Decision Report

Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W6178/2018/1
Works Approval Holder	Galena Mining Limited
ACN	616 317 778
File Number	DER2018/001469
Premises	Abra Base Metals Project General Purpose Lease G52/292 Meekatharra WA 6642
Date of Report	14 March 2019
Status of Report	Final

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1. Definitions of terms and acronyms

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

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
ANZECC (1997)	Australian and New Zealand Environment and Conservation Council (ANZECC) 1997 *Australian Guidelines for Sewage systems, Effluent Management*, National Water Quality Management Strategy
ANZECC (2000)	Means the Australian and New Zealand Environment and Conservation Council (ANZECC) 2000, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, October 2000
BOD	Biochemical Oxygen Demand
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CS Act	*Contaminated Sites Act 2003* (WA)
C & D waste	Construction and demolition waste as defined in the *Landfill Waste Classification and Waste Definitions 1996*
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 *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER). DWER was established under section 35 of the *Public Sector Management Act 1994* and is responsible for the administration of the *Environmental Protection Act 1986* along with other legislation.
E.coli	*Escherichia coli*
EPA	Environmental Protection Authority

EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
ESA	Environmentally Sensitive Area
Landfill Waste Classification and Waste Definitions 1996	'Landfill Waste Classification and Waste Definitions 1996' published by the Chief Executive Officer, as amendment from time to time
m^3	cubic metres
Minister	the Minister responsible for the EP Act and associated regulations
mtpa	million tonnes per annum
NATA	National Association of Testing Authorities
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
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
Putrescible waste	As defined in the *Landfill Waste Classification and Waste Definitions 1996*
Risk Event	As described in *Guidance Statement: Risk Assessment*
STV	Means Short-term Trigger Value. Up to 20 years
Type 1 wastes	As described in the *Landfill Waste Classification and Waste Definitions 1996*
Type 2 inert waste	As defined in the *Landfill Waste Classification and Waste Definitions 1996*
TN	Total Nitrogen
Tonnes per annum	tpa
TP	Total Phosphorus
TSS	Total Suspended Solids
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)

Works Approval Holder	Galena Mining Limited
WWTP	Waste Water Treatment Plant

2. Purpose and scope of assessment

Galena Mining Limited (Galena) has applied for a works approval to construct a WWTP and a Landfill on General Purpose Lease G52/292. The WWTP and Landfill will be built to service the accommodation camp which will house staff for the construction of the Abra Base Metals Project (Project). Following the completion of construction works at the Project, the accommodation camp will be used to house operational staff.

Galena intends to apply for a Registration to operate the WWTP and a Registration to operate the Landfill.

The Decision Report presents an assessment of potential environmental and public health risks from the emissions and discharges associated with the construction and operation of the WWTP and Landfill.

2.1 Application details

The Application was received by DWER on the 19 September 2018 from Galena for Prescribed Premises category 85 to construct a WWTP, and category 89 to construct a landfill. The category 85 WWTP will have a maximum throughput of 70 m^3/day and the category 89 Landfill will receive up to 500 tpa of waste.

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
Application form and associated attachments DWER record A1721898	19 September 2018
Additional information submitted via email DWER record A1731174	22 October 2018

3. Background

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

Table 3: Prescribed Premises Categories

Classification of Premises	Description	*Approved Premises production or design capacity or throughput*
Category 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.	70 m^3/day

Category 89	Putrescible landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled 'Landfill Waste Classification and Waste Definitions 1996' published by the Chief Executive Officer, as amendment from time to time) is accepted for burial.	500 tpa

4. Overview of Premises

4.1 Operational aspects

WWTP

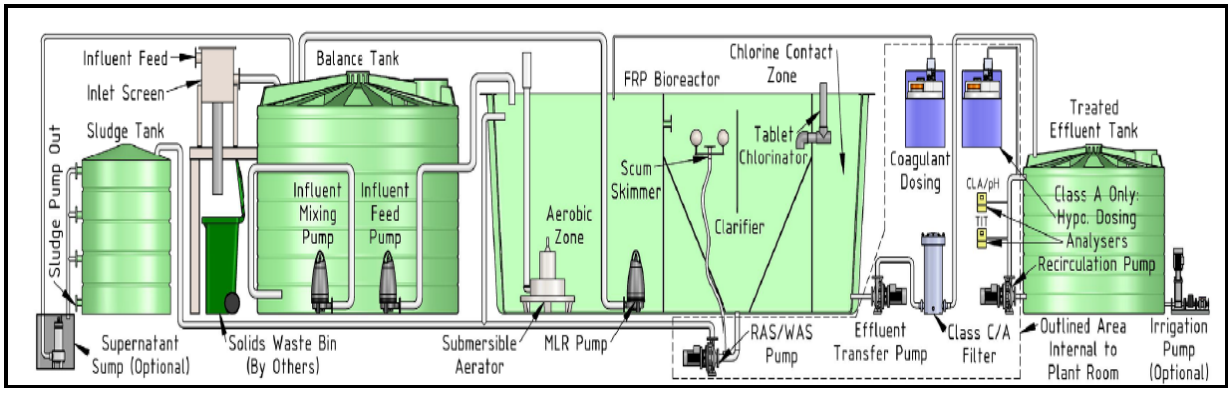
The WWTP is designed to treat and dispose of wastewater generated from the accommodation camp. The WWTP has been designed to treat a throughput of approximately 70 m^3/day during the Project construction phase, which will then drop to approximately 55 m^3/day during mining operations.

The WWTP is an activated sludge bioreactor packaged sewage treatment plant designed to treat raw sewage generated at the accommodation camp, prior to discharge to the environment through a spray irrigation field. The WWTP is modular in design and will be pre-fabricated offsite. The main construction activities will consist of assembling the components and pipework. The components of the WWTP consist of:

- A sea container housing circulation pumps, chlorine dosing system and process control systems;
- Plastic tanks manufactured offsite for delivery to the Premises or alternatively components of pre-fabricated steel tanks delivered to the Premises for assembly;
- Pipework, flanges and valves that are pre-fabricated and connected on site; and
- Spray irrigation onto a fenced 1.5 Ha irrigation field.

Figure 1 below provides an overview of the infrastructure associated with the WWTP.

Figure 1: WWTP



The WWTP has a design specification to achieve a 'Class A' rating for the discharged treated effluent. The Class A system when installed to the WWTP provides additional equipment to achieve an improved effluent quality. The additional equipment includes an auto backwashing filter, secondary chlorination via tank recirculation and residual trim hypochlorite dosing, and analysers for online monitoring of treated effluent turbidity, free chlorine and pH. The expected output characteristics of the treated effluent are presented in Table 4 below.

Table 4: Waste water output characteristics

Parameter	Concentration including units
Biochemical Oxygen Demand	<20 mg/L
Total Suspended Solids	<30 mg/L
Total Nitrogen	<40 mg/L (or 10 mg/L reduction from influent valve)
Total Phosphorus	<12 mg/L
E.coli	<10 cfu/100 mL
Residual chlorine	0.2 – 2.0 mg/L
pH	6.6 – 8.5 pH units

The treated effluent will be discharged via a series of sprinklers onto a fenced 1.5 hectare area. The sprinklers will be set out in 'zones' so treated effluent can be discharged systematically to reduce the likelihood of inundation of the irrigated area and to allow other areas to dry out.

The WWTP and irrigation area will be inspected daily to assess if the facility is operating in accordance with the manufacturer's specifications and to assess for inundation of the spray field.

Landfill

The landfill will be designed to accept for burial Class II type wastes generated at the Premises. The Class II type wastes will consist of the following:

- Type 1 inert waste – 90 tpa;
- Putrescible waste – 150 tpa;
- Type 2 inert waste – 50 tpa;
- C&D waste – 150 tpa; and
- Contaminated solid waste – 60 tpa.

Wastes accepted at the Landfill will be disposed into a purpose built trench with the waste being covered monthly (more frequently if required). The cover material will consist of mine waste (overburden from pit construction) and material excavated from the construction of the trenches.

The trenches will be constructed to be 30 m long by 3 m wide and 3 m deep with a 0.5 m earthen safety bund around the perimeter. The earthen safety bund also assists in diverting stormwater away from the trenches.

The landfill will be enclosed within a 0.7 Ha fenced area to prevent the entry of fauna and livestock.

4.2 Infrastructure

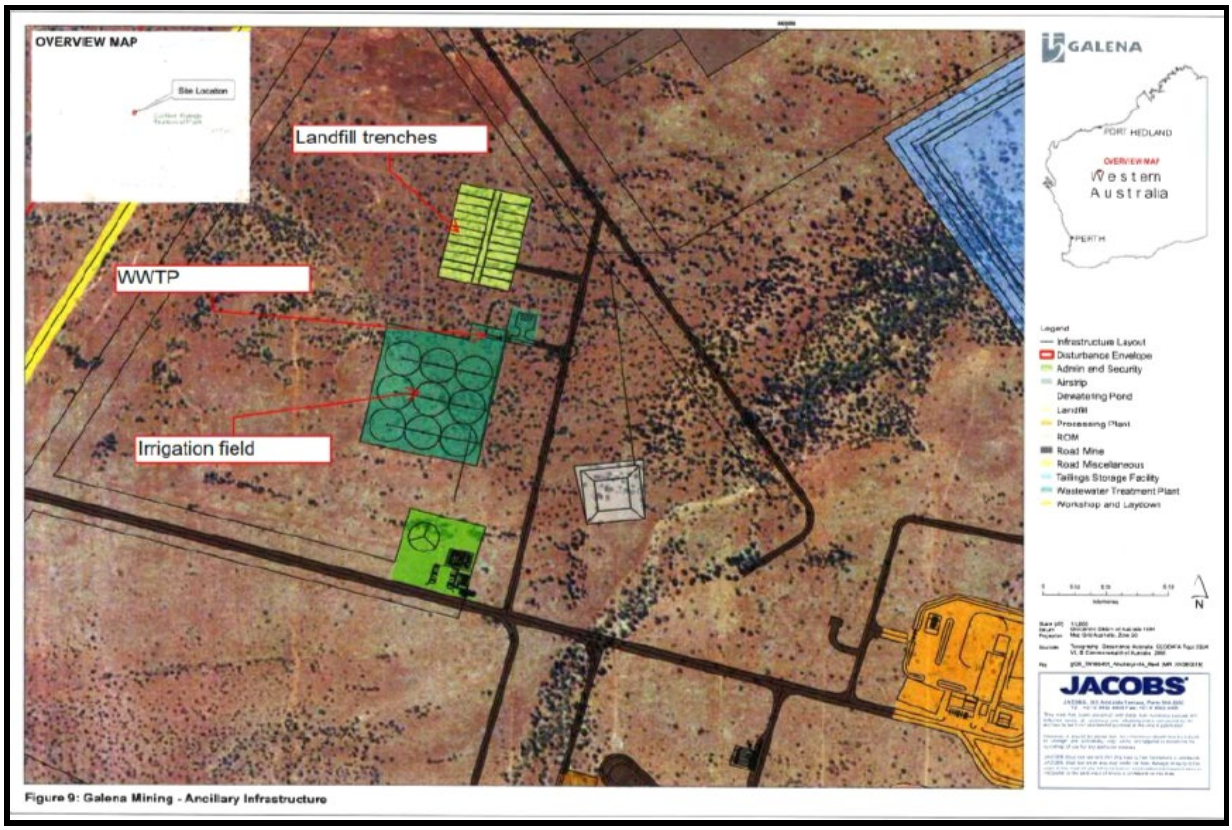
The Premises infrastructure, as it relates to Category 85 and 89 activities, is detailed in Table 5 and with reference to the Site Plan (attached in the Issued Works Approval).

Table 5 lists infrastructure associated with each prescribed premises category.

Table 5: Category 85 and 89 infrastructure

	Infrastructure	Site Plan Reference
	Prescribed Activity Category 85	
The WWTP is designed to treat and dispose of wastewater generated from the accommodation camp and has a design capacity to treat up to 70 m^3/day. The treated wastewater will be discharged to the environment through an irrigation spray field.		
1	Influent screen	Figure 1 site plan
2	Balance tank	
3	FRP Bioreactor including aerobic and anoxic zones; clarifier, and effluent sterilization (chlorine tablets)	
4	Bag filtration (100 micron)	
5	Auto backwashing filter (25 micron)	
6	Control room	
7	Irrigation pipework and sprinklers to irrigation area	
	Prescribed Activity Category 89	
The Landfill is designed to receive up to 500 tpa of class II type wastes for burial		
1	Each landfill trench with dimensions 30 m long, 3 m wides and 3 m deep	Figure 1 site plan
2	0.5 m high earthen stormwater bund around the perimeter of each trench.	
3	Perimeter fence which is an effective barrier to cattle, horses and other stock	
	Other activities	
1	Fence surrounding the WWTP irrigation area	Figure 1 site plan

Figure 1: Site plan



5. Legislative context

Table 6 summarises approvals relevant to the assessment.

Table 6: Relevant approvals and tenure

Legislation	Number	Subsidiary	Approval
Health Act 1911 – Health (Treatment of sewage and disposal of effluent and liquid waste) Regulations 1974	-	Galena Mining Limited	Application submitted to the Department of Health for approval to construct and operate a WWTP. Awaiting decision.
Mining Act 1978	-	Galena Mining Limited	Purpose Permit (CPS 8234/1) granted 12 January 2019. General Purpose Lease 52/292, Mining Lease 52/776, Miscellaneous Licence 52/194, Shire of Meekatharra General Purpose Lease G52/292 has been granted for the proposed processing plant, tailings dam, WWTP and Landfill. The Mining Proposal, Mine Closure Plan and Environmental

Legislation	Number	Subsidiary	Approval
			Management System applications were lodged and accepted by DMIRS in October 2018. Approval pending.
Rights in Water and Irrigation Act 1914	-	Galena Mining Limited	Application submitted to DWER for approval to construct wells and abstract water. Awaiting decision.

5.1 Part IV of the EP Act

The proposal was not referred to DWER – Environmental Protection Division as it was not deemed to be a 'significant proposal' by the applicant.

5.2 Contaminated sites

General Purpose lease G52/292 is not listed on DWER's contaminated sites database.

5.3 Part V of the EP Act

5.3.1 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

The applicable regulations include:

- *Environmental Protection (Noise) Regulations 1997*;
- *Environmental Protection (Rural Landfill) Regulations 2002*; and
- *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

The guidance statements which inform this assessment are:

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Decision Making (February 2017)*
- *Guidance Statement: Risk Assessments (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

Following compliance with this Works Approval, Galena plans to apply for Registration of the Category 85 WWTP and for the Category 89 Landfill.

5.3.2 Clearing

Clearing required for the construction and installation of the WWTP and Landfill is included as part of the application for a purpose clearing permit for the whole Project.

6. Consultation

The Application was advertised on 5 November 2018 seeking public comment. Comments were due by the 26 November 2018. No comments were received.

7. Location and siting

7.1 Siting context

The Premises is located on General Purpose Lease G52/292. The Premises is located approximately 200 km north of Meekatharra, 190 km south of Newman and 100 km west of the Great Northern Highway.

7.2 Residential and sensitive Premises

The distances to residential and sensitive receptors are detailed in Table 7.

Table 7: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Residential Premises	Tangadee homestead – 40 km NE of the Premises Woodlands homestead – 40 km WSW of the Premises Mingah Springs homestead – 40 km SE of the Premises

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 8. Table 8 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 8: Environmental values

Specified ecosystems	Distance from the Premises
RAMSAR wetland Sites in Western Australia	None within 2 km of the Premises
Department of Biodiversity, Conservation and Attractions (DBCA) Managed Lands and Waters	Approximately 7.5 km to the east of the Premises
Threatened Ecological Communities and Priority Ecological Communities	None within 2 km of the Premises
Biological component	**Distance from the Premises**
Threatened/Priority Flora	Priority 3 species located approximately 2 km north of the Premises
Threatened/Priority Fauna	*Dasycercus blythi* located 8 km to the east of the Premises

7.4 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 9.

Table 9: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental value
Public drinking water source areas	No nearby public drinking water source areas.	Not applicable
Major watercourses/waterbodies	No nearby major watercourses or water bodies. The nearest surface water is 5 Mile Creek which is located 2.4 km to the east of the Premises. 5 Mile Creek is an ephemeral creek which remains dry for long periods of time and only flows during heavy rainfall events.	Provides surface drainage during heavy rainfall events. 5 Mile Creek discharge into the Ethel River which is located over 6 km away. Provides temporary aquatic environments for active and passive dispersers.
Groundwater	Rockwater assessed the groundwater at the Premises during 2018 and found groundwater levels ranged from 16-54 mbgl. The depth to groundwater at the location of the WWTP and Landfill was found to be approximately 30 mbgl. No groundwater bores are located within 4 km of the Premises (based on available GIS dataset –WIN Groundwater Sites).	Groundwater is this area is good quality (TDS 400 – 460 mg/L) and is suitable for livestock drinking, potable or industrial use.

7.5 Soil type

The surface soils are described as fine sandy silt interspersed with gravel and stone. Depth of the soils varies across the premises with depths ranging from duricrust at the surface (no soil) right up to one metre in thickness, however approximately 300 mm thickness is common across the Premises.

7.6 Meteorology

The area is characterised by a ‘hot semi-arid’ to ‘hot desert’ climate, influenced by infrequent summer rainfall events and mild winters. Average daily maximum temperatures range from 19.1 degrees in winter and 38.3 degrees during summer. The average annual rainfall in the area is 239.1 mm with most occurring from January to July. Weather data is obtained from the Bureau of Meteorology for the Town of Meekatharra located approximately 200 km south of the proposed Premises.

8. Risk assessment

8.1 Determination of emission, pathway and receptor

In undertaking its risk assessment, DWER will identify all potential emission 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 the Tables.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Tables 10 and 11 below.

Table 10. Identification of emissions, pathway and receptors during construction

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
Construction of landfill trenches	Earthmoving activities and vehicle movements on unsealed access roads	Noise	No residences or other sensitive receptors in proximity Nearest residence is 40 km away	Air / wind dispersion	Amenity impacts	No	No receptor present The construction works are minimal with only the excavation of a trench and installation of a perimeter fence required. The distance to residential receptors is considered to be too great for dust impacts from construction to occur. The Delegated Officer considers that a pathway for dust emissions does not exist. The provisions of the *Environmental Protection (Noise) Regulations 1997* are applicable.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		Dust	No residences or other sensitive receptors in proximity Nearest residence is 40 km away No threatened or priority flora within 2km of the Premises	Air / wind dispersion	Amenity impacts Smothering of vegetation	No	No receptor present. The distance to sensitive receptors is considered to be too great for dust impacts from construction to occur. The Delegated Officer considers that a pathway for dust emissions does not exist. Any potential dust emissions can be regulated by section 49 of the EP Act.
Construction of WWTP and irrigation field	Earthmoving activities and installation of prefabricated WWTP and construction of irrigation field Vehicle movements on unsealed access roads	Noise	No residences or other sensitive receptors in proximity Nearest residence is 40 km away	Air / wind dispersion	Amenity impacts	No	No receptor present. The construction works are minimal as the WWTP is containerised (sea container) and is only designed for 70 m^3/day so is considered a relatively small plant. The distance to residential receptors is considered to be too great for noise impacts from construction to occur. The Delegated Officer considers that a pathway for noise emissions does not exist. The provisions of the *Environmental Protection (Noise) Regulations 1997* are applicable.
		Dust	No residences or other sensitive receptors in proximity Nearest residence is 40 km away	Air / wind dispersion	Amenity impacts Smothering of vegetation	No	No receptor present. The distance to sensitive receptors is considered to be too great for dust impacts from construction to occur. The Delegated Officer considers that a pathway for dust emissions does not exist. Any potential dust emissions can be regulated by section 49 of the EP Act.

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

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
Landfill operations	Earthmoving activities when waste is covered, dust lift off from cover stockpiles and from vehicle movement on unsealed roads	Dust	No residences or other sensitive receptors in proximity Nearest residence is 40 km away No threatened or priority flora within 2km of the Premises	Air / wind dispersion	Amenity impacts Vegetation smothering	No	No receptor present. The distance to sensitive receptors is considered to be too great for dust impacts from operation of the landfill to occur. The Delegated Officer considers that a pathway for dust emissions does not exist. *The Environmental Protection (Rural landfill) Regulations 2002* are applicable (Condition 11).
	Operation of earthmoving equipment and movement of vehicles	Noise					No receptor present. Minimal noise emissions are expected to occur during the operation of the landfill. Noise emissions will be intermittent and of short duration (covering events, tipping). The provisions of *the Environmental Protection (Noise) Regulations 1997* are applicable.
	Disposal of Class II waste into a trench	Odour	Nearest residence is 40 km away	Air / wind dispersion	Amenity impacts	No	No receptor present. Waste will be covered on a monthly basis or more regularly if required. The distance to sensitive receptors is considered to be too great for odour impacts from operation of the landfill to occur. The Delegated Officer considers that a pathway for odour emissions does not exist. *The Environmental Protection (Rural landfill) Regulations 2002* are applicable. Any potential odour emissions can be regulated by section 49 of the EP Act.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		Leachate	Depth to groundwater is approximately 30 mbgl	Seepage through soil to groundwater	Contamination of groundwater	Yes	See section 8.4
		Windblown waste	Surrounding environment Nearest residence is 40 km away	Air / wind dispersion	Amenity impacts	Yes	See section 8.5
		Contaminated stormwater	Local soils 5 Mile Creek is located 2.4 km to the east of the Premises and is considered too far to be a potential receptor	Overland flow	Contamination of soils	Yes	See section 8.6
Waste Water Treatment Plant	Treatment of sewage	Odour	No residences or other sensitive receptors in proximity	Air / wind dispersion	None	No	No receptor present. The Delegated Officer considers the distance to sensitive receptors is considered to be too great for odour impacts from the treatment of sewage to occur. The Delegated Officer considers that a pathway for odour emissions does not exist. Any potential odour emissions can be regulated by section 49 of the EP Act.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
	Overtopping of holding tanks	Overtopping of holding tanks resulting in sewage discharge to land	Vegetation adjacent to discharge area The depth to groundwater is approximately 30 mbgl. This separation distance is considered too far to be a potential receptor 5 Mile Creek is located 2.4 km to the east of the Premises and is considered too far to be a potential receptor	Direct discharge	Increase in nutrient levels in soils affecting growth of native vegetation	No	No pathway to receptor The WWTP is a containerised self bunded unit. Limited vegetation will remain within the WWTP area following clearing for the installation of infrastructure and access roads. Galena has committed to daily inspections of the WWTP. Any accidental discharge of sewage due to equipment or pipeline failure can be regulated through the provisions of the UDR's.
	Irrigation of treated effluent	Treated effluent to land	Terrestrial ecosystems Vegetation in the irrigation area Increased nutrients in the soil The depth to groundwater is approximately 30 mbgl. This separation distance is considered too far to be a potential receptor 5 Mile Creek is located 2.4 km to the east of the Premises and is considered too far to be a potential receptor	Discharge to land via irrigation	Facilitated growth of weeds Increase nutrient levels within soils	Yes	See section 8.7

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	• **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	• 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	• **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	• **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	• **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	• **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	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• 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	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **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 – Leachate (Landfill operation)

8.4.1 Description of Leachate emissions

Waste deposited at the Premises has the potential to generate leachate through seepage of stormwater through waste. Leachate may result in contamination of soil, surface water and groundwater.

8.4.2 Identification and general characterisation of emission

Leachate is formed from the infiltration of water (e.g. from rainfall) into the landfill and also from the moisture content of waste itself. It is highly variable in its chemical characteristics and typically exhibits levels of organics and nutrients.

8.4.3 Description of potential adverse impact from the emission

Leachate from landfilled waste may cause contamination of the groundwater from nutrients metals and other toxicants. This may result in reduced quality of extracted groundwater for human uses and impact the survival or growth of stygofauna within the aquifer beneath the site.

Rockwater assessed the groundwater at the Premises during 2018 and found groundwater levels ranged from 16-54 mbgl. The depth to groundwater at the location of the Landfill was found to be approximately 30 mbgl.

No groundwater bores are located within 4 km of the Premises (based on available GIS dataset –WIN Groundwater Sites). Groundwater is this area is good quality (TDS 400 – 460 mg/L) and is suitable for livestock drinking, potable or industrial use.

8.4.4 Criteria for assessment

Relevant land and groundwater quality criteria include the ANZECC (2000) Guidelines for Fresh

and Marine Water Quality, and the Assessment of Site Contamination National Environmental Protection Measure (ASC NEPM) 1999 (as amended in 2013) for soils and groundwater.

Regulation 9 of the Rural Landfill Regulations provides:

"Unless otherwise approved in writing, the occupier of a landfill site must ensure that there is no waste within –

a) 35 meters from the fence surrounding the site;

b) 100 meters of any surface water body at the site; or

c) 3 meters of the highest level of the water table aquifer at the site."

8.4.5 Applicant controls

A total of 150 tpa of putrescible waste is expected to be buried at the Landfill. Waste materials to be disposed of at the new landfill include:

- Type 1 inert waste – 90 tpa;
- Putrescible waste – 150 tpa;
- Type 2 inert waste – 50 tpa;
- C&D waste – 150 tpa; and
- Contaminated solid waste – 60 tpa.

Waste will be covered monthly to prevent exposure of waste to rainfall. The capping will be slightly mounded to assist the dispersion of storm-water. Storm-water that assists in leachate formation will be diverted away from the Landfill trench through the use of an earthen bund around the trench perimeter.

8.4.6 Key findings

The Delegated Officer has reviewed the information regarding leachate and has found:

1. *The small volumes of waste to be deposited and the low rainfall patterns in the area present a low likelihood of significant leachate being generated.*
2. *The depth to groundwater beneath the landfill is 30 mbgl and therefore it is unlikely that any leachate generated would reach the groundwater.*
3. *The controls proposed by the Applicant are likely to be sufficient to manage the potential for leachate generation.*

8.4.7 Consequence

If seepage of leachate through soil to groundwater occurs, then the Delegated Officer has determined that the impact will be low- level onsite and minimal offsite (due to the small amount of waste to be deposited). Therefore, the Delegated Officer considers the consequence of leachate to be **minor.**

8.4.8 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of leachate impacting sensitive receptors will only occur in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood to be **rare.**

8.4.9 Overall rating of leachate emissions

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 of leachate impacting sensitive receptors during operation is **low.**

8.5 Risk Assessment – Windblown waste (Landfill operation)

8.5.1 Description of windblown waste

Windblown waste from the landfilling of putrescible waste may be spread over a wide area by wind movement impacting public amenity and potentially altering local ecosystems.

8.5.2 Identification and general characterisation of emission

Litter from landfilling putrescible waste, especially light items such as paper, plastic film and plastic bags can be spread over a wide area by wind movement. The rate of litter borne from landfilling activities will be dependent on the waste type, ambient weather and efficiency of litter prevention activities onsite.

8.5.3 Description of potential adverse impact from the emission

Litter can result in potential nuisance impacts including degradation to the aesthetic value of the local area as well as potential alteration to local ecosystems.

8.5.4 Criteria for assessment

Regulation 8 of the Rural Landfill Regulations provides:

"The occupier of a landfill site must ensure that –

(a) *waste does not get washed, or blown, outside the site; and*

(b) *waste that has been washed, or blown, away from the tipping area of the site is returned to the tipping area at least once in each month".*

8.5.5 Applicant controls

Any windblown wastes will be collected monthly and returned to the Landfill for burial in accordance with the Rural Landfill Regulations. Wastes will be covered monthly to reduce windblown waste and the landfill is also to be fenced to prevent waste escaping. Wastes are disposed into a below ground trench which reduces the exposure of the wastes to the wind. The earthen bunds around the trench perimeter also assist in diverting the wind.

8.5.6 Key findings

The Delegated Officer has reviewed the information regarding windblown waste and has found:

1. *The small quantity of waste being landfilled reduces the potential for windblown waste.*
2. *The fence surrounding the landfill will help prevent windblown waste escaping the landfill area.*
3. *Monthly collection of windblown waste in accordance with the Rural Landfill Regulations will help prevent the spread of waste outside of the landfill area.*

8.5.7 Consequence

Given the small quantity of waste to be landfilled, the Delegated Officer has determined that the impact of litter on sensitive receptors will be minimal with off-site impacts on a local scale. Therefore, the Delegated Officer considers the consequence of litter to be **slight**.

8.5.8 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of windblown waste impacting sensitive receptors may only occur in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood to be **rare.**

8.5.9 Overall rating of odour emissions

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 of windblown waste impacting sensitive receptors during operation is **low.**

8.6 Risk Assessment – Contaminated Stormwater (Landfill operation)

8.6.1 Description of contaminated stormwater

Stormwater may come into contact with waste, causing run-off and overland flow of contaminated stormwater to surface water.

8.6.2 Identification and general characterisation of emission

Putrescible waste will be disposed of at the Premises. Stormwater may become contaminated with nutrients or organic matter if it comes into contact with waste.

8.6.3 Description of potential adverse impact from the emission

Overland flow of stormwater contaminated with waste from the landfill may cause off-site impacts on neighboring ecosystems. Nutrients and suspended solids in contaminated stormwater may cause eutrophication and degradation of nearby surface water.

The nearest surface water feature is a 5 Mile Creek (only flows during rainfall events) which is approximately 2.4km to the east of the premises boundary.

8.6.4 Criteria for assessment

Regulation 9 of the *Environmental Protection (Rural Landfill) Regulations 2002* (Rural Landfill Regulations) states:

"Unless otherwise approved in writing, the occupier of a landfill site must ensure that there is no waste within –

a) 35 metres from the fence surrounding the site;

b) 100 metres of any surface water body at the site; or

c) 3 metres of the highest level of the water table aquifer at the site."

Regulation 10 of the *Environmental Protection (Rural Landfill) Regulations 2002* (Rural Landfill Regulations) states:

"The occupier of a landfill site must ensure that stormwater on the site is adequately managed so that –

a) it is diverted from areas of the site where there is waste; and

b) water that has come into contact with waste is to be diverted into a sump on the site, or otherwise retained on the site."

8.6.5 Applicant controls

Stormwater will be diverted away from the Landfill trench through the use of an earthen bund around the trench perimeter. Any stormwater that comes into direct contact with the waste will remain within the below ground trench.

Waste will be covered regularly to prevent exposure of waste to rainfall.

8.6.6 Key findings

The Delegated Officer has reviewed the information regarding contaminated stormwater and has found:

1. *The small volumes of waste to be deposited and the low rainfall patterns (and high evaporation rate) in the area present a low likelihood of significant contaminated stormwater being generated.*
2. *The distance to the nearby surface water features makes it unlikely that potential contaminated stormwater will reach surface water.*
3. *The controls proposed by the Applicant are likely to be sufficient to manage the potential for contaminated stormwater to be generated.*

8.6.7 Consequence

The Delegated Officer considers the consequence of contaminated stormwater on surface water to be **slight**.

8.6.8 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of contaminated stormwater impacting sensitive receptors may only occur in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood to be **rare.**

8.6.9 Overall rating of contaminated stormwater

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 of contaminated stormwater impacting sensitive receptors during operation is **low.**

8.7 Risk Assessment – Irrigation of treated effluent (WWTP Operation)

8.7.1 Description of Irrigation of treated effluent

The spray irrigation field will receive treated effluent generated from the site's accommodation camp. The WWTP has been designed to treat a throughput of approximately 70 m^3/day during the Project construction phase, which will then drop to approximately 55 m^3/day during mining operations.

The treated effluent will be discharged via a series of sprinklers onto a fenced 1.5 Ha area. The sprinklers will be set out in 'zones' so treated effluent can be discharged systematically to reduce the likelihood of inundation of the irrigated area and to allow other areas to dry out.

8.7.2 Identification and general characterization of emission

The type of emission is direct daily discharge of treated wastewater from the WWTP. The WWTP has a design specification to achieve a 'Class A' rating for the discharged treated effluent. The expected output characteristics of the treated effluent are presented in the table below.

Waste water output characteristics

Parameter	Concentration including units
Biochemical Oxygen Demand	<20 mg/L
Total Suspended Solids	<30 mg/L
Total Nitrogen	<40 mg/L (or 10 mg/L reduction from influent valve)
Total Phosphorus	<12 mg/L
E.coli	<10 cfu/100 mL
Residual chlorine	0.2 – 2.0 mg/L
pH	6.6 – 8.5 pH units

A spray irrigation area of 15,000 m^2 (1.5 Ha) is proposed.

8.7.3 Description of potential adverse impact from the emission

Increased nutrients in the soil and water logging may impact the health of vegetation.

8.7.4 Criteria for assessment

Relevant land and surface water quality criteria include:

- National Environment Protection (Assessment of Site Contamination) Measure 1999;
- Australian and New Zealand Environment and Conservation Council (ANZECC) 2000, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, October 2000;
- Code of Practice – Onsite Wastewater Management, Victorian EPA, Publication 891.4, 2016;
- US EPA, Process design manual, land treatment of municipal wastewater effluents, 2006; and
- Australian and New Zealand Environment and Conservation Council (ANZECC) 1997 Australian Guidelines for Sewage systems, Effluent Management, National Water Quality Management Strategy.

The following equation is used to determine the size of the spray irrigation land required to enable the water and its dissolved constituents are taken up by vegetation or retained within the soil profile without excessive seepage into groundwater (US EPA, 2006).

$A = (3.65 \times Q)/ (L \times T_{app})$

Where: A = land area (hectares)
Q = flow rate of wastewater (m^3/day)
L = wastewater hydraulic loading to soil (cm/week)
T_{app} = period of wastewater application each year (weeks)

Notes: The nutrient loading is not considered for this determination.
Wastewater hydraulic loading to soil is estimated as 4cm/week for this area

Pan evaporation exceeds typical monthly rainfall throughout the whole year (DPIRD)

To avoid water logging, the Victorian EPA (2016) recommends a maximum irrigation rate for wastewater for different soil textures are set out in the table below.

Soil Type	Irrigation rates (L/m^2/day)
Sands and gravels	5
Sandy loams	5
Loams	4
Clay loams	3.5
Light clay	3
Medium to heavy clays	2

From AS/NZS 1547: 2012

8.7.5 Applicant controls

The WWTP spray irrigation field has been adequately located (2.4km away from 5 Mile creek) so that no surface runoff discharges into any surface waters will occur.

Depth to groundwater in the area is 30mbgl.

The Spray irrigation field will have a 5m spray drift buffer therefore weed growth is expected to be limited to the irrigated area.

The ANZECC (2000) guidelines establishes the STV's (20 years) for Nitrogen and Phosphorus in irrigated treated effluent at 125 mg/L and 12 mg/L respectively, when impacts to native vegetation could occur if concentrations exceed these values. The Licensee expects the maximum concentration levels for Nitrogen and Phosphorous in the discharged effluent will be less than 40 mg/L and less than 12 mg/L respectively.

The spray irrigation area is sparsely vegetated with no threatened or priority flora within 2 km of the WWTP. Only a small amount of remanent vegetation is expected to be influenced by an increase in soil nutrients.

In accordance with US EPA guidelines (US EPA, 2006) in determining the land area required for a wastewater irrigation scheme (disregarding nutrient loading rates), the estimated irrigation land area required to manage the rate of wastewater discharge has been calculated as follows:

> A = (3.65 x 70) / (4 x 52) = 1.22 hectares. The size of the proposed spray irrigation land area will be 1.5 hectares which is approximately 20 percent larger than recommended.

This area experiences high evaporation rates with low rainfall. Combined with fine sand/silt interspersed with gravel and iron stone, a large amount of the wastewater discharged is expected to experience evapotranspiration with minimal infiltration to the ground expected.

The maximum irrigation rate in accordance with AS/NZS 1547: 2012 for sands and gravels (soil type in this area) to avoid water logging is 5 L/m^2/day. The initial effluent discharge rate is 4.66 L/m^2/day (70 m^3/day) however this drops to 3.66 L/m^2/day (55 m^3/day) when the Premises becomes operational and therefore satisfies this criterion.

Galena has also committed to daily inspections of the WWTP and spray irrigation area.

8.7.6 Key Findings

The Delegated Officer has reviewed the information Irrigation and has found:

1. *The WWTP spray irrigation field has been adequately located (2.4km away from 5 Mile creek) so that no surface runoff discharges into any surface waters will occur.*
2. *The distance to groundwater (30 mbgl) makes it unlikely that potential seepage will reach groundwater.*
3. *The maximum irrigation rate in accordance with AS/NZS 1547: 2012 for sands and gravels (soil type in this area) to avoid water logging is 5 L/m^2/day. The initial effluent discharge rate is 4.66 L/m^2/day (70 m^3/day) however this drops to 3.66 L/m^2/day (55 m^3/day)* when the Premises becomes operational and therefore satisfies this criterion.
4. *The expects maximum concentration levels for Nitrogen and Phosphorus in the discharged effluent will be less than 40 mg/L and less than 12 mg/L respectively. These levels are below trigger values set out in the ANZECC (2000) guidelines when impacts to native vegetation could occur if these values are exceeded.*
5. *The estimated irrigation land area required to manage the rate of wastewater discharge has been calculated at 1.22 hectares during the construction stage (based upon the maximum rate of 70 m^3/day) and 0.96 hectares during the operational stage (based upon the maximum rate of 55 m^3/day). The proposed size of the spray irrigation area is 1.5 hectares and therefore satisfies this criterion.*
6. *The expected water quality of the effluent meets the guidelines set out in the ANZECC (1997) Category C – secondary treatment for infiltration.*
7. *This area experiences high evaporation rates with low rainfall. Combined with fine sand/silt interspersed with gravel and iron stone, a large amount of the wastewater discharged is expected to experience evapotranspiration with minimal infiltration to the ground expected.*
8. *The controls proposed by the Applicant are likely to be sufficient to manage the potential impacts from irrigation of treated wastewater to land.*

8.7.7 Consequence

The Delegated Officer has determined that the impact of irrigation will have minimal onsite impacts. Therefore, the Delegated Officer considers the consequence of irrigation to be **slight**.

8.7.8 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of the risk even occurring is **possible**.

8.7.9 Overall rating of Irrigation of treated effluent

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 14) and determined that the overall rating for the risk of irrigation is Low.

8.8 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 15 below. Controls are described further in section 9.

Table 15: Risk assessment summary

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)
	Emission	Source	Pathway/Receptor (impact)			
1.	Leachate (operation)	Waste being landfilled and rain	Soil to groundwater causing contamination to groundwater.	Infrastructure and equipment controls	Minor consequence Unlikely likelihood **Low Risk**	Acceptable subject to Applicants controls
2.	Windblown waste (operation)	Waste being landfilled	Wind disturbing waste causing attraction of vermin and amenity impacts.	Infrastructure and equipment controls	Slight consequence Rare likelihood **Low Risk**	Acceptable subject to Applicants controls
3.	Contaminated stormwater (operation)	Waste being landfilled and rain	Soil to surface water causing contamination to surface water.	Infrastructure and equipment controls	Minor consequence Rare likelihood **Low Risk**	Acceptable subject to Applicants controls
4.	Discharge of treated effluent to land, groundwater and surface water	Irrigation of treated effluent	Direct discharge causing impacts to soil/vegetation and indirect discharges to groundwater and surface water quality	Infrastructure and management controls	Slight consequence Possible likelihood **Low Risk**	Acceptable and not generally subject to regulatory controls

9. Regulatory controls

A summary of regulatory controls determined to be appropriate for the Works Approval is set out in Table 16. The conditions of the works Approval will be set to give effect to the determined regulatory controls.

The Applicant will be required to apply for a Registration for the WWTP and landfill prior to commissioning of the WWTP. The landfill does not require commissioning.

There will be no conditions for Operations of the WWTP, however the *Environmental Protection (Rural Landfill) Regulations 2002* will be applicable for the landfill.

Table 16: Summary of regulatory controls to be applied

		Controls (references are to sections below, setting out details of controls)			
		9.1.1 Infrastructure and equipment	9.1.2 Emissions	9.1.2 Commissioning	9.1.3 Record keeping
Risk Items (see risk analysis in section 10)	1. Construction of the WWTP	●	●	●	●

9.1 Works Approval controls

9.1.1 Infrastructure and equipment

Works Approval condition 1 of the Works Approval is to allow the Applicant to construct the WWTP, spray irrigation field and related pipework according to the specification outlined in condition 1. Works Approval condition 2 allows for minor departures if required. Works Approval condition 3 requires a construction compliance document be submitted by the Applicant to the CEO prior to Commissioning to ensure construction has occurred with no material defects. Works Approval condition 4 requires the construction compliance document to identify any departures for works consistent with condition 2.

9.1.2 Emissions

Specified and general emissions have been conditioned within the Works Approval detailing acceptable and unacceptable emissions.

9.1.3 Commissioning

Condition 6 allows Emissions to occur during Commissioning of the WWTP for a period of 3 months. Condition 7 requires weekly effluent monitoring of the treated effluent during the commissioning period. Condition 8 requires the Applicant to submit a Commissioning Report upon completion of Commissioning.

9.1.4 Record keeping

Standard works approval record-keeping conditions have been applied.

10. Determination of Works Approval conditions

The conditions in the issued Works Approval 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 Works Approval

expires in 3 years from the date of issue.

Table 17 provides a summary of the conditions to be applied to this Works Approval.

Table 17: Summary of conditions to be applied

Condition Ref	Grounds
Infrastructure and Equipment 1, 2, 3 and 4	These conditions are valid, risk-based and contain appropriate controls.
Emissions 5	This condition is valid, risk-based and consistent with the EP Act.
Commissioning 6, 7 and 8	This condition is valid, risk-based and consistent with the EP Act.
Record-keeping 9 and 10	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 Works Approval under the EP Act.

11. Applicant's comments

The Applicant was provided with the draft Decision Report and draft Works Approval on 7 March 2019. The Applicant responded on 11 March 2019 and did not provide comments on the draft documents.

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 Works Approval will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Alana Kidd
Manager, Resource Industries
Delegated Officer
under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

	Document title	In text ref	Availability
1.	Works Approval application form including supporting documentation	Application	DWER records (A1721898)
2.	Works Approval Application – Further information	Additional information	DWER records (A1731174)
3.	Guidance Statement: Regulatory Principles (July 2015)	Guidance Statement: Regulatory Principles	accessed at www.dwer.wa.gov.au
4.	Guidance Statement: Decision Making (February 2017)	Guidance Statement: Decision Making	
5.	Guidance Statement: Risk Assessments (February 2017)	Guidance Statement: Risk Assessments	
6.	Guidance Statement: Licence Duration (August 2016)	Guidance Statement: Licence Duration	
7.	Guidance Statement: Environmental Siting (November 2016)	Guidance Statement: Environmental Siting	
8.	Guidance Statement: Setting Conditions (October 2015)	Guidance Statement: Setting Conditions	
9.	Australian and New Zealand Environment and Conservation Council (ANZECC) 1997 Australian Guidelines for Sewage systems, Effluent Management, National Water Quality Management Strategy	ANZECC (1997)	Accessed at http://www.waterquality.gov.au
10.	US EPA, Process design manual, land treatment of municipal wastewater effluents, 2006	US EPA (2006)	accessed at www.epa.gov/nrmrl/pubs/625r0601

			6/625r06016whole.pdf
11.	Code of Practice – Onsite Wastewater Management, Victorian EPA, Publication 891.4, 2016	Victorian EPA (2016)	Accessed at www.epa.vic.gov.au/media/Pulications/891%204.pdf
12.	Means the Australian and New Zealand Environment and Conservation Council (ANZECC) 2000, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, October 2000	ANZECC (2000)	Accessed at http://www.agriculture.gov.au/water/quality/guidelines

Attachment 1: Issued Works Approval W6178/2018/1