



Application for Licence

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	L9195/2019/1
Applicant	Adaman Resources Pty Ltd
ACN	620 314 007
File Number	DER2018/001608
Premises	Kirkalocka Gold Mine Part of Mining Lease M59/234 DAGGAR HILLS WA 6638 As defined by the coordinates in Schedule 1 of the Works Approval
Date of Report	10 May 2019
Status of Report	Final

Table of Contents

1.	Definitions of terms and acronyms	1
2.	Purpose and scope of assessment	3
2.1	Application details	3
2.2	Classification of premises	3
3.	Overview of Premises	3
3.1	Operational aspects	3
3.2	Infrastructure	5
4.	Exclusions	5
5.	Legislative context	6
5.1.1	Works approval and licence history	6
5.1.2	Compliance inspections and compliance history	6
5.1.3	Clearing	6
6.	Consultation	7
7.	Location and siting	7
7.1	Siting context	7
7.2	Residential and sensitive Premises	7
7.3	Specified ecosystems	7
7.4	Groundwater and water sources	1
7.5	Soil type	1
7.6	Meteorology	1
8.	Risk assessment	2
8.1	Determination of emission, pathway and receptor	2
8.2	Consequence and likelihood of risk events	4
8.3	Acceptability and treatment of Risk Event	5
8.4	Risk Assessment – Discharge to land (overtopping/seepage)	5
8.4.1	Description of discharge to land	5
8.4.2	Identification and general characterisation of emission	5
8.4.3	Description of potential adverse impact from the emission	5
8.4.4	Criteria for assessment	5
8.4.5	Licence Holder controls	6
8.4.6	Key findings	6
8.4.7	Consequence	6
8.4.8	Likelihood of Risk Event	6
8.4.9	Overall rating of discharges to land	6
8.5	Risk Assessment – Discharge to land (infiltration)	6

8.5.1	Description of discharge to land	6
8.5.2	Identification and general characterisation of emission.....	6
8.5.3	Description of potential adverse impact from the emission	7
8.5.4	Criteria for assessment.....	7
8.5.5	Licence Holder controls	7
8.5.6	Consequence	7
8.5.7	Likelihood of Risk Event	8
8.5.8	Overall rating of discharges to land	8
8.6	Summary of acceptability and treatment of Risk Events	8
9.	Regulatory controls	10
9.1	Licence controls	10
9.1.1	Infrastructure and equipment.....	10
9.1.1	Discharges to land (limits)	10
9.1.2	Monitoring	10
9.1.3	Specified actions	11
9.1.4	Reporting requirements	11
10.	Determination of Licence conditions	11
11.	Applicant's comments.....	12
12.	Conclusion	12
	Appendix 1: Key documents	13
	Attachment 1: Issued Licence L9195/2019/1	15
	Table 1: Definitions	1
	Table 2: Documents and information submitted during the assessment process.....	3
	Table 3: Prescribed Premises Categories in the Existing Licence	3
	Table 4: Influent and effluent characteristics	5
	Table 5: WWTP facility Category 85 infrastructure	5
	Table 6: Relevant approvals and tenure.....	6
	Table 7: Works approval and licence history	6
	Table 8: Receptors and distance from activity boundary	7
	Table 9: Environmental values	1
	Table 10: Groundwater and water sources.....	1
	Table 11: Identification of emissions, pathway and receptors during operation	2
	Table 12: Risk rating matrix.....	4
	Table 13: Risk criteria table.....	4
	Table 14: Risk treatment table	5
	Table 15: Licence Holder's proposed controls for discharges to land (from Application)	6

Table 15: Licence Holder's proposed controls for discharges to land (from Application)	7
Table 16: Risk assessment summary.....	9
Table 17: Summary of regulatory controls to be applied.....	10
Table 18: Summary of conditions to be applied.....	11

1. Definitions of terms and acronyms

In this Decision Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
Applicant	Adaman Resources Pty Ltd
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CS Act	<i>Contaminated Sites Act 2003 (WA)</i>
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
Department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of, and during this Review
kg/ha/year	kilograms per hectare per year
m ³ /day	cubic metres per day
mbgl	metres below ground level
Minister	the Minister responsible for the EP Act and associated regulations
NATA	National Association of Testing Authorities, Australia
NEPM	National Environmental Protection Measure
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997 (WA)</i>

Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Primary Activities	as defined in Schedule 2 of the Revised Licence
Risk Event	As described in <i>Guidance Statement: Risk Assessment</i>
UDR	<i>Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA)</i>
WWTP	wastewater treatment plant

2. Purpose and scope of assessment

2.1 Application details

Adaman Resources Pty Ltd (the Applicant) has recently acquired the Kirkalocka Gold Mine located 60km south of Mount Magnet. The site has been in care and maintenance since 2008 and the Applicant wishes to recommence operations. On the 14 November 2018 the Applicant applied for a licence (the Application) to recommission and operate the existing wastewater treatment plant (WWTP) Category 85 of Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations).

Table 2 lists the documents submitted during the assessment process.

Table 2: Documents and information submitted during the assessment process

Document/information description	Date received
Licence (L9195/2019/1) application form and supporting documentation	14 November 2018
Kirkalocka Mine Site Wastewater Treatment Plant Assessment, Response to DWER Queries, EEI Report # 24000069-E, February 2019	8 February 2019

2.2 Classification of premises

Table 3 lists the prescribed premises categories that have been applied for.

Table 3: Prescribed Premises Categories in the Existing Licence

Category	Description	Approved Premises design capacity or throughput
85	Sewage facility: premises – (a) on which sewage is treated (excluding septic tanks); or (b) from which treated sewage is discharged onto land or into waters.	60m ³ /day although actual throughput estimated to be 23m ³ /day

3. Overview of Premises

3.1 Operational aspects

The WWTP receives and treats sewer waste from the mine accommodation camp (including kitchen) prior to discharge to an infiltration area. Three underground tanks collect wastewater from the camp which is broken down via maceration pumps and transferred to a solids tanks on the northern edge of the WWTP ponds prior to being discharged into the first aerobic treatment pond (Pond 1). Wastewater undergoes initial aerobic and anaerobic treatment (aerobic treatment in the upper section and with anaerobic conditions supported in the settled sludge) before overflowing into Pond 2 where it undergoes further aerobic treatment prior to being released into a fenced infiltration area. Pond 2 will have less sludge and therefore supports lower proportions of anaerobic bacteria. The process is shown in Figure 1. Discharge to the infiltration area is from Pond 2 via a gravity fed overflow pipe.

There is currently no clear channel or distribution system for the treated effluent to be distributed to the infiltration area. The Applicant is proposing to upgrade the system to ensure an even distribution over the infiltration area, and avoid flooding of the area near the discharge pipe. This will involve development of a channel system (Figure 2) consisting of a main channel (60m in length and 300mm deep) that directs wastewater from the outlet of Pond 2

and connects to 6 sub-channels, each 60m long and sloping to a depth of 600mm to encourage flow. The total area of infiltration will be 100m x 90m, equating to approximately 0.9ha (9,000m²). A discharge pipe will connect Pond 2 to the main channel.

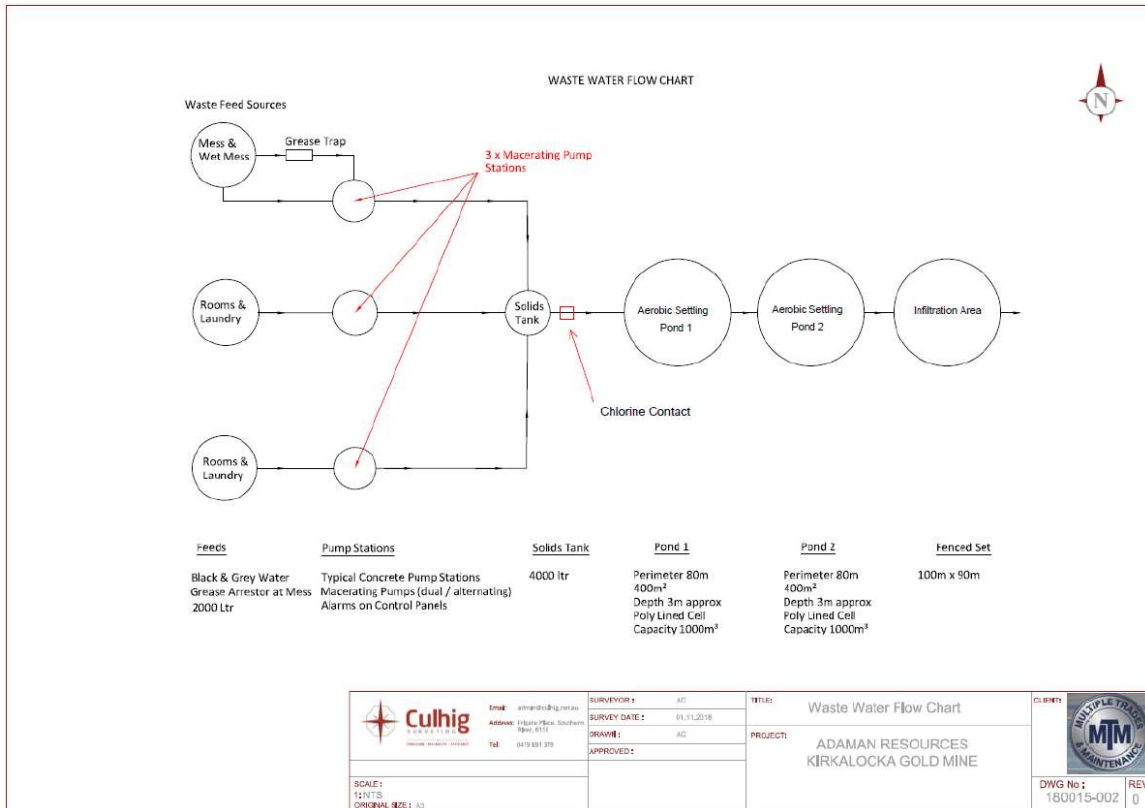


Figure 1: WWTP process

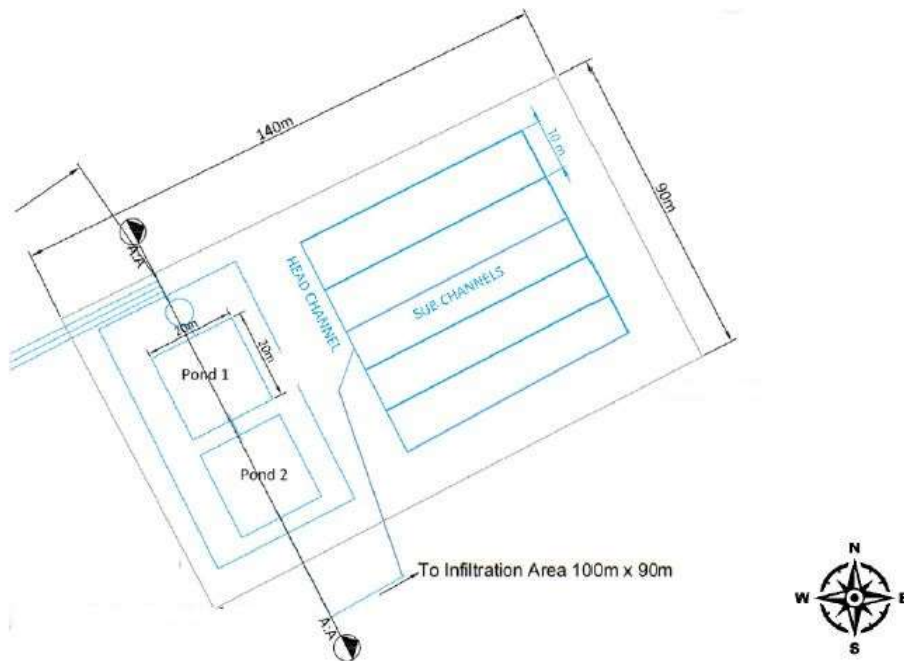


Figure 2: Schematic of channel system for distribution to infiltration area.

The WWTP has a maximum design capacity to treat up to of 60m³/day, however, based on expected occupation levels of the camp (estimated to be a maximum of 128 people at peak times), the maximum expected throughput is approximately 23m³/day. This is not expected to be achieved until July 2019 when the workforce achieves maximum numbers. Overflow from Pond 2 into the infiltration area is not anticipated until November 2019.

The quality of treated wastewater at this throughput rate (i.e. 23m³/day) compared to the *Australian Guidelines for Sewerage Systems: Effluent Management* (ANZECC/ARMCANZ 1997) is provided in Table 4.

Table 4: Influent and effluent characteristics

Pollutant	Expected influent	Expected effluent	Guidelines*
Biological Oxygen Demand (BOD)	250 - 350 mg/L	<20 mg/L	20-30 mg/L
Total Nitrogen (TN)	100 - 150 mg/L	<75 mg/L	20-50 mg/L
Total Phosphorus (TP)	25 - 40 mg/L	<25 mg/L	6-12 mg/L
Total Suspended Solids (TSS)	155 - 330 mg/L	<30 mg/L	25-40 mg/L
Faecal Coliforms	100 – 1000 orgs/mL	<10 orgs/mL	10 ⁵ – 10 ⁶ orgs/mL
Total Dissolved Solids (TDS)	100 – 1000 mg/L	<800 mg/L	Not available

* Category C treatment for infiltration

3.2 Infrastructure

The WWTP infrastructure, as it relates to Category 85 activities, is detailed in Table 5 and with reference to the Site Plan (attached in the Licence).

Table 5 lists infrastructure associated with each prescribed premises category.

Table 5: WWTP facility Category 85 infrastructure

	Infrastructure	Site Plan Reference
1	HDPE lined Settling Pond 1 (1,000m ³)	Refer to Schedule 1: Premises Map in the attached Licence
2	HDPE lined Settling Pond 2 (1,000m ³)	
3	Discharge from Pond 2 to Infiltration Area	
4	Infiltration area (approx. 100m x 90m)	

4. Exclusions

The WWTP does not contain any screening or primary sedimentation system and therefore all solids will settle within Pond 1. Sludge generation is estimated to be approximately 5.12m³/year for the maximum population of 128 personnel equating to an approximate depth of 0.024m. Based on this estimate, sludge removal is not expected to be required during the life of the Kirkalocka Gold Mine which expected to be 7 years and hence assessment of risks associated with the removal of sludge from the treatment ponds has not been assessed. Further approval may be required should sludge removal be required.

5. Legislative context

Table 6 summarises approvals relevant to the assessment.

Table 6: Relevant approvals and tenure

Legislation	Number	Approval
<i>Environmental Protection Act 1986</i>	CPS 8367/1	Clearing for development of the irrigation channels is authorised under Clearing Permit CPS 8367/1 granted on 4 May 2019. The permit has been granted for the purpose of clearing for mineral production and associated infrastructure and expires on 3 May 2024.
<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>		
<i>Mining Act 1978</i>	MP 37823 approved 2013	Kirkalocka Gold SPV Pty Ltd is the registered holder of M59/234 which is a wholly owned subsidiary of Adaman Resources Pty Ltd. Mining Proposal managed by DMIRS. An updated Mining Proposal was submitted to DMIRS on 9 March 2019 and is currently under assessment.
<i>Health Act 1911</i>	260.18	Includes the existing Pond 1 and Pond 2 discharging to the fenced infiltration area up to 40kL/day.
<i>Rights in Water and Irrigation Act 1914</i>	GWL202380(1)	The authorised activity of taking of water for mining camp purposes on tenement M59/234 is included in the groundwater licence. Annual water entitlement for the licence is 3,500,000kL.

5.1.1 Works approval and licence history

Table 7 summarises the works approval and licence history for the premises.

Table 7: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
L7814/2002/6	Ceased	Licence Category 5, 54 and 89 activities ceased due to non-payment fees
L9195/2019/1	10/05/2019	New Licence – Category 85

5.1.2 Compliance inspections and compliance history

The site has been in care and maintenance since 2008. A compliance inspection was previously carried out in August 2016 against the previous licence (L7814/2002/6) and no compliance issues were identified. It is noted that while the WWTP was operational at the time of the inspection, inflows were sufficiently low that no wastewater was being discharged to the infiltration area.

5.1.3 Clearing

Clearing for development of the irrigation channels is authorised under Clearing Permit CPS 8367/1 granted on 4 May 2019. The permit has been granted for the purpose of clearing for mineral production and associated infrastructure and expires on 3 May 2024.

6. Consultation

The Application was open for public consultation from 13 December 2018 to 3 January 2019. No submissions were received. The following stakeholders were contacted directly:

- Department of Mines, Industry Regulation and Safety;
- Department of Biodiversity, Conservation and Attractions;
- Shire of Yalgoo; and
- Shire of Mount Magnet.

7. Location and siting

7.1 Siting context

The Kirkalocka Gold Mine is an existing mine located on mining tenement M59/234, 70km south of Mount Magnet. The area consists primarily of pastoral landuse and the Premises is located within the boundaries of Kirkalocka Station and Nalbarra Station. The mine also crosses the boundaries of two local government authorities; Shire of Mount Magnet and Shire of Yalgoo. North West Coastal Highway, a major state road, is located approximately 2km east of the Premises.

7.2 Residential and sensitive Premises

The distances to residential and sensitive receptors are detailed in Table 8.

Table 8: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Residential Premises (Kirkalocka Station Homestead)	~12km north of the boundary of M59/234
Residential Premises (Nalbarra Station Homestead)	~14km west north west of the boundary of M59/234

Key finding: In accordance with the *Guidance Statement: Risk Assessments*, the Delegated Officer has determined that this assessment will not consider the risk of potential impacts to people in accommodation camps occupied by the Applicant. Potential impacts to people at these locations are subject to requirements under occupational health and safety regulations and obligations, therefore, the Delegated Officer considers that people at the accommodation camp are excluded as potential receptors.

7.3 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 9. Table 9 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

The table has also been modified to align with the *Guidance Statement: Environmental Siting*.

Table 9: Environmental values

Specified ecosystems	Distance from the Premises
Threatened/Priority Fauna	Shield-backed Trapdoor Spider (<i>Idiosoma nigrum</i>) listed as “Endangered” under the <i>Wildlife Conservation Act 1950</i> and “Vulnerable” under the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> recorded to occur within M59/234.
Threatened Ecological Communities (TEC)	The nearest TEC is located approximately 40km away.
Designated Areas	Distance from the Premises
RIWI Act	The Premises is located within the East Murchison Groundwater Area.

7.4 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 10.

Table 10: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental value
Watercourses/waterbodies	Kirkalocka Creek is located approx. 8.5km north west of the WWTP. A minor drainage line is located 1.5km from the WWTP, north of the mine pit and tailings storage facility (TSF) that drains north west towards Kirkalocka Creek.	The region is used for pastoral purposes and water within creeks may be utilised by stock.
Groundwater	<p>Depth to groundwater was measured in monitoring bore CWE27 (located approximately 150m south-east of the treatment ponds) was approximately 7.8mbgl in April 2019.</p> <p>Groundwater salinity at the mine ranges from 840mg/L to 3500mg/L (based on 2015 monitoring data). Groundwater generally flows in a north-east west direction towards the mine pit (MMS 2013).</p> <p>The nearest privately owned bore (Curara Well ID 61812806) is located approximately 1.1km south east of the WWTP (based on available GIS dataset –WIN Groundwater Sites).</p>	<p>Groundwater is used onsite for industrial and domestic purposes.</p> <p>Groundwater in the regional area may be used for stock watering.</p> <p>There are no Public Drinking Source Water Areas within 50km of the premises.</p>

7.5 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” (Tille 2006).

7.6 Meteorology

Rainfall in the area can vary considerably, however on average it is approximately 260 mm per year with the majority falling between January and August. This pattern reflects the influence of summer cyclones emerging from northern monsoonal weather patterns as well as winter fronts associated with low-pressure systems, which affect the southwest land division. Evaporation rates exceed annual rainfall with average annual Class A pan evaporation at Mount Magnet approximately 2,500mm.

8. Risk assessment

8.1 Determination of emission, pathway and receptor

In undertaking its risk assessment, DWER will identify all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires detailed risk assessment.

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. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through Table 13.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Tables 12 and 13 below.

Table 11: Identification of emissions, pathway and receptors during operation

Risk Events					Continue to detailed risk assessment	Reasoning	
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts			
Category 85 - WWTP	Sewage treatment, storage and discharge to land	Odour	Closest human receptors (pastoral stations) approximately 12km from prescribed premises.	Air	None	No	The nearest residential receptor is located 12km away. The Delegated Office considers there is sufficient separation from sensitive receptors to mitigate the risk of odour impacts.
		Overtopping of treatment ponds	Priority fauna within tenement M59/234	Infiltration to underlying groundwater Direct discharge to land	Contamination of soil and impacts to groundwater or surface water quality Impacts to vegetation habitat for priority fauna, contamination of soil and groundwater	Refer to section 8.4	
		Seepage of wastewater from ponds	Minor ephemeral creek 1.5km north draining to Kirkalocka Creek 8.5km away. Depth to groundwater 7.8mbgl				

Risk Events					Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway		
		Discharge to infiltration trench	Nearest WIN site 1.1km south west	Infiltration to underlying groundwater Direct discharge to land	Contamination of soil and impacts to groundwater or surface water quality Impacts to vegetation habitat for priority fauna, contamination of soil and groundwater	Refer to section 8.5

8.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 12 below.

Table 12: Risk rating matrix

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 13 below.

Table 13: Risk criteria table

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		The following criteria has been used to determine the consequences of a Risk Event occurring:		
			Environment	Public health* and amenity (such as air and water quality, noise, and odour)
Almost Certain	The risk event is expected to occur in most circumstances	Severe	<ul style="list-style-type: none"> onsite impacts: catastrophic offsite impacts local scale: high level or above offsite impacts wider scale: mid-level or above Mid to long-term or permanent impact to an area of high conservation value or special significance[^] Specific Consequence Criteria (for environment) are significantly exceeded 	<ul style="list-style-type: none"> Loss of life Adverse health effects: high level or ongoing medical treatment Specific Consequence Criteria (for public health) are significantly exceeded Local scale impacts: permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	<ul style="list-style-type: none"> onsite impacts: high level offsite impacts local scale: mid-level offsite impacts wider scale: low level Short-term impact to an area of high conservation value or special significance[^] Specific Consequence Criteria (for environment) are exceeded 	<ul style="list-style-type: none"> Adverse health effects: mid-level or frequent medical treatment Specific Consequence Criteria (for public health) are exceeded Local scale impacts: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	<ul style="list-style-type: none"> onsite impacts: mid-level offsite impacts local scale: low level offsite impacts wider scale: minimal Specific Consequence Criteria (for environment) are at risk of not being met 	<ul style="list-style-type: none"> Adverse health effects: low level or occasional medical treatment Specific Consequence Criteria (for public health) are at risk of not being met Local scale impacts: mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	<ul style="list-style-type: none"> onsite impacts: low level offsite impacts local scale: minimal offsite impacts wider scale: not detectable Specific Consequence Criteria (for environment) likely to be met 	<ul style="list-style-type: none"> Specific Consequence Criteria (for public health) are likely to be met Local scale impacts: low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	<ul style="list-style-type: none"> onsite impact: minimal Specific Consequence Criteria (for environment) met 	<ul style="list-style-type: none"> Local scale: minimal to amenity Specific Consequence Criteria (for public health) met

[^] Determination of areas of high conservation value or special significance should be informed by the *Guidance Statement: Environmental Siting*.

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines*.

“onsite” means within the Prescribed Premises boundary.

8.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment Table 14 below:

Table 14: Risk treatment table

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
High	May be acceptable. Subject to multiple regulatory controls.	Risk Event may be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk Event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled.	Risk Event is acceptable and will generally not be subject to regulatory controls.

8.4 Risk Assessment – Discharge to land (overtopping/seepage)

8.4.1 Description of discharge to land

Release of untreated and/or treated wastewater (Emission) from the WWTP ponds (Source) to land or groundwater (via infiltration) (Pathway) through overtopping or seepage causing potential contamination of soil and groundwater (Adverse Impact/Receptor).

8.4.2 Identification and general characterisation of emission

Untreated wastewater is initially received in Pond 1 prior to undergoing both aerobic and anaerobic treatment and flowing (via gravity) into Pond 2, and therefore wastewater received in Pond 2 has been partially treated.

8.4.3 Description of potential adverse impact from the emission

Overtopping or seepage from the treatment ponds may result in the release of untreated or treated wastewater to ground which may cause groundwater contamination via infiltration and impact on beneficial uses. It is noted that depth to groundwater is approximately 7.8mbgl with the nearest groundwater well used for livestock watering located 1km up-gradient of the WWTP.

There are no surface water systems that are likely to be impacted by the discharge.

8.4.4 Criteria for assessment

Relevant land and groundwater quality criteria include ANZECC & ARMCANZ (2000) guidelines for fresh and marine waters, and the *National Environment Protection (Assessment of Site Contamination) Measure 1999* for soils and groundwater.

8.4.5 Licence Holder controls

This assessment has reviewed the controls set out in Table 16 below.

Table 15: Licence Holder's proposed controls for discharges to land (from Application)

Site infrastructure	Control / description
Wastewater treatment ponds (Pond 1 and Pond 2)	<p>The ponds are lined with HDPE to prevent seepage although the integrity of the liners is unknown as the site has been in care and maintenance since 2008. The Applicant has advised that an engineer will inspect the WWTP ponds to confirm integrity of the liners.</p> <p>A 500mm freeboard will be maintained on the ponds at all times which allows sufficient capacity to contain a 1 in 100 year, 72 hour duration stormwater event.</p> <p>Ponds are elevated to prevent stormwater ingress.</p>

8.4.6 Key findings

The Delegated Officer has reviewed the information regarding discharges to land and has found:

1. The site has been in care and maintenance since 2008. The structural integrity of the existing pond liners is unknown.

8.4.7 Consequence

The Delegated Officer has determined that discharges to land from the WWTP (overtopping and seepage) could result in low level onsite impacts (i.e. alterations to groundwater and soil chemistry) with minimal offsite impacts (on a local scale) and no detectable wider scale off-site impacts. Therefore, the Delegated Officer considers the consequence to be **Minor**. In making this determination, the Delegated Officer has considered the limited throughput of the WWTP, Applicant controls detailed above and the distance to sensitive receptors.

8.4.8 Likelihood of Risk Event

The Delegated Officer has considered the Applicant controls listed above and determined that impacts from overtopping or seepage from the treatment ponds will only occur in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood to be **Rare**.

8.4.9 Overall rating of discharges to land

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 12) and determined that the overall rating for the risk is **Low**.

8.5 Risk Assessment – Discharge to land (infiltration)

8.5.1 Description of discharge to land

Release of treated wastewater (Emission) from the WWTP ponds (Source) to land or groundwater (via infiltration) (Pathway) through direct discharge to land (via the overflow pipe from Pond 2) causing potential contamination of soil and groundwater (Adverse Impact/Receptor).

8.5.2 Identification and general characterisation of emission

Wastewater characteristics are detailed in Table 4 which indicates that wastewater quality is

generally in line with national standards for sewage systems with the exception of Total Nitrogen and Total Phosphorus. Based on an application rate of 23m³/day and that the full infiltration area (approximately 9ha) will be utilised for wastewater disposal, nutrient loadings are calculated to be approximately 70kg/ha/year of nitrogen and 23kg/ha/year of phosphorus.

8.5.3 Description of potential adverse impact from the emission

Disposal of treated wastewater via infiltration may result in contamination of groundwater impacting on beneficial uses. It is noted that depth to groundwater is approximately 12mbgl with the nearest groundwater well used for livestock watering located 1km up-gradient of the WWTP.

There are no surface water systems that are likely to be impacted by the discharge.

8.5.4 Criteria for assessment

With the exception of Total Nitrogen and Total Phosphorus, treated wastewater meets relevant criteria the *Australian Guidelines for Sewerage Systems: Effluent Management* (ANZECC/ARMCANZ 1997) (Category C treatment for discharge to land). ANZECC & ARMCANZ (2000) also provide short term trigger values for irrigation for Total Nitrogen (25-125mg/L) and Total Phosphorus (0.8-12mg/L).

There is no applicable nutrient loading criteria available as most land application guidelines refer to irrigation schemes for crop harvesting and are not applicable to disposal via infiltration.

Relevant land and groundwater quality criteria include ANZECC & ARMCANZ (2000) guidelines for fresh and marine waters, and the *National Environment Protection (Assessment of Site Contamination) Measure 1999* for soils and groundwater.

8.5.5 Licence Holder controls

This assessment has reviewed the controls set out in Table 16 below.

Table 16: Licence Holder’s proposed controls for discharges to land (from Application)

Site infrastructure	Control / description
Infiltration Area	<p>No wastewater will be discharged beyond the fenced infiltration area.</p> <p>The infiltration area will have diversion bunds around the perimeter to prevent flooding associated with stormwater ingress and prevent wastewater from moving beyond the boundary of the infiltration area.</p> <p>The infiltration area will consist of a series of channels to direct wastewater flow and distribute across the infiltration area (approximately 0.9ha).</p> <p>The Applicant will conduct weekly inspections of the infiltration area to confirm it is maintained in good working order. Inspections will also be conducted after major rainfall events.</p>
General	<p>The quality of wastewater discharged to the infiltration basin will be monitored from Pond 2 (prior to discharge) on a monthly basis once discharging to verify performance of the WWTP.</p>

8.5.6 Consequence

The Delegated Officer has determined that discharges to land from the WWTP (via infiltration) could result in low level onsite impacts (i.e. alterations to groundwater and soil chemistry) with minimal offsite impacts (on a local scale) and no detectable wider scale off-site impacts.

Therefore, the Delegated Officer considers the consequence to be **Minor**. In making this determination, the Delegated Officer has considered the limited throughput of the WWTP, Applicant controls detailed above and the distance to sensitive receptors.

8.5.7 Likelihood of Risk Event

Discharge to the infiltration area

Noting that disposal is via infiltration, there is limited potential for nutrient uptake of nutrients from native vegetation as opposed to a managed irrigation/cropping scheme. The Delegated Officer has determined that discharge to the infiltration area will likely result in alterations to soil and groundwater chemistry on the Premises. It is noted that the WWTP is located approximately 3km from the nearest water production bore (Currurra Well) and that groundwater flow is generally away from the well towards the mine pit. Therefore, impacts on a wider scale (i.e. impacting the Currurra Well) are not expected to occur. Furthermore, the Delegated Officer considers there to sufficient separation between the WWTP and the nearest surface drainage channel (located 1.5km north of the WWTP) to mitigate impacts to this receptor.

Based on the above, the Delegated Officer considers that the likelihood of onsite impacts from discharge to the infiltration area will be **Likely** but beneficial groundwater would use associated with livestock watering is not likely to be impacted.

8.5.8 Overall rating of discharges to land

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 12) and determined that the overall rating for the risk is **Moderate**.

8.6 Summary of acceptability and treatment of Risk Events

A summary of the risk assessment and the acceptability or unacceptability of the risk events set out above, with the appropriate treatment and control, are set out in Table 17 below. Controls are described further in section 9.

Table 17: Risk assessment summary

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)
	Emission	Source	Pathway/ Receptor (Impact)			
1.	Discharge to land from overtopping	Wastewater treatment ponds	Direct discharge to land and infiltration to groundwater	Infrastructure and management controls.	Minor consequence Rare Low risk	Acceptable subject to proponent controls conditioned / outcomes based controls
	Discharge to land from seepage		Infiltration to groundwater		Minor consequence Rare Low risk	
2.	Discharge to infiltration basin		Direct discharge to land and infiltration to groundwater		Minor consequence Likely Medium risk	

9. Regulatory controls

A summary of regulatory controls determined to be appropriate for the Risk Event is set out in Table 18. The risks are set out in the assessment in section 8 and the controls are detailed in this section. DWER will determine controls having regard to the adequacy of controls proposed by the Applicant. The conditions of the Licence will be set to give effect to the determined regulatory controls.

Table 18: Summary of regulatory controls to be applied

		Controls (references are to sections below, setting out details of controls)				
		9.1.1 Infrastructure and equipment	9.1.1n Emission limit	9.1.2 Monitoring	9.1.3 Specified actions	9.1.4 Reports
Risk Items (see risk analysis in section 8)	Discharge to land from overtopping /seepage	•				
	Discharge to infiltration basin	•	•	•	•	•

9.1 Licence controls

9.1.1 Infrastructure and equipment

Conditions setting requirements for infrastructure and equipment are included on the Licence (Condition 2).

Grounds: The condition has relevance to the risk assessments for discharges to land during operation, and are derived from Applicant controls as detailed above.

The Applicant includes upgrades to the existing infiltration area to include a series of infiltration channels to distribute wastewater evenly across the infiltration area. Prior to the commencement of operation, the Applicant is required to provide evidence that these channels have been constructed.

Prior to the commencement of operation, evidence is required confirming that the pond liners have been maintained to achieve a permeability of 2×10^{-10} which is consistent with the *Water Quality Protection Note 26: Liners for containing pollutant, using synthetic membranes* (DoW, 2009).

9.1.1 Discharges to land (limits)

Emission limits for the quality treated wastewater are included on the Licence. The Licence also limits the discharge of treated wastewater to 23m³/day (Schedule 2 of the Licence).

Grounds: Risks associated with discharges to land have been assessed as Medium and conditions are derived from the controls outlined by the Applicant.

9.1.2 Monitoring

Conditions are included on the Licence requiring the monitoring of wastewater discharged from the treatment ponds to the infiltration area.

Grounds: Emissions monitoring is required on a monthly basis to confirm WWTP performance. Sampling is required to be carried out in accordance with the relevant Australian Standard and analysed by a laboratory with NATA accreditation to ensure appropriate quality control.

9.1.3 Specified actions

The Licence requires that the Applicant determine the volume of wastewater discharged from the WWTP on a daily basis.

Grounds: The Applicant has advised that no flow meter is installed on the WWTP inflow or outflow, indicating that the quantity of wastewater discharged is determined based on the volume of water abstracted from the production bore and used at the accommodation camp. This information can be used to determine the quantity of wastewater discharged to the infiltration areas to confirm that the throughput limit is not being exceeded.

9.1.4 Reporting requirements

The Licence requires the submission of an Annual Environmental Reporting consisting of monitoring data as required under the conditions of the Licence with a requirement to compare against specified limits and analyse trends where appropriate.

Grounds: Reporting requirements are necessary for the administration of the Licence and validating ongoing acceptability of the Premises operation.

10. Determination of Licence conditions

The conditions in the issued Licence in Attachment 1 have been determined in accordance with the *Guidance Statement: Setting Conditions*.

The *Guidance Statement: Licence Duration* has been applied and the issued licence expires in 20 years from date of issue.

Table 19 provides a summary of the conditions to be applied to this licence.

Table 19: Summary of conditions to be applied

Condition Ref	Grounds
Emissions 1	The general and authorised emissions condition is a valid, risk-based condition to ensure appropriate extent of authorised emissions
Infrastructure and Equipment 2 and 3	The conditions are valid, risk-based and contain appropriate controls on infrastructure requirements.
Emission (discharges to land) including limits 4 and 5	These conditions are valid, risk-based and consistent with the EP Act.
Monitoring 6, 7 and 8	
Specified actions 9	
Information 10, 11, 12 and 13	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.

DWER notes that it may review the appropriateness and adequacy of controls at any time and that, following a review, DWER may initiate amendments to the licence under the EP Act.

11. Applicant's comments

The Applicant was provided with the draft Decision Report and draft issued Licence on 23 April 2019. In response to clarifications and additional information received from the Applicant on 30 April 2019 the Applicant was provided with a second draft of the documents on 1 May 2019. Further clarifications and a new premises map were received from the Applicant on 9 May 2019. The Licence and Decision Report were updated in accordance with the clarifications provided by the Applicant.

12. 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 Decision Report (summarised in Appendix 1).

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

Caron Goodbourn
Manager, Process Industries
Delegated Officer
under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

	Document title	In text ref	Availability
1.	ANZECC/ARMCANZ, 1997. National Water Quality Management Strategy, Australian Guidelines for Sewerage Systems, Effluent Management,	ANZECC/ARMCANZ 1997	Accessed at http://www.waterquality.gov.au
2.	ANZECC & ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality – Volume 1. National Water Quality Management Strategy.	ANZECC & ARMCANZ 2000	
3.	Mount Magnet South NL, 2013. <i>Mining Proposal for the Kirkalocka Gold Project Mine Expansion (Version 2)</i>	MMS 2013	DWER records
4.	Adaman Resources 2019a, <i>Response to Draft Instrument and Decision Report for Application for a Licence (L9195/2019/1) Category 85 – Sewage Facility April 2019</i>	Adaman 2019a	
5.	Adaman Resources 2019b, <i>Response to Draft Instrument and Decision Report for Application for a Licence (L9195/2019/1) Category 85 – Sewage Facility May 2019</i>	Adaman 2019b	
6.	National Environmental Protection Council (NEPC), 2013. <i>National Environment Protection (Assessment of Site Contamination) Measure 1999</i>	NEPC 2013	Available online at: https://www.legislation.gov.au/
7.	DER, July 2015. <i>Guidance Statement: Regulatory principles</i> . Department of Environment Regulation, Perth.	DER 2015a	accessed at www.dwer.wa.gov.au
8.	DER, October 2015. <i>Guidance Statement: Setting conditions</i> . Department of Environment Regulation, Perth.	DER 2015b	
9.	DER, August 2016. <i>Guidance Statement: Licence duration</i> . Department of Environment Regulation, Perth.	DER 2016a	
10.	DER, November 2016. <i>Guidance Statement: Risk Assessments</i> . Department of Environment Regulation, Perth.	DER 2016b	
11.	DER, November 2016. <i>Guidance Statement: Decision Making</i> . Department of Environment Regulation, Perth.	DER 2016c	

	Document title	In text ref	Availability
12.	Department of Water (DoW), 2009. <i>Water Quality Protection Note 26: Liners for containing pollutant, using synthetic membranes</i>	DoW 2009	
13.	Tille, P., 2006 <i>Soil-landscapes of Western Australia's Rangelands and Arid Interior</i> Resource Management Technical Report 313, Department of Agriculture and Food, Government of Western Australia	Tille 2006	Accessed at https://researchlibrary.agric.wa.gov.au

Attachment 1: Issued Licence L9195/2019/1
