Amendment Report

Application for Licence Amendment

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

Licence Number	L9195/2019/1
Licence Holder	Adaman Resources Pty Ltd
ACN	620 314 007
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	02 November 2020
Decision	Revised licence granted

Suzy Roworth
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Date: 2020.11.02 13:43:38 +08'00'

SUZY ROWORTH
A/MANAGER, RESOURCE INDUSTRIES
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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1. Decision summary

Licence L9195/2019/1 is held by Adaman Resources Pty Ltd (Licence Holder) for the Kirkalocka Gold Mine (the Premises), located at Part of Mining Lease M59/233 and Mining Lease M59/234, 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 28 August 2020, the Licence Holder submitted an application to the department to amend Licence L9195/2019/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendment is being sought:

- Construction and operation of a category 85 Waste Water Treatment Plant (WWTP), maximum design capacity of 50 cubic metres per day (m^3/day).

This amendment is limited only to changes to Category 85 activities from the Existing Licence. No changes to the aspects of the existing Licence relating to Categories 5, 6 and 89 have been requested by the Licence Holder.

Table 1 below outlines the proposed changes to the existing Licence.

Table 1: Proposed design or throughput capacity changes

Category	Current throughput capacity	Proposed design/ throughput capacity	Description of proposed amendment
85	Not more than 23 m^3 per day	50 m^3/day	Construction and operation of a new 50 m^3/day WWTP and irrigation spray field. Once operational the existing WWTP will be decommissioned.

2.3 Infrastructure

The Licence Holder proposes to replace the existing WWTP (two lined facultative ponds and an infiltration area) with a Tristar Water Solutions (Tristar) Sequence Batch Reactor (SBR) System and Spray Field.

The Tristar WWTP will include a balance tank, treated effluent storage tank, and a sludge storage tank. The sludge storage tank will be emptied at required periods and disposed offsite.

Treated wastewater will be discharged to a 2.88 (ha) spray field by 15 sprinklers each with a radius of 30 m and field area allowing for spray drift.

2.4 Treatment and effluent disposal

Treatment of up to 50 cubic metres per day sewage will occur in the closed tank system through the application of several chemicals and physical mixing elements to facilitate chemical reactions designed to reduce bacterial and nutrient concentrations to a Category C class effluent standard. The treatment is to an improved standard from the existing WWTP as shown in Table 2.

Table 2: Tristar WWTP effluent

Pollutant parameter	Existing WWTP effluent	Tristar WWTP treatment capability	Category C class effluent standard
Biological Oxygen Demand (BOD)	<20 mg/L	< 20 mg/L	20-30 mg/L
Total Suspended Solids (TSS)	<30 mg/L	< 30 mg/L	25-40 mg/L
Total Nitrogen (TN)	<75 mg/L	< 30 mg/L	20-50 mg/L
Total Phosphorus (TP)	<25 mg/L	< 8 mg/L	6-12 mg/L
pH	-	6.5 – 8.5	-
Faecal Coliforms	<10 orgs/mL	<1000 CFU/100 mL	10^5 – 10^6 orgs/mL
Chlorine (Cl)	-	0.2 – 2.0 mg/L	-
Total Dissolved Solids (TDS)	Previously <800 mg/L, now <100 mg/L as source is potable water.	<100 mg/L (source is potable water)	-

The anticipated maximum annual discharge loads of nitrogen and phosphorus are within Water Quality Protection Note 22 (WQPN 22) risk category D guideline values for irrigation water, as shown in Table 3.

Table 3: Expected maximum nutrient loads

Nutrient	Annual load (kg/ha/year)	WQPN (kg/ha/year)
Nitrogen	190	480
Phosphorus	51	120

The Tristar plant will be constructed within the camp area and the spray field located adjacent to the existing ponds and irrigation area, as shown in Figures 1 and 2 below.

Figure 1: Location of the proposed spray field

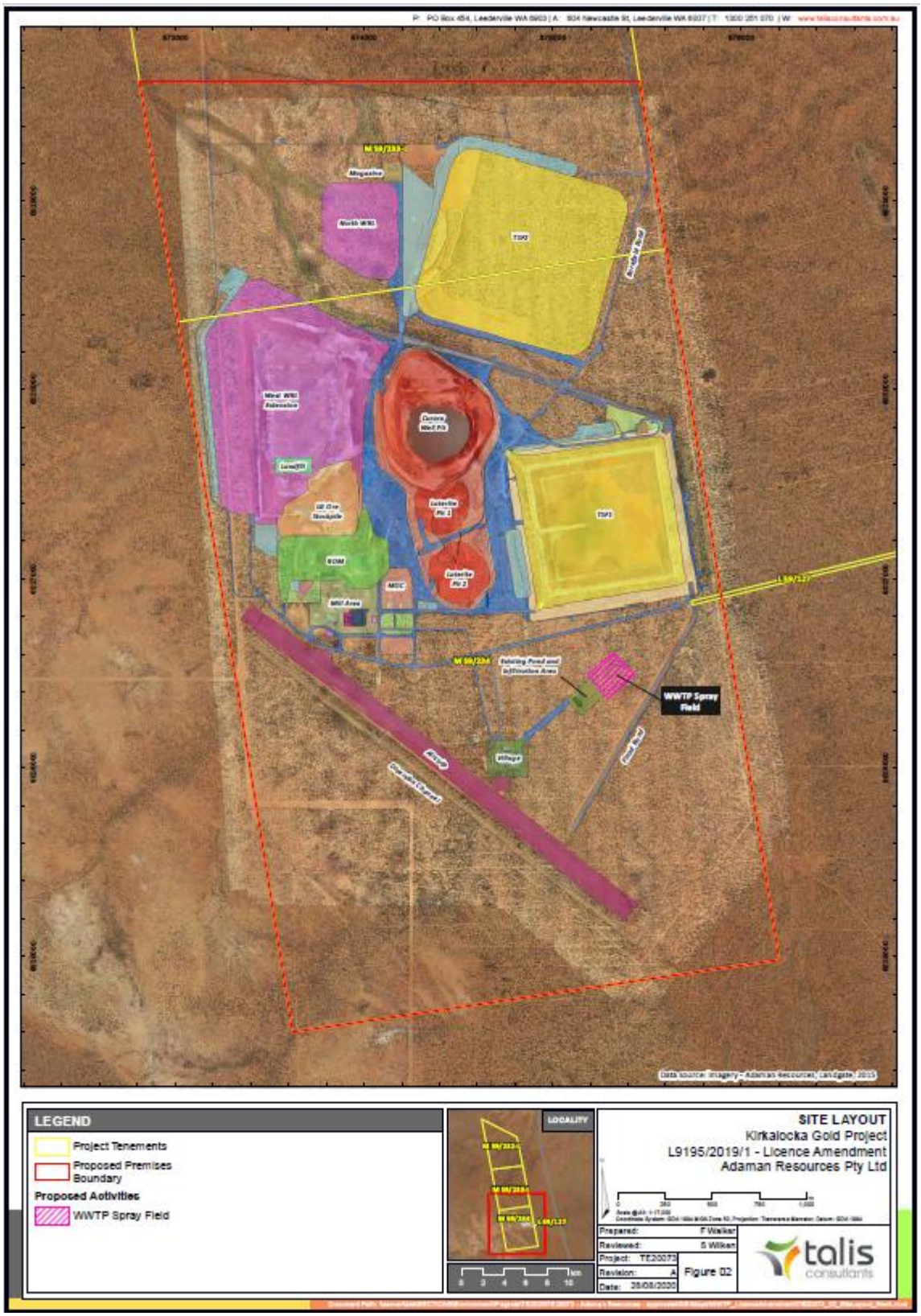
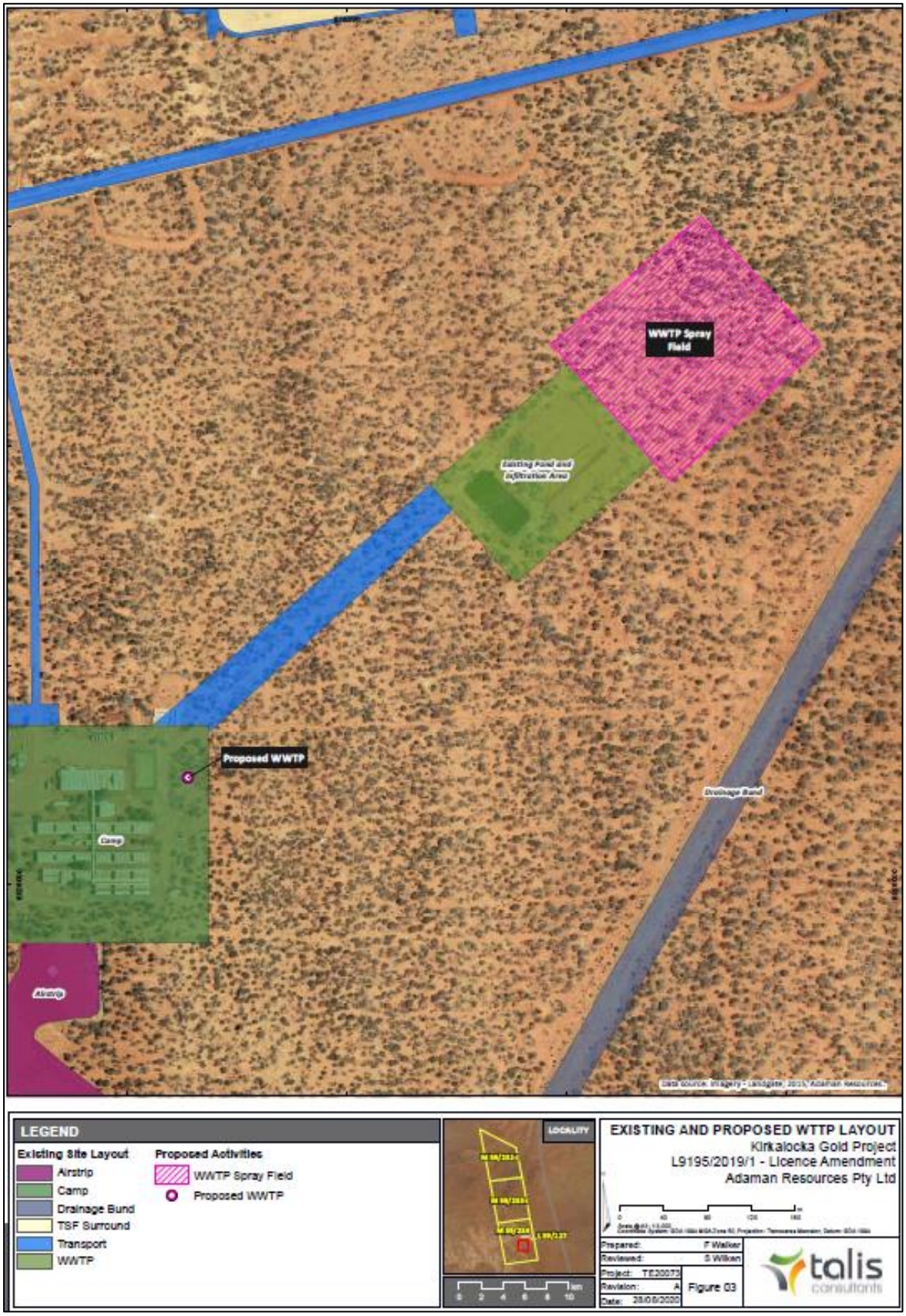


Figure 2: Location of the proposed WWTP and Spray field



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 construction and operation which have been considered in this Amendment Report are detailed in Table 4 below. Table 4 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 4: Licence Holder controls - construction

Emission	Sources	Potential pathways	Proposed controls (from the Application)
Dust and noise (construction)	Construction machinery and movement of earth	Air	Not provided – no sensitive receptor

Table 5: Licence Holder controls – operation

Emission	Sources	Potential pathways	Proposed controls
Odour	Tristar WWTP Irrigation spray field	Air	Not provided - no sensitive receptor
Spills and leaks of sewage	Tristar WWTP	Direct discharge to soils and seepage to groundwater	A bund will be constructed around the perimeter of the unit and storage tanks to contain any unforeseen spills. Low alarms on chemicals and high level alarms on screen box, tanks and pumps/ aerators faults etc. The balance tank can hold more than a day of storage, plus the volumes within the treatment plant as contingency storage. Sludge will be emptied as required and disposed off site. Siting - distance from groundwater (approximately 8 mbgl)
Treated effluent	Effluent from the WWTP discharged at the irrigation spray field	Direct discharge to soils. Pooling with overflow.	Effluent treated to Class C standards as listed in Section. Spray field sized almost twice the guideline value of WQPN 22. Monitoring of effluent - providing

Emission	Sources	Potential pathways	Proposed controls
		Spray drift. Infiltration to groundwater.	information for corrective management. Licence Holder has stated that potable water is now used in the sewage treatment process (salinity <100 mg/L) therefore TDS not proposed to be monitored. Discharge via 15 equally dispersed 30 m radius sprinklers with a spray field area of 2.88 ha allowing for spray drift. Nutrient discharge maximum load of 190 kg/ha/year Nitrogen and 51 kg/ha/year Phosphorus, within WQPN 22 guidelines.

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 6 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 6: 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**
Mulga vegetation	Adjacent to and within the spray field.
Minor ephemeral creek-lines	A minor drainage line is located 1.5km from the WWTP, north of the mine pit and tailings storage facility (TSF) and drains north west towards Kirkalocka Creek which is 8.5 km north of the WWTP.
Groundwater salinity at the Kirkalocka mine site ranges from 840mg/L to 3500mg/L (based on 2015 monitoring data). Groundwater in used in the regional area for stock watering.	Depth to groundwater was approximately 7.8mbgl in April 2019 at monitoring bore CWE27 (located approximately 150m south-east of the spray field). Groundwater generally flows in a north-east west direction towards the mine pit. The nearest privately owned bore (Curara Well ID 61812806) is approximately 1.1km south east of the WWTP (based on available GIS dataset - WIN Groundwater Sites) (from L9195/2019/1 Decision Report, 2019) .
RIWI Act East Murchison Groundwater Area.	Activities located within the Area

3.2 Soil type

Soils in the region are described as “Red loamy earths and Red shallow loams (often with hardpans) with Red deep sands and Red shallow sands and some Red shallow sandy duplexes” (L9195/2019/1 Decision Report, 10 May 2019).

3.3 2. Meteorology

Rainfall in the area can vary considerably from year to year, however on average it is approximately 260 mm per year with the majority falling between January and August (Bureau of Meteorology). Average annual Class A pan evaporation at Mount Magnet (70 km away) is approximately 2,500 mm.

3.4 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 7.

The Revised Licence L9195/2019/1 that accompanies this Amendment Report authorises emissions associated with construction and commissioning of the new WWTP and 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 7. Risk assessment of potential emissions and discharges from the proposed WWTP during commissioning and operation.

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**				
Commissioning and Operation								
Sewage treatment at the WWTP	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.	Refer to Section 3.1	C = Minor L = Unlikely **Risk = Medium**	Y	Conditions 1 and 33 - 39	Commissioning conditions to confirm plant is operating as expected
Effluent discharge to an irrigation spray field	Treated effluent	Direct discharge and spray drift to soils with nutrient uptake by Mulga vegetation. Pooling and runoff of effluent.	Contamination of soils with raised nutrient levels potentially impacting health of mulga. Waterlogging of soils and reduced health of mulga.	Refer to Section 3.1	C = Minor L = Unlikely **Risk = Medium**	Y	Conditions 1, 4, 10, 11, 14, 19, and 33- 39 No limit applied in accordance with risk ratings. Annual reporting of monitoring results with comparison against previous results required	Requirement to operate the spray field to minimise pooling to reduce risk of waterlogging of soils. Commissioning conditions to confirm plant is operating as expected

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. Consultation

Table 8 provides a summary of the consultation undertaken by the department.

Table 8: Consultation

Consultation method	Comments received	Department response
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal 21 September 2020	No issues with the Category 85 application.	N/A
Department of Health (DOH) advised of proposal (22 September 2020)	Waste water approval for the Kirkalocka Mine Site has been revised for the 42.5 kL/day Sequence Batch Reactor WWTP upgrade, granted on 25 August 2020 (Approval No: 129.20).	N/A
Licence Holder was provided with draft amendment on 28 October 2020	The Licence Holder advised on 28 October 2020 that they have no further comments on the draft documents and waived the remaining consultation period.	N/A

5. 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.

5.1 Summary of amendments

Table 9 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 9: Summary of licence amendments

Condition no.	Proposed amendments
1	Inclusion of construction requirements for the Tristar WWTP and spray field.
4	Addition of operating requirements for the spray field (no discharge beyond the boundary and minimise pooling).
10	Addition of the spray field as an authorised discharge point.
11	TDS removed as a discharge parameter limit for the existing WWTP discharge
14	Addition of monitoring during commissioning as monitoring required to be tested by a NATA accredited laboratory.

19	Addition of monitoring of the treated effluent discharged from the Tristar WWTP to the spray field.
27	AER Table amended to include comparison of monitoring results of discharge to the spray field (condition 19) to include a comparison against manufacturers maximum specifications.
33 - 39	Addition of commissioning conditions for the Tristar WWTP - timeframe, monitoring requirements, submission of commissioning report and reporting start and finish of commissioning.
Definitions	Updated
Schedule 2	Addition of Site Plan 4 - location map for the Tristar WWTP and spray field
Schedule 2	Addition of Site Plan 5 – Tristar WWTP and spray field layout.

References

1. ANZECC/ARMCANZ, 1997. National Water Quality Management Strategy, Australian Guidelines for Sewerage Systems, Effluent Management
2. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
3. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
4. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
5. Department of Water and Environmental Regulation (DWER) 2019, Industry Regulation Guide to Licensing, Perth, Western Australia.

Appendix 2: Application validation summary

<table>
<tr><th colspan="7">SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)</th></tr>
<tr><td colspan="7">Application type</td></tr>
<tr><td>Works approval</td><td>☐</td><td colspan="5"></td></tr>
<tr><td rowspan="4">Licence</td><td rowspan="4">☐</td><td>Relevant works approval number:</td><td></td><td>None</td><td>☐</td></tr>
<tr><td colspan="3">Has the works approval been complied with?</td><td colspan="2">Yes ☐ No ☐</td></tr>
<tr><td colspan="3">Has time limited operations under the works approval demonstrated acceptable operations?</td><td colspan="2">Yes ☐ No ☐ N/A ☐</td></tr>
<tr><td colspan="3">Environmental Compliance Report / Critical Containment Infrastructure Report submitted?</td><td colspan="2">Yes ☐ No ☐</td></tr>
<tr><td colspan="5">Date Report received:</td></tr>
<tr><td>Renewal</td><td>☐</td><td>Current licence number:</td><td colspan="3"></td></tr>
<tr><td>Amendment to works approval</td><td>☐</td><td>Current works approval number:</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Amendment to licence</td><td rowspan="2">☒</td><td>Current licence number:</td><td colspan="3">L9195/2019/1</td></tr>
<tr><td>Relevant works approval number:</td><td></td><td>N/A</td><td>☐</td></tr>
<tr><td>Registration</td><td>☐</td><td>Current works approval number:</td><td></td><td>None</td><td>☐</td></tr>
<tr><td colspan="2">Date application received</td><td colspan="5">28/08/2020</td></tr>
<tr><td colspan="7">Applicant and Premises details</td></tr>
<tr><td colspan="2">Applicant name/s (full legal name/s)</td><td colspan="5">Adaman Resources Pty Ltd</td></tr>
<tr><td colspan="2">Premises name</td><td colspan="5">Kirkalocka Gold Mine</td></tr>
<tr><td colspan="2">Premises location</td><td colspan="5">M59/234 and M59/233
Daggar Hills, WA 6638

Premises boundary is defined by the coordinates:
<table>
<tr><th>Easting</th><th>Northing</th></tr>
<tr><td>572811.02</td><td>6829635.42</td></tr>
<tr><td>575461.29</td><td>6829635.43</td></tr>
<tr><td>576199.91</td><td>6824980.59</td></tr>
<tr><td>573620.76</td><td>6824599.41</td></tr>
<tr><td colspan="2">Projection: MGA94 (Zone50)</td></tr>
</table></td></tr>
<tr><td colspan="2">Local Government Authority</td><td colspan="5">Shire of Yalgoo and
Shire of Mount Magnet</td></tr>
</table>

Application documents	
HPCM file reference number:	DWERDT328994
Key application documents (additional to application form):	• Attachment 3B: Supporting Document: Talis Consultants, 28 August 2020, letter titled *Kirkalocka Gold Project Waste Water Treatment Plant – Application For Licence Amendment* • Attachment 5: CPS8367/1 • Email chain further information between DWER and Mathew Blacklow, Adaman Resources Pty Ltd, *RE: L9195 licence amendment application WWTP* end 7 September 2020 begin 22 October 2020.
Scope of application/assessment	
Summary of proposed activities or changes to existing operations.	Construction and Operation of a Tristar WWTP with maximum design capacity of 50 cubic metres/day and treated effluent discharge to a spray field. Once operating, the WWTP and spray field will replace the existing 23 cubic metres/day WWTP, ponds and effluent infiltration area.

Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	**Assessed production or design capacity**	**Proposed changes to the production or design capacity**
Category 85: Sewage facility	23 cubic metres per day	50 cubic metres per day

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 ☐ No ☒	Referral decision No: N/A
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☐ No ☒	Ministerial statement No: N/A EPA Report No: N/A
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☐ No ☒	Reference No: N/A
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☒ No ☐	Mining lease / tenement ☒ M59/234 expiry: 03/11/2033 M59/233 expiry: 03/11/2033 Tenements held by Kirkalocka Gold SPV Pty Ltd (Application form states Kirkalocka Gold SPV Pty Ltd is a wholly owned subsidiary of Adaman Resource Pty Ltd and McMahon Mining Title Services Pty Ltd)

Has the applicant obtained all relevant planning approvals?	Yes ☐ No ☐ N/A ☒	N/A - Mining Tenements
Has the application obtained all other relevant approvals?	Department of Health	Approval No: 129.20 granted on 25 August 2020
	Department of Mines, Industry Regulation and Safety (DMIRS)	Approval under the *Mining Act 1978* – Revised mining proposal Reg ID 89319 submitted 4th September 2020.
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ☒ No ☐	CPS No: 8367/1
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes ☐ No ☒	No clearing is proposed for construction of the new WWTP and irrigation field.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes ☐ No ☒	Licence / permit not required.
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes ☒ No ☐	Name: East Murchison Groundwater Area Type: Proclaimed Groundwater Area Has Regulatory Services (Water) been consulted? Yes ☒ No ☐ N/A ☐ Previously 21/09/2019 for existing WWTP and irrigation area. Regional office: Mid-West Gascoyne
Is the Premises (Cat 85 activities) situated in a Public Drinking Water Source Area (PDWSA)?	Yes ☐ No ☒	Closest is Mount Magnet PDWS 50 km north.
Is the Premises (Cat 85 activities) subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act*)	Yes ☒ No ☐	
Is the Premises (Cat 85 activities) within an Environmental Protection Policy (EPP) Area?	Yes ☐ No ☒	N/A
Is the Premises (Cat 85 activities) subject to any EPP requirements?	Yes ☐ No ☒	N/A

Is the Premises (Cat 85 activities) a known or suspected contaminated site under the *Contaminated Sites Act 2003*?	Yes ☐ No ☒	Classification: N/A Date of classification: N/A