundments_Acid_Mine_Drainage_versus_Neutral_Mine_Drainage/links/556e8dec08aefcb861db9d44/Geochemical-Characterisation-of-Seepage-and-Drainage-Water-Quality-from-Two-Sulphide-Mine-Tailings-Impoundments-Acid-Mine-Drainage-versus-Neutral-Mine-Drainage.pdf.
12. Lindsay, M.B., Condon, P.D., Jambor, J.L., Lear, K.G., Blowes, D.W. and Ptacek, C.J., 2009. Mineralogical, geochemical, and microbial investigation of a sulfide-rich tailings deposit characterized by neutral drainage. *Applied Geochemistry*, **24**, 2212-2221. The paper is available from web site <https://i2mconsulting.com/clients/tailings-ponds-research/Mineralogical,%20geochemical,%20and%20microbial%20investigation%20of%20a%20sulfide-rich%20tailings1-s2.0-S0883292709002443-main.pdf>.

Appendix 1: Summary of Licence Holder's comments on risk assessment and draft conditions

Condition	Summary of Licence Holder's comment	Department's response
Licence Holder details	Following the completion of the administration period, the proposed change to the licence holder (<i>administrators appointed</i>) is no longer required. Evidence provided to DWER.	Supported. 'administrators appointed' removed.
Condition 22	Seeking a 4 week extension to the seepage management plan submission date. New date requested 31 October 2021.	Supported. Submission date updated.
Schedule 1, Figure 2	Tristar WWTP is in a slightly different location than shown on Figure 2.	Minor variation so no change in risk. Map updated.

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY						
Application type						
Works approval	<input type="checkbox"/>					
Licence	<input type="checkbox"/>	Relevant works approval number:		None	<input type="checkbox"/>	
		Has the works approval been complied with?		Yes <input type="checkbox"/>	No <input type="checkbox"/>	
		Has time limited operations under the works approval demonstrated acceptable operations?		Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?		Yes <input type="checkbox"/>	No <input type="checkbox"/>	
		Date Report received:				
Renewal	<input type="checkbox"/>	Current licence number:				
Amendment to works approval	<input type="checkbox"/>	Current works approval number:				
Amendment to licence	<input checked="" type="checkbox"/>	Current licence number:	L9195/2019/1			
		Relevant works approval number:	W6190/2018/1: Cat 5 <ul style="list-style-type: none"> • Construction compliance submitted 20/09/2019 • Amended 11/08/2020 to include 3 months commissioning and extend TLC to 9 months after completion of commissioning. W6249/2019/1: Cat 6 <ul style="list-style-type: none"> • Construction compliance and commissioning report 	N/A	<input type="checkbox"/>	

			<p>submitted 4/05/2020.</p> <ul style="list-style-type: none"> • Changes to the approved construction reported – Relocation of Sprinkler Banks; and Discharge points B and C - information provided for assessment, • Commissioning completed on 31/03/2020. • Amendment on 26/08/2020 for TLO extended to 6 months after commissioning (TLO expires 30/09/2020). <p>W6191/2018/1: Cat 89</p> <ul style="list-style-type: none"> • Construction compliance submitted 4/05/2020. Change of location OK'd by emails from A/DO (Carmen). Also no fencing and other changes. Requires review and changes to be made for the amendment. • Amended 26/08/2020 for Time limited operations for 6 months (to 3/11/2020) 		
Registration	<input type="checkbox"/>	Current works approval number:		None	<input checked="" type="checkbox"/>
Date application received	2/10/2020				
Applicant and Premises details					
Applicant name/s (full legal name/s)	Adaman Resources Pty Ltd				
ACN	620314007				
Premises name	Kirkalocka Gold Project				
Premises location	Part of M59/233 and M59/234 DAGGAR HILLS WA 6636				
Local Government Authority	Shire of Mount Magnet and Shire of Yalgoo				
Application documents					
HPCM file reference number:	DER2018/001608-1				
Key application documents (additional to application form):	Supporting document (dated 2 October 2020) Kirkalocka Gold Project Additional EOS prepared by Talis consultants EOS Environmental Procedure document- Adaman Resources Testing of Tailings-Slurry samples results				
Scope of application/assessment					

Summary of proposed activities or changes to existing operations.	Approval for processing of ore from an external resources (and storage of blended tailings). Licence holder would also like to include further EOS in the Kirkalocka processing plant feed, and proposes a Process with trigger values for self-assessment of EOS to allow such ores within specified parameters (recommended by a geochemical specialist) to be processed at Kirkalocka without future License amendments. This trigger values would be part of the Licence and reported on annually as part of the Annual Audit Compliance Report.
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Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	Production or design capacity (Assessed – existing licence)	Proposed changes to the production or design capacity (amendments only)
Category 85	N/A	N/A
Category 5	2,500,000 tonnes per year	N/A
Category 6	N/A	N/A
Category 89	N/A	N/A

Legislative context and other approvals

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No: N/A Managed under Part V <input type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Ministerial statement No: N/A EPA Report No: N/A
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Reference No: N/A
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Mining lease / tenement <input checked="" type="checkbox"/> Expiry: M59/233 – expiry: 03/11/2033 M59/234 – expiry: 03/11/2033
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	The site is located within mining tenements and is therefore not subject to planning approval. The area is currently zoned for rural/mining purposes.
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Valid permit applies - CPS No: CPS 8367/1

Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	GWL202380(1)
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Name: East Murchison Groundwater Area Type: Proclaimed Groundwater Area Has Regulatory Services (Water) been consulted? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Regional office: Mid-West Gascoyne Consulted at works approvals stage
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004</i> , <i>Environmental Protection (Controlled Waste) Regulations 2004</i> , <i>State Agreement Act xxxxx</i>)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	<i>Dangerous Goods Safety Act 2004</i> <i>Mining Act 1978</i> <i>Environmental Protection (Unauthorised Discharges Regulations 2004</i>
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Classification: N/A – not listed in DWERS Geocortex viewer Date of classification: N/A