



Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number W6149/2018/1

Applicant Kalium Lakes Potash Pty Ltd

ACN 601 436 060

File Number DER2018/000831

Premises Beyondie Sulphate of Potash Project Wastewater Treatment Plant
Part of tenement M69/145
WILUNA WA 6646

Date of Report 4 October 2018

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
ACN	Australian Company Number
Applicant	Kalium Lakes Potash Pty Ltd
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
cfu/100mL	colony-forming units per 100 millilitres
DBCA	Department of Biodiversity, Conservation and Attractions
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
DoH	Department of Health
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 <i>Public Sector Management Act 1994</i> and is responsible for the administration of the <i>Environmental Protection Act 1986</i> along with other legislation
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>
HDPE	high density polyethylene
Issued Licence	The licence issued under Part V, Division 3 of the EP Act
Issued Works Approval	The works approval issued under Part V, Division 3 of the EP Act following the finalisation of this assessment
m ³	cubic metres
mbToC	metres below Top of Casing

Term	Definition
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	The primary activities which fall within the description of the category of prescribed premises in Schedule 1 of the EP Regulations
Risk Event	As described in <i>Guidance Statement: Risk Assessments</i>
SBR	Sequence Batch Reactor
UDR	<i>Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA)</i>
WC Act	<i>Wildlife Conservation Act 1950</i>
WWTP	Wastewater Treatment Plant

2. Purpose and scope of assessment

Kalium Lakes Potash Pty Ltd (Applicant) submitted an application (Application, 2018) on 9 May 2018 to the Department of Water and Environmental Regulation (DWER) for a works approval under the *Environmental Protection Act 1986* (EP Act).

The Applicant is currently focused on its Beyondie Sulphate of Potash Project, to develop a sub surface brine deposit to produce approximately 75 kilotonnes per annum of Sulphate of Potash (SOP) and other by-products.

Application, 2018 is for the development of a wastewater treatment plant (WWTP) to service the expanded accommodation camp for the Beyondie SOP Project. The Beyondie SOP WWTP (Premises) is located on tenement M69/145, which is located approximately 160 kilometres (km) south-east of Newman and 75 km east of the Kumarina Roadhouse in the eastern Pilbara region of Western Australia.

This Decision Report assesses emissions and discharges associated with the construction and operation of the WWTP.

This assessment has resulted in DWER issuing Works Approval W6149/2018/1 (Issued Works Approval) which is contained in Attachment 1.

2.1 Application details

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
Beyondie Project WWTP Works Approval including: <ul style="list-style-type: none">• 180509 Beyondie SOP Project WWTP_Works approval form_Final; and• 180509 Beyondie SOP Project WWTP_Works approval_supporting documentation_FINAL. Beyondie SOP Project WWTP Works approval – Appendices 1 & 2 including: <ul style="list-style-type: none">• Appendix 1_Existing approvals; and• Appendix 2_Kalium Lakes Preliminary Water Supply Assessment Rev0. Beyondie SOP Project WWTP works approval_Appendix 3 including Appendix 3_Beyondie flora and vegetation report1.	9 May 2018
Kalium Lakes Works Approval Application W6149/2018/1 including: <ul style="list-style-type: none">• Request for additional information on works approval application for Beyondie Sulphate of Potash Wastewater Treatment Plant – W6149/2018/1; and• Kalium Lakes_Spill Management Procedure	18 June 2018

3. Background

The application relates to the following Primary Activities at the Premises for the prescribed premises categories defined in Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) as listed in Table 3.

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.	52.5 m ³ /day

4. Overview of Premises

4.1 Operational aspects

The operational aspects for the WWTP as defined within Application, 2018 are detailed below. The schematic layout of the WWTP is shown in Figure 1.

The WWTP will be designed to treat and dispose of wastewater generated from the accommodation camp (toilets, bathroom, kitchen and laundry facilities). The WWTP has a design capacity of 52.5 cubic metres (m³) per day (m³/day), though the throughput has been estimated at approximately 35 m³/day.

Raw wastewater will be pumped via the sewerage pump station. Storage of raw wastewater will be achieved in the Balance Tank. Sewage will be pumped into the Sequence Batch Reactor (SBR) and enter via the Anaerobic Tank. From the Anaerobic Tank, effluent passes through several treatment stages including an Anoxic Tank, Aeration Tank and a Classifier Tank.

The SBR methodology of wastewater treatment utilises a biological treatment process whereby highly aerated effluent flows through inert media that is completely submerged, promoting formation of a fixed microbial film that reduces the biological oxygen demand and ammonia content of the effluent.

The biomass from the effluent (sludge) settles out and is then removed and stored in a Sludge Thickening Tank. The effluent is then filtered and dosed with chlorine to a low exposure risk level quality prior to discharging into the Irrigation Tank, ready for disposal. The WWTP is designed on the basis of producing treated wastewater characteristics as detailed in Table 4.

The sludge will be removed from the Sludge Thickening Tank by a licensed carrier and taken for disposal at an appropriately licensed waste facility in accordance with the *Environmental Protection (Controlled Waste) Regulations 2004*. Typically the sludge will be removed every 12 months, with an estimated 1 m³ of sludge generated annually.

The WWTP is controlled by an electrical panel positioned in a control room, equipped with an audible and visual alarm system. If high water levels in the tank or pump failure occur, the audible alarm and red flashing light will activate.

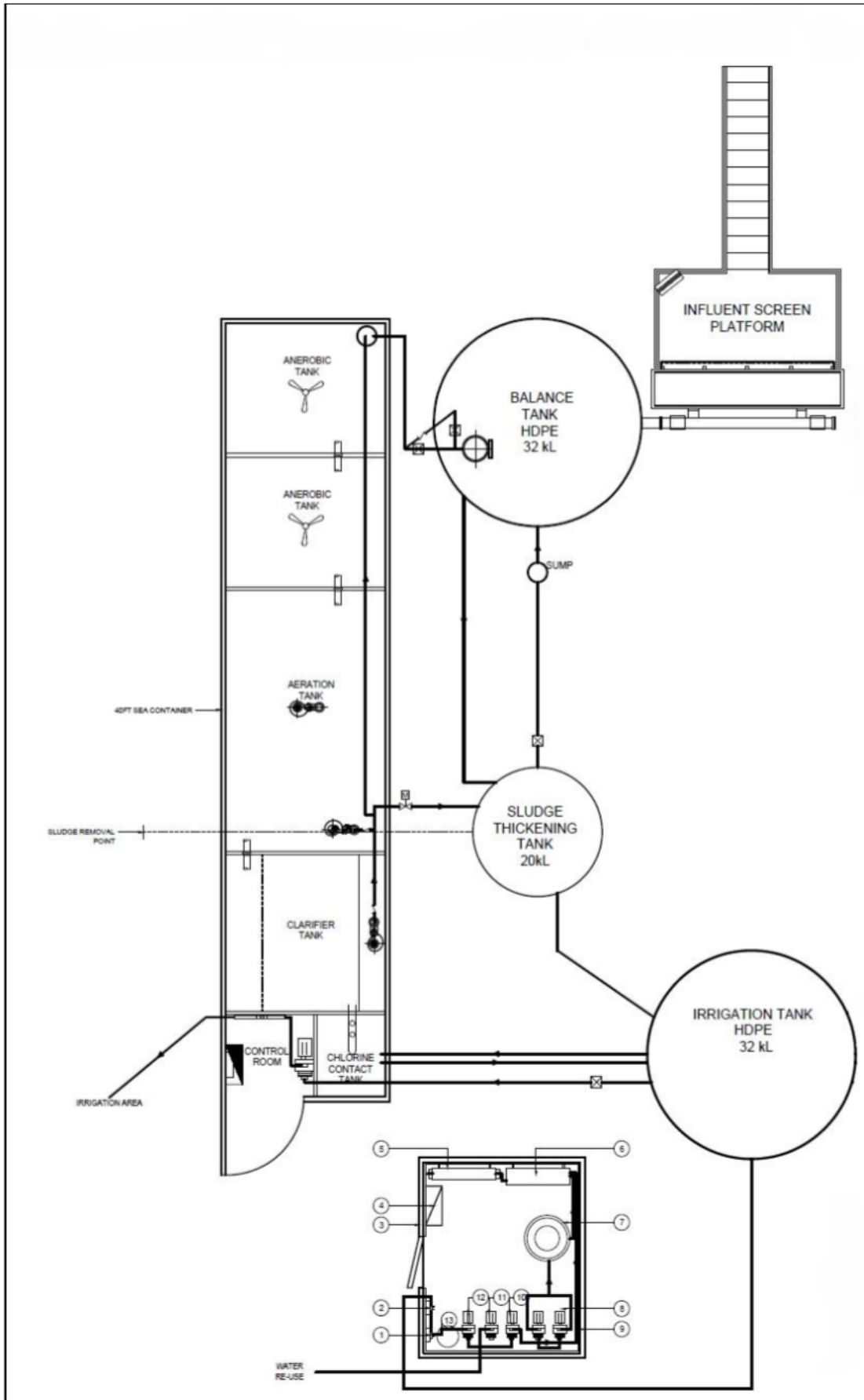


Figure 1: Schematic layout of the WWTP

Table 4: Wastewater output characteristics

Parameter	Concentration including units
Biochemical Oxygen Demand	<5 mg/L
Chemical Oxygen Demand	<30 mg/L
Total Suspended Solids	<5 mg/L
Total Nitrogen	<15 mg/L
Total Phosphorus	<8 mg/L
<i>E.coli</i>	<1,000 cfu/100 mL
<i>Coliphages</i>	<1 pfu/100 mL
<i>Clostridia</i>	<1 cfu/100 mL
Residual Chlorine	0.2 – 2.0 mg/L
pH	6.5 – 8.5 pH units

The Applicant has proposed three options (listed in order of preference) for the disposal of treated wastewater including:

1) Dust suppression

Treated wastewater will be applied to access roads and tracks via one or more dedicated water trucks within and outside of the Premises (Figures 2 and 3 show the location of the existing roads and tracks). Signage will be used to advertise the use of treated wastewater for dust suppression in line with Department of Health (DoH) requirements.

2) Discharge to a disposal area located on the bare surface of Ten Mile Lake

Treated wastewater will be discharged via an open high density polyethylene (HDPE) pipe, to a discharge point (E 232100 N 7258619) located on the bare surface of Ten Mile Lake.

Kalium, 2018 states “*The pipeline will not be located within a bunded containment trench as the environmental impact associated with the trench (vegetation clearing, fauna entrapment, surface water diversion) was deemed to be greater than what would occur following a spill. Any spills of treated wastewater are likely to infiltrate or flow onto the lake directly*”.

Application, 2018 states that a discharge to Ten Mile Lake will not occur when there is surface water within Ten Mile Lake.

3) Discharge to a dedicated spray irrigation area directly adjacent to the WWTP

Treated wastewater will be discharged to a dedicated 5.11 hectare (ha) spray irrigation area, which will not be cleared of vegetation prior to irrigation (Preston, 2018a).

Kalium, 2018 states “*The pipeline will not be located within a bunded containment trench as the environmental impact associated with the trench (vegetation clearing, fauna entrapment, surface water diversion) was deemed to be greater than what would occur following a spill. Any spills of treated wastewater are likely to infiltrate or flow onto the lake directly*”.

The spray irrigation area will be enclosed with two strand 1.2 m high wire fence around the perimeter to restrict access to the area. A danger sign will also be fitted to all sides of the fence and the fence will be a minimum of 5 m from the sprinkler spray pattern to allow for spray drift.

4.2 Infrastructure

The Premises infrastructure, as it relates to Category 85 activities, is detailed in Table 5 and with reference to the Site Plan (Figure 2).

Table 5: Category 85 infrastructure

	Infrastructure	Site Plan Reference
	Prescribed Activity Category 85	
The WWTP will be designed to treat and dispose of wastewater generated from the accommodation camp and has a design capacity of 52.5 m ³ /day. Treated wastewater will be disposed of via three options: dust suppression; discharge to Ten Mile Lake; or discharge to a spray irrigation area.		
1	32 kilolitre (kL) Balance Tank	Figure 1 and within the proposed WWTP area in Figure 2
2	SBR including Anaerobic Tank; Anoxic Tank; Aeration tank; and Clarifier Tank	
3	20 kL Sludge Thickening Tank	
4	Chlorine Contact Tank	
5	32 kL Irrigation Tank	
6	Control Room	
7	Spray Irrigation Area	Figure 2: Proposed Spray Irrigation
8	Discharge Pipeline to Ten Mile Lake	Figure 2: Proposed Discharge Pipeline
9	Chlorine storage	Figure 1: No. 13 – chlorine storage bund and within the proposed WWTP area in Figure 2
	Other facilities	
1	Camp	Figure 2: Proposed new camp area
2	Administration, Workshop and Laydown area	Figure 2: Proposed new admin, workshop and laydown
3	Pilot ponds	Figure 2: Current pilot ponds
4	Roads / access tracks	Figures 2 and 3: Existing roads and tracks

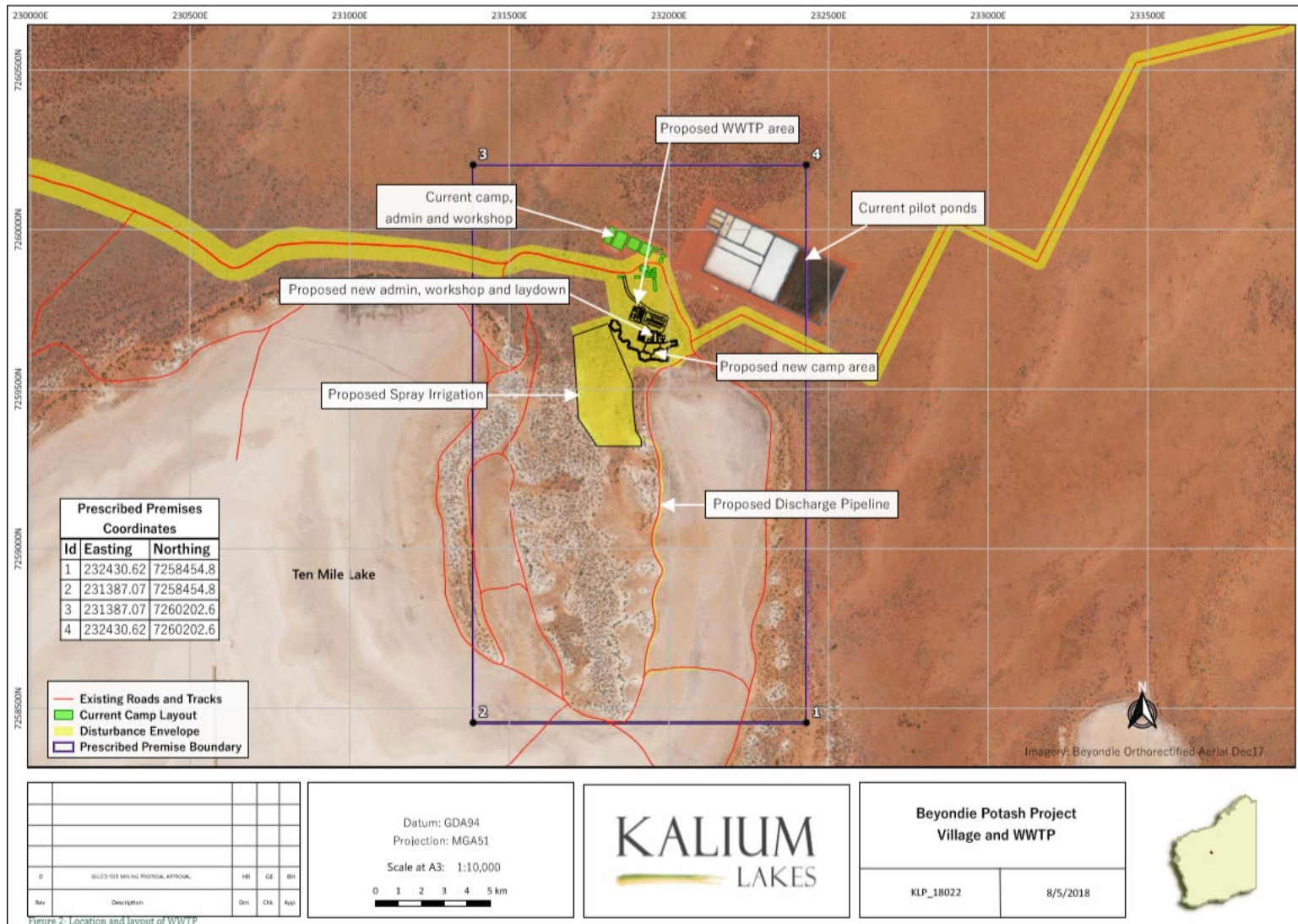


Figure 2: Site Plan

5. Legislative context

Table 6 summarises approvals relevant to the assessment.

Table 6: Relevant approvals and tenure

Legislation	Number	Subsidiary	Approval
<i>Mining Act 1978</i>	Reg. ID 55805	Kalium Lakes Potash Pty Ltd	Programme of Works for Exploration on E69/3309 and E69/3347, was issued on 8 February 2016 for a four year period. A Mining Proposal and Mine Closure Plan is currently being prepared which includes this WWTP.
<i>Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974</i>	-	Kalium Lakes Potash Pty Ltd	The Applicant has applied for approval from DoH for the installation of the WWTP and on-site disposal of wastewater. This has not yet been obtained.
<i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	EPBC 2017/8088	Kalium Lakes Potash Pty Ltd	-
<i>Rights in Water and Irrigation Act 1914</i>	Groundwater licences	Kalium Lakes Pty Ltd	The Applicant has applied for licences to take groundwater under the RIWI Act for both brine and fresh water supply. The applications are currently being assessed and will not be finalised until the acceptability of drawdown impacts on subterranean fauna and trigger levels have been approved by the Environmental Protection Authority (EPA) and the Department of Biodiversity, Conservation and Attractions (DBCA) under Part IV of the EP Act (Water, 2018).

Key Finding: The Applicant will require approval under the *Health Act 1911* prior to the construction and commissioning of the WWTP.

5.1 Part IV of the EP Act

On 31 October 2017, the Applicant referred the Beyondie SOP Project to the EPA under section 38 of the EP Act. This proposal included the development of a sub-surface brine deposit to produce approximately 150 kilotonnes per annum of SOP product and by-products. The EPA determined to assess this proposal at the level of Environmental Review – no public review, and is yet to publish its assessment report.

The Applicant submitted an application to the EPA to undertaken minor or preliminary works on 22 March 2018, which included upgrades to an existing accommodation camp, WWTP, workshop, communications towers and widening of Beyondie Road. A Notice of Decision to Consent to Minor or Preliminary Works (CMS14379) was approved by a delegate of the EPA on 25 May 2018.

5.1.1 CMS14379

The preliminary key environmental factors associated with the proposed Beyondie Project are:

1. Flora and Vegetation;
2. Terrestrial Fauna;
3. Subterranean Fauna;
4. Hydrological Processes; and
5. Inland Waters and Environmental Quality.

It is stated within CMS14379 that “*The proponent has proposed an updated pipeline route associated with the wastewater treatment plant that avoids habitat for the Priority 1 Tecticornia (Samphire) species*”.

5.2 Part V of the EP Act

5.2.1 Applicable regulations, standards and guidelines

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

The guidance statements which inform this assessment are:

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

5.2.2 Works approval history

Table 7 summarises the works approval history for the Premises.

Table 7: Works approval history

Instrument	Issued	Nature and extent of works approval or amendment
W5939/2015/1	21/01/2016	New works approval for a 12 month pumping and evaporation trial (Trial Extraction Programme) to test the production of SOP via an evaporation operation at Beyondie Lakes and Ten Mile Lake.

W5939/2015/1	5/05/2016	Works approval amendment to revise the layout of the ponds.
W6149/2018/1	4/10/2018	This new works approval for the construction of a 52.5 m ³ /day WWTP.

5.2.3 Clearing

The clearing of native vegetation is not approved under the Issued Works Approval.

Clearing of up to 44.5 ha being:

- 32 ha for the site access road;
- 10 ha for the accommodation camp and WWTP;
- 2.5 ha for the workshop; and
- No clearing for the communication towers

has been approved under CMS14379.

6. Consultation

The Application was advertised in the West Australian on 18 June 2018 for a 21 day comment period. No comments were received.

A letter inviting comment was sent to the Shire of Wiluna on 20 June 2018. No comments were received.

A letter of referral was sent to DWER's Regulatory Services (Water) directorate on 20 June 2018 and their comments are outlined below (section 6.1).

A letter of referral was sent to DBCA on 23 July 2018. DBCA (Goldfields Region) responded on 14 August 2018 (DBCA, 2018), stating they had no comments to provide in relation to the application.

6.1 Regulatory Services (Water)

The following comments were received from Regulatory Services (Water) on 6 July 2018 (Water, 2018):

- *"Potential impacts on the hydrology and water quality of Ten Mile Lake from the proposed activities will need to be assessed by the DBCA in accordance with the existing Department of Water and Department of Environment and Conservation – Wetland, Waterways and Estuary Agreement (June, 2008) which is still in operation".*
- Regulatory Services (Water) *"recommends that the preferred option for treated wastewater effluent discharge is via a dedicated irrigation area that is located a minimum 100 meters away from sensitive water resources (including the lake and water abstraction bores for potable water supply), has a minimum 2 meter vertical clearance from the highest known water table and is not subject to inundation or flooding".*
- *"Water Quality Protection Note No. 22 - Irrigation with nutrient-rich wastewater (Department of Water, 2008) is referenced in the application supporting document, however this note covers irrigation of vegetated land with stabilised, nutrient-rich wastewater from industry (such as abattoirs, animal holding yards, aquaculture, breweries and food processors) and recycled run-off from agricultural and tree plantation land. It is not intended to cover treated sewage which requires specific approval under the Health Act 1911".*

7. Location and siting

7.1 Siting context

The Premises is located approximately 160 km south-east of Newman and 75 km east of the Kumarina Roadhouse as shown in Figure 3.

The workforce for the Premises will be accommodated at the on-site camp. The camp is operated by the Applicant, as such will not be considered a sensitive land use or receptor.

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
Closest residential zoned premises (zoned residential East Pilbara Planning Scheme No. 4)	The residential area of Newman is approximately 160 km north-west of the Premises.
Kumarina Roadhouse	Approximately 75 km to the west of the Premises.

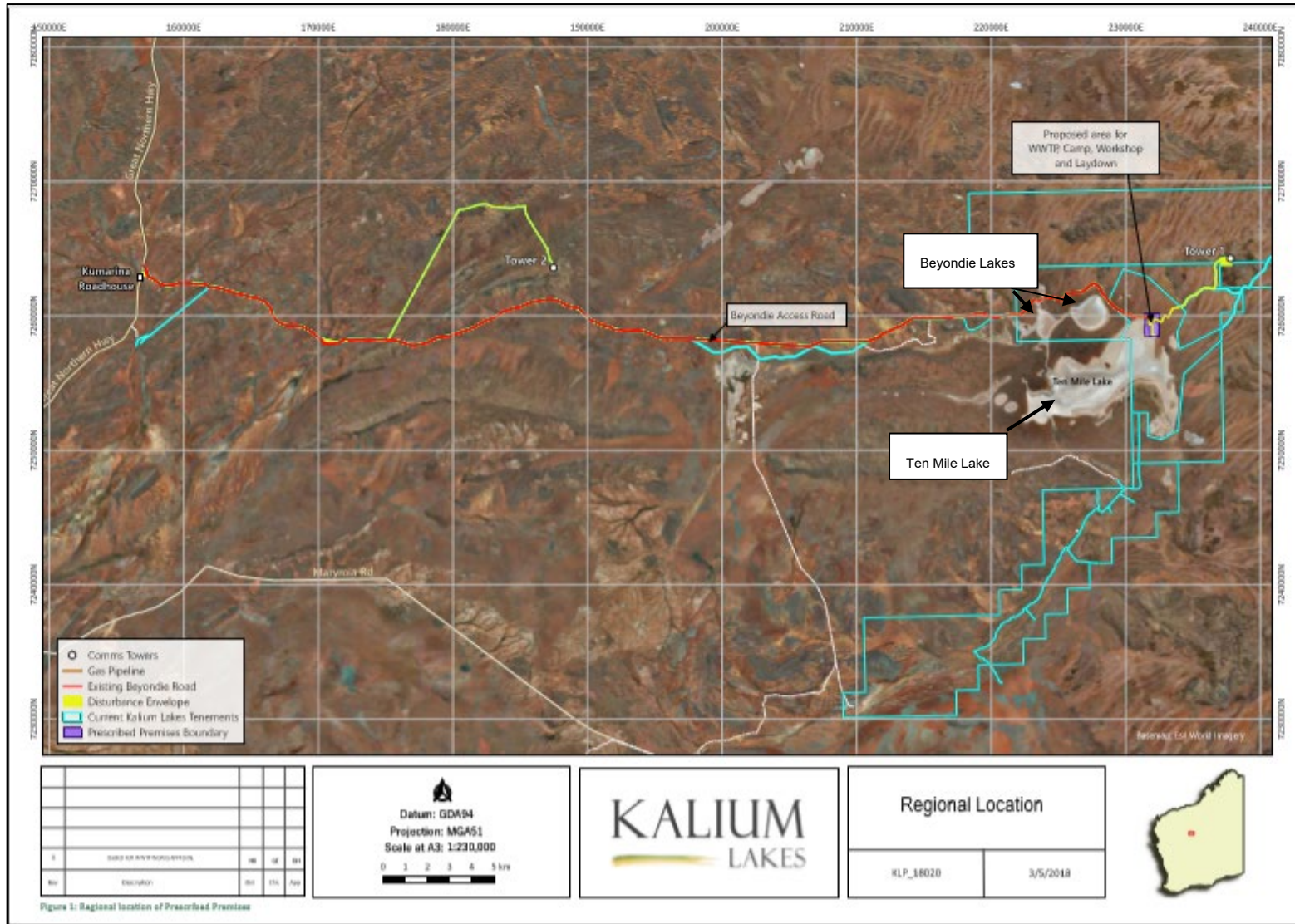


Figure 3: Regional location of Premises

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 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
Ramsar Sites in Western Australia	The Fortescue Marshes is located approximately 240 km north-west of the Premises.
Department of Biodiversity, Conservation and Attractions Managed Lands and Waters	Collier Range National Park boundary is located approximately 72 km north-west of the Premises.
Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs)	<p>Application, 2018 states that the Premises is located within the 90 km buffer zone for the Priority 1, PEC of the Lee Steere Range vegetation complexes (banded ironstone formations), though this PEC has not been recorded in the Premises to date.</p> <p>Figure 4 shows the location of sensitive land uses and specific ecosystems.</p> <p>Phoenix, 2018 states that “<i>none of the vegetation defined for the study area resembles any of the listed TECs or PECs</i>”.</p>
Declared Rare Flora	No Declared Rare Flora was identified within the Premises.
Biological component	Distance from the Premises
Threatened/Priority Flora	Four Priority 1 flora species, all <i>Tecticornia spp.</i> (Samphire shrublands vegetation type) were recorded by Phoenix, 2018 in the study area as shown in Figure 5.
Threatened/Priority Fauna	<p>Habitats present in the Premises are suitable to support fauna of conservation significance such as the:</p> <ul style="list-style-type: none"> Greater Bilby (<i>Macrotis lagotis</i>) (Vulnerable under the EPBC Act and the <i>Wildlife Conservation Act 1950</i> (WC Act))*, Brush-tailed Mulgara (<i>Dasycercus blythi</i>) (Priority 4 Fauna)* and Northern Marsupial Mole (<i>Notoryctes caurinus</i>) (Priority 4 Fauna)*. <p>These fauna or significant portions of their habitat were not recorded in the Premises (Preston, 2018a).</p>

Other relevant ecosystem values	Distance from the Premises
<p>Salt lakes host a diverse array of fauna and flora, despite representing one of the most hostile ecosystems on earth due to high incident daily temperatures and high salt concentrations in their soils and their ephemeral water bodies (Phoenix, 2017b).</p> <p>Salt lakes provide potential habitat for a range of waterbird and shorebird species which forage on the lakes surface when the water level is low and may roost in fringing vegetation where suitable cover is present.</p> <p>Suitable habitat is provided for specialist salt lake endemic species, particularly invertebrates.</p> <p>Endemic invertebrate fauna are known to occur at other Western Australian salt lakes (e.g. Lake Disappointment, Lake Lefroy), but none are currently known to be endemic to the Beyondie Lakes and Ten Mile Lake (Phoenix, 2017a).</p>	<p>The Premises is located on and surrounding a salt lake habitat (Ten Mile Lake).</p>

*Threatened and Priority Fauna List

Key Finding: Phoenix Environmental Sciences Pty Ltd was commissioned to conduct a waterbird and aquatic invertebrate fauna survey for the Project. Phoenix, 2017b states “Site selection was dependent on the presence of sufficient surface water and therefore only the Beyondie Lakes and an associated claypan were surveyed”.

The Premises is located on and surrounding Ten Mile Lake. Phoenix, 2017b states “Ten Mile Lake was almost dry during Phase 1 and no suitable sites for aquatic samples could be selected during that or subsequent phases”. Therefore, the Delegated Officer notes that there is limited data on waterbird and aquatic invertebrate fauna at Ten Mile Lake.

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
Public drinking water source areas	The Newman Water Reserve is located approximately 153 km north of the Premises.	Priority 1 Water Reserve. Newman town water supply.
Major watercourses/waterbodies	The Premises is located on and surrounding Ten Mile Lake.	The suite of lakes do not connect above ground but they form part of the Ilgari palaeoriver, which is a remnant of an extensive river system from the tertiary

Groundwater and water sources	Distance from Premises	Environmental value
		<p>period (Phoenix, 2017b).</p> <p>The salt lakes are dry most to the year but become seasonally inundated during the wet season if there is sufficient rainfall.</p>
<p>Beyondie Lakes are a suite of wetlands consisting of a freshwater marsh area to the west, two circular salt playas and interconnecting channels.</p>	<p>Beyondie Lakes are located approximately 3 km west of the Premises.</p>	<p>Beyondie Lakes connects with Ten Mile Lake during extreme inundation events.</p>
<p>Wild Rivers, Savory Creek</p>	<p>Boundary of the Priority 1 Wild Rivers, Savory Creek is approximately 86 km north of the Premises.</p>	<p>Savory Creek Wild River Area, has been recognised by DWER and the Australian Heritage Commission as a Wild River catchment and has been classified as Priority 1 – in near pristine condition, and of a very high environmental value.</p> <p>Savory Creek currently has no/or minor impact from clearing, road or track construction, or introduced plants or plant diseases.</p>
<p>Groundwater</p>	<p>The Premises is located in the East Murchison Groundwater Area.</p> <p>Advisian, 2017 states that standing water levels (SWLs) range between 1 and 16 metres below Top of Casing (mbToC) in the bores in the immediate vicinity of the Project area. Water quality is likely to be fresh to saline, depending on the geology, depth and relative position in the basin.</p> <p>Groundwater salinity as Total Dissolved Solids range between 100 and 4,500 mg/L.</p>	<p>The catchment areas for Beyondie and Ten Mile Lake extend more than 50 km upstream, with the lakes fed by ephemeral streams that drain from west to east and terminate at 10 Mile Lake.</p> <p>Shallow groundwater flow is from west to east across the wider project area, which reflects topography.</p> <p>Advisian, 2017 states “<i>there are existing bores in the vicinity of the Project recorded to be used for stock watering and pastoral water supply needs</i>”.</p>

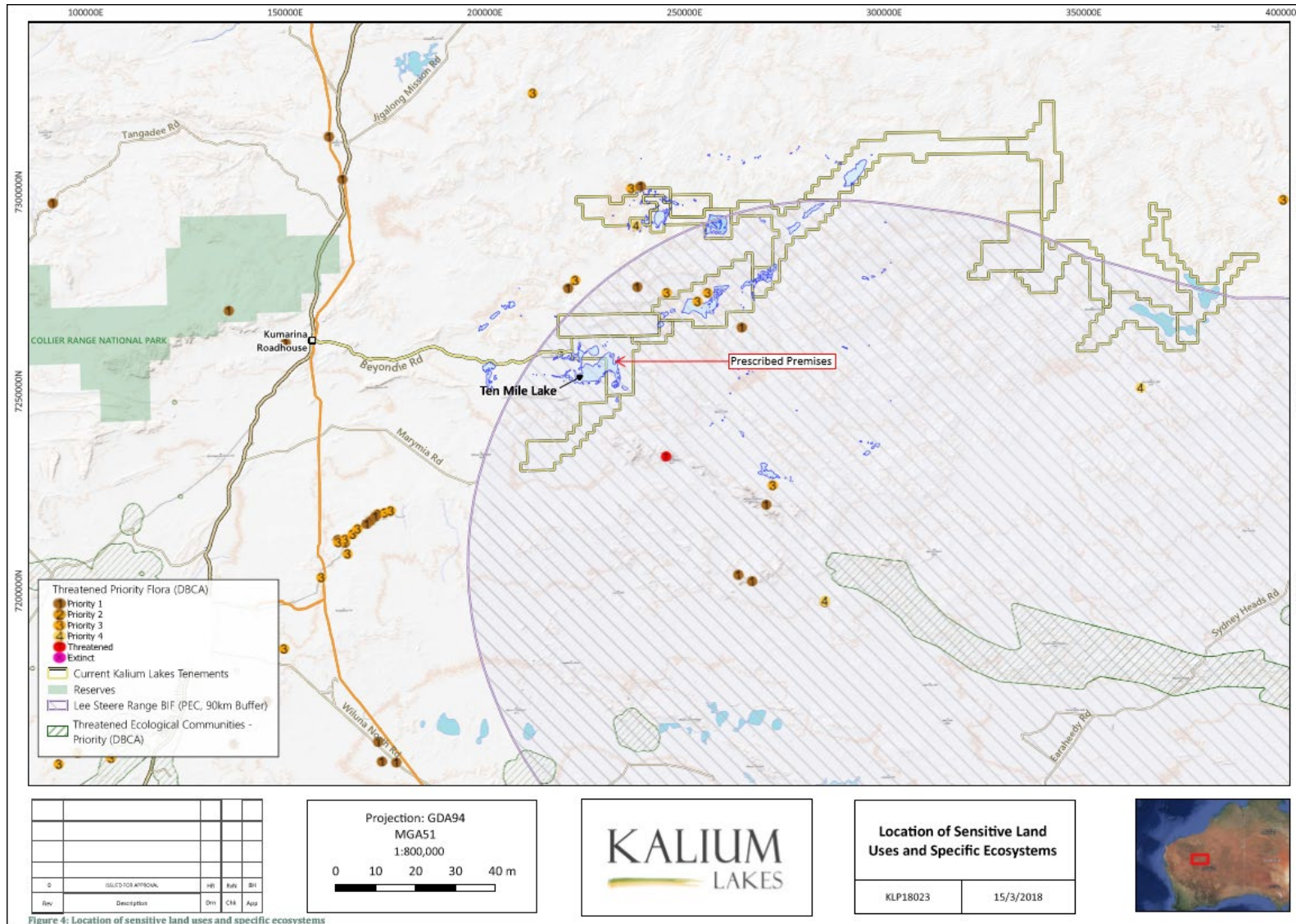


Figure 4: Location of Sensitive Land Uses and Specific Ecosystems

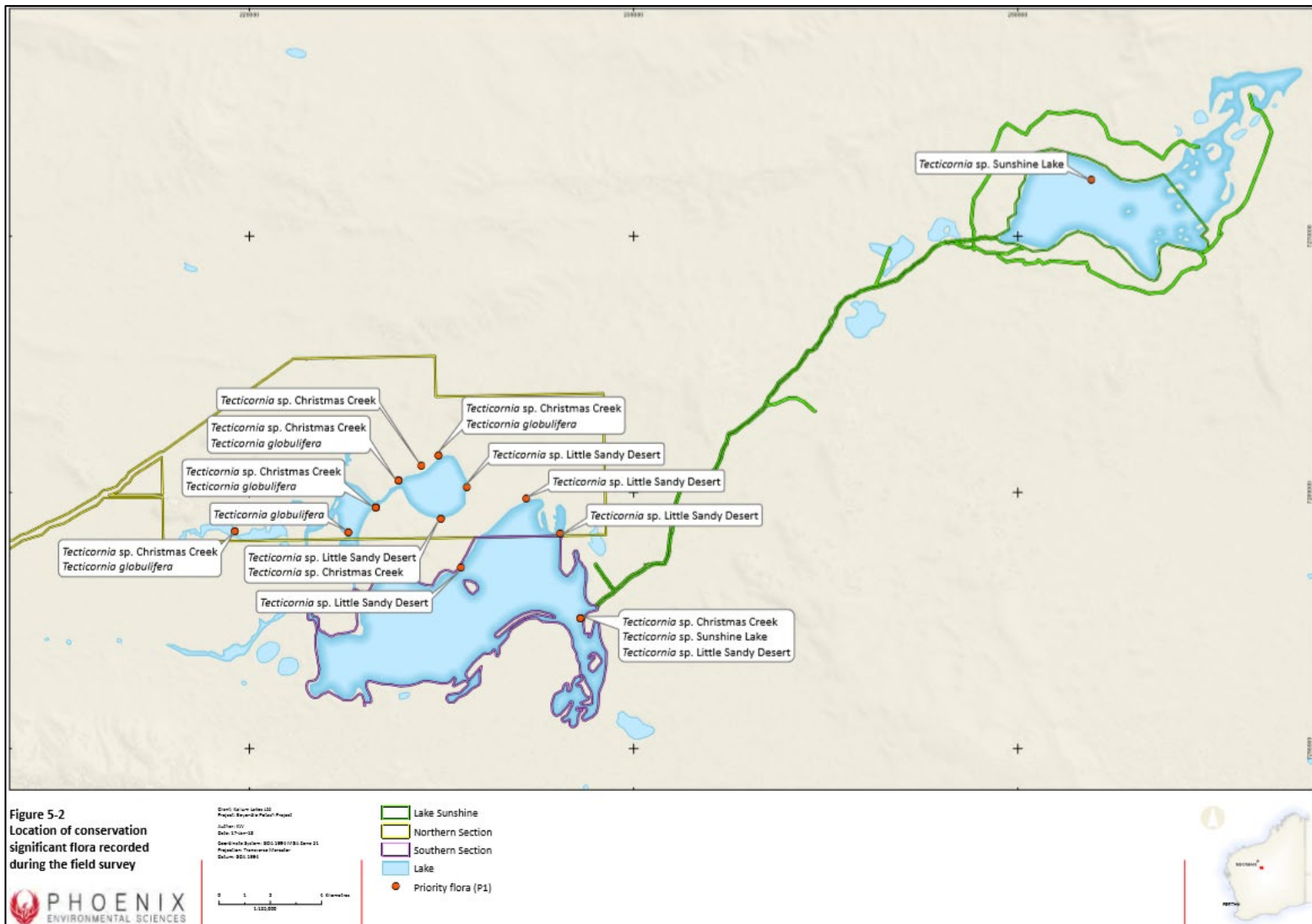


Figure 5: Location of conservation significant flora

7.5 Soil type

DWER's GIS dataset identifies that soil types within the Premises are generally saline soils associated with salt lakes; sand and kopi gypsum dunes, and intervening plains. Chief soils are probably shallow (Um1), with various (Dr1) and (Dr2) soils, together with saline (Gn2.13), (Uc1.23), and (Um5.11) soils that sometimes overlie red-brown hardpan, and the soils of unit B39 in the area of Sheet 10 (Northcote, 1960-68).

7.6 Meteorology

7.6.1 Regional climatic aspects

The Gascoyne bioregion has an arid climate. Phoenix, 2018 states the climate of the Little Sandy Desert and the south-western Little Sandy Desert as arid and desert tropical respectively with summer-dominant rainfall.

7.6.2 Rainfall and temperature

Figure 6 provides the mean rainfall and maximum temperatures for Three Rivers (mean maximum temperature 1967-2004 and mean rainfall 1907-2018), which is approximately 120 km to the south-west of the Premises.

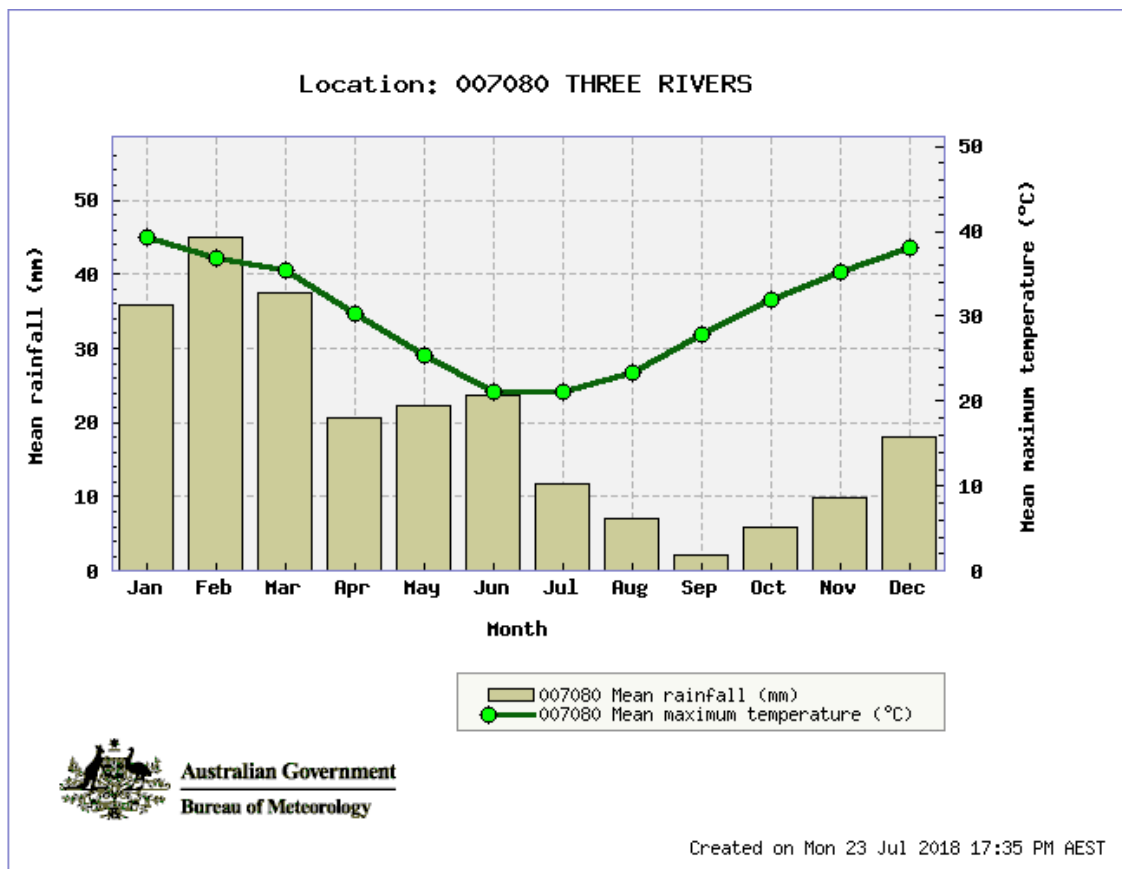


Figure 6: Mean temperatures and rainfall, Three Rivers

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 the Tables.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Tables 11 and 12 below.

Table 11. 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, mobilisation and positioning of infrastructure	Vehicle movements on unsealed access roads	Noise	No residences or other sensitive receptors in proximity	Air / wind dispersion	None	No	No receptor present.
		Dust			None	No	No receptor present.
	Earthworks, construction of new WWTP and associated infrastructure	Noise	No residences or other sensitive receptors in proximity	Air / wind dispersion	None	No	No receptor present.
		Dust	No residences or other sensitive receptors in proximity	Air / wind dispersion	None	No	No receptor present.
			Flora and vegetation		Potential to be deposited on vegetation and may prevent photosynthesis and plant respiration	No	The Delegated Officer considers the natural dust tolerance of vegetation species should prevent vegetation impacts. There are also no Declared Rare Flora, TECs or PECs within or in a 30 km radius of the Premises.

Table 12: 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			
WWTP	Treatment of sewage	Odour	No residences or other sensitive receptors in proximity	Air / wind dispersion	None	No	No receptor present.
	Sewage pipes and holding tanks	Rupture of pipes / overtopping of holding tanks resulting in sewage discharge to land	Vegetation adjacent to discharge area	Discharges to land	Soil contamination	Yes – Refer to section 8.4	Potential soil contamination from the release of untreated wastewater.
	Irrigation of treated effluent	Treated wastewater used for dust suppression on access road and tracks	Localised environment receiving runoff and road-side vegetation	Discharges to land	Increase in nutrient levels in soil	No	<i>Kalium, 2018 states that the “areas subject to dust suppression will fall outside the prescribed premises boundary and comprise of access roads and tracks”.</i> The Delegated Officer notes that the access roads and tracks will be previously disturbed / cleared areas with limited vegetation. Impacts will be minimal. There are also no Declared Rare Flora, TECs or PECs within or in a 30 km radius of the Premises.
		Treated wastewater discharged to Ten Mile Lake	Waterbirds and shorebirds Fringing vegetation Endemic invertebrate fauna	Discharges to land via irrigation	Water quality with the addition of freshwater to a saline ecosystem and an increase in nutrient levels Ponding at the discharge location	Yes – Refer to section 8.5	Potential for water quality of Ten Mile Lake to be impacted with the addition of nutrients and freshwater to a saline / hypersaline ecosystem. Impact to fringing vegetation, waterbirds and invertebrate fauna with the disposal of treated effluent to an ephemeral salt lake environment.
		Treated wastewater discharged to spray	Terrestrial ecosystem Vegetation within spray irrigation area	Discharges to land via irrigation	Facilitated growth of weeds Increase in nutrient levels in soil	Yes – Refer to section 8.6	Potential for ponding in the spray irrigation area and impacts to vegetation / soils with the increase in nutrient levels and disposal of freshwater to a saline / hypersaline

Risk Events					Continue to detailed risk assessment	Reasoning	
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts			
		irrigation area			Ponding in the irrigation area		ecosystem.
	Chlorine	Leaks and spills of chlorine	Soil and vegetation adjacent to the area of spill or breach	Direct discharges to land	Degradation of the soil profile Soil contamination inhibiting vegetation growth and survival	No	Application, 2018 states that chlorine will be stored and fully contained in a designated storage area within the WWTP. The Delegated Officer considers the general provisions of the EP Act and <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> to be sufficient regulatory controls.
	Stormwater runoff	Contaminated stormwater	Soil and surface water drainage	Stormwater runoff Gravity flow overland	Soil contamination Increase in sedimentation Vegetation growth and survival impacts	No	Application, 2018 states that “ <i>Stormwater runoff is expected to be minimal due to the small clearing areas and the sandy soils at the premises that have high infiltration</i> ”. Stormwater will be diverted around the WWTP area and this drainage will be inspected on a regular basis.
Other	Hydrocarbons and chemical storage areas	Spills and breach of containment	Soil and vegetation adjacent to the area of spill or breach	Direct discharges to land	Soil contamination inhibiting vegetation growth and survival	No	Application, 2018 and Kalium, 2018 includes the following management measures for leaks or spillages of hydrocarbons or chemicals: <ul style="list-style-type: none"> Hydrocarbons and chemicals will be stored in accordance with AS 1940. Hydrocarbons and chemicals will be stored in bunded facilities; All hydrocarbons or chemical storage facilities will be fitted with spill kits; Fuel will be stored in self-bunded tanks; Refuelling of immobile or semi-mobile equipment will be conducted using a service vehicle, fitted with a spill kit; Light vehicle refuelling facilities will be

Risk Events					Continue to detailed risk assessment	Reasoning
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
						<p>conducted in a dedicated area; and</p> <ul style="list-style-type: none"> Any spills will be controlled, contained and cleaned up in accordance with the <i>Spill Management Procedure</i>. <p>The Delegated Officer considers the general provisions of the EP Act and <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> to be sufficient regulatory controls.</p>

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 13 below.

Table 13: 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 14 below.

Table 14: 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 15 below:

Table 15: 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 – Pipe ruptures and overtopping / tank failure of WWTP during operation

8.4.1 Description of pipe ruptures and overtopping / tank failure of WWTP during operation

The release of wastewater to the environment due to pipe ruptures and overtopping and/or tank failure may cause contamination of the surrounding soils.

8.4.2 Identification and general characterisation of emission

Treated wastewater may contain high levels of pathogens and nutrients which have been identified as key environmental hazards.

8.4.3 Description of potential adverse impact from the emission

Improperly treated sewage wastewater may have high biochemical oxygen demand, which can affect natural soil microbial activity, contain dangerous pathogens, excessive nutrients which promote growth of weeds on land or algal blooms in water, or suspended solids which contain toxic organic or inorganic compounds.

8.4.4 Criteria for assessment

The wastewater output characteristics are shown in Table 4 (section 4.1).

Relevant land and groundwater quality criteria include *ANZECC and ARMCANZ, 2000* and the *ASC NEPM*.

8.4.5 Applicant controls

Table 16 outlines the Applicant's controls for the WWTP associated with sewage discharge from pipe ruptures and overtopping / tank failure (Application, 2018 and Kalium, 2018).

Table 16: Applicant’s controls for pipe ruptures and overtopping / tank failure of the WWTP during operation

Site infrastructure	Construction	Operation details																				
<p>WWTP</p>	<ul style="list-style-type: none"> • Situated outside of the 1:100 year flood risk area. • WWTP tanks installed on an impermeable concrete pad. • Installed as per manufacturer specifications. • All storage components impermeable (i.e. fiberglass, concrete or lined with HDPE). • WWTP controlled by an electrical panel positioned in a control room, equipped with an audible and visual alarm system. • Flow meter installed directly on the outlet of the treated wastewater tank. <p>WWTP consisting of:</p> <ul style="list-style-type: none"> • 32 kL enclosed HDPE Balance Tank; • 20 kL Sludge Thickening Tank; • 32 kL enclosed HDPE Irrigation Tank with a minimum storage capacity of three days; and • SBR contained within a 40 foot sealed sea container, which includes: <ul style="list-style-type: none"> - Anaerobic Tank; - Anoxic Tank; - Aeration Tank; - Clarifier Tank; - Chlorine Contact Tank; and - Control Room. 	<ul style="list-style-type: none"> • 300 mm freeboard maintained within each tank to ensure overflow does not occur. • Irrigation Tank will have a minimum of three days storage capacity. • If significant rainfall continues (more than three days) that prevents the discharge of wastewater, the wastewater will be pumped out into water trucks to prevent overtopping. • Sludge collected in the Sludge Thickening Tank to be removed (approximately every 12 months) from the tanks by a licensed carrier and taken for disposal at an appropriately licensed waste facility in accordance with the <i>Environmental Protection (Controlled Waste) Regulations 2004</i>. • The WWTP will meet the following emission standards: <table border="0" style="width: 100%;"> <tr> <td style="width: 70%;">Biochemical Oxygen Demand</td> <td style="width: 30%; text-align: right;"><5 mg/L</td> </tr> <tr> <td>Chemical Oxygen Demand</td> <td style="text-align: right;"><30 mg/L</td> </tr> <tr> <td>Total Suspended Solids</td> <td style="text-align: right;"><5 mg/L</td> </tr> <tr> <td>Total Nitrogen</td> <td style="text-align: right;"><15 mg/L</td> </tr> <tr> <td>Total Phosphorus</td> <td style="text-align: right;"><8 mg/L</td> </tr> <tr> <td><i>E.coli</i></td> <td style="text-align: right;"><1,000 cfu/100 mL</td> </tr> <tr> <td><i>Coliphages</i></td> <td style="text-align: right;"><1 pfu/100 mL</td> </tr> <tr> <td><i>Clostridia</i></td> <td style="text-align: right;"><1 cfu/100 mL</td> </tr> <tr> <td>Residual Chlorine</td> <td style="text-align: right;">0.2 – 2.0 mg/L</td> </tr> <tr> <td>pH</td> <td style="text-align: right;">6.5 – 8.5 pH units</td> </tr> </table>	Biochemical Oxygen Demand	<5 mg/L	Chemical Oxygen Demand	<30 mg/L	Total Suspended Solids	<5 mg/L	Total Nitrogen	<15 mg/L	Total Phosphorus	<8 mg/L	<i>E.coli</i>	<1,000 cfu/100 mL	<i>Coliphages</i>	<1 pfu/100 mL	<i>Clostridia</i>	<1 cfu/100 mL	Residual Chlorine	0.2 – 2.0 mg/L	pH	6.5 – 8.5 pH units
Biochemical Oxygen Demand	<5 mg/L																					
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Total Suspended Solids	<5 mg/L																					
Total Nitrogen	<15 mg/L																					
Total Phosphorus	<8 mg/L																					
<i>E.coli</i>	<1,000 cfu/100 mL																					
<i>Coliphages</i>	<1 pfu/100 mL																					
<i>Clostridia</i>	<1 cfu/100 mL																					
Residual Chlorine	0.2 – 2.0 mg/L																					
pH	6.5 – 8.5 pH units																					

8.4.6 Consequence

Based on the information detailed above and distance to the nearest sensitive receptors and that the wastewater will undergo treatment prior to discharge, the impact of WWTP pipe ruptures and overtopping / tank failure will result in low level on-site impacts. Therefore, the consequence is **minor**.

8.4.7 Likelihood of Risk Event

Based upon the treatment applied to the wastewater and Applicant controls, an environmental impact from the discharge of wastewater associated with pipe ruptures and overtopping / tank failure of the WWTP will not occur in most circumstances. Therefore, the likelihood of the consequence is **unlikely**.

8.4.8 Overall rating of pipe ruptures and overtopping / tank failure of the WWTP during operation

Comparison of the consequence and likelihood ratings described above with the risk rating matrix (Table 13) determines the overall rating of risk for discharges to land from pipe ruptures and overtopping / tank failure of the WWTP during operation to be **medium**.

8.5 Risk Assessment – Treated wastewater discharge to Ten Mile Lake during operation

8.5.1 Description of treated wastewater discharge to Ten Mile Lake during operation

Sewage from the accommodation camp will be treated through a WWTP with treated wastewater potentially discharged to an area on the surface of Ten Mile Lake.

8.5.2 Identification and general characterisation of emission

Treated wastewater may contain high levels of pathogens and nutrients which have been identified as key environmental hazards.

8.5.3 Description of potential adverse impact from the emission

Improperly treated sewage wastewater may have high biochemical oxygen demand, which can affect natural soil microbial activity, contain dangerous pathogens, excessive nutrients which promote growth of weeds on land or algal blooms in water, or suspended solids which contain toxic organic or inorganic compounds.

Potential for water quality of Ten Mile Lake to be impacted with the addition of nutrients and freshwater to a saline / hypersaline ecosystem.

Impact to fringing vegetation, waterbirds and invertebrate fauna with the disposal of treated wastewater to an ephemeral salt lake environment.

8.5.4 Criteria for assessment

The wastewater output characteristics are shown in Table 4 (section 4.1).

Relevant land and groundwater quality criteria include *ANZECC and ARMCANZ, 2000* and the *ASC NEPM*.

8.5.5 Applicant controls

Table 17 outlines the Applicant's controls for the discharge of treated wastewater to Ten Mile Lake during operation (Application, 2018 and Kalium, 2018).

Table 17: Applicant’s controls for treated wastewater discharge to Ten Mile Lake during operation

Site infrastructure	Construction	Operation details
Discharge pipeline	Open HDPE pipeline.	Visual inspection on a regular basis for leaks or damage.
Discharge point on Ten Mile Lake	Discharge point on Ten Mile Lake at E232100 N7258619.	<ul style="list-style-type: none"> • Disposal of treated wastewater will occur as per DoH approval under the <i>Health Act 1911</i>. • Volume of treated wastewater discharged to Ten Mile Lake will be recorded. • Irrigation to Ten Mile Lake will not occur during significant rainfall events to prevent potential discharges to surface water flows.

8.5.6 Consequence

Salt lakes provide potential habitat for a range of waterbird and shorebird species and salt lake endemic species, particularly invertebrates. Limited data on waterbird and aquatic invertebrate fauna at Ten Mile Lake was provided by the Applicant.

The discharge of treated wastewater to the surface of Ten Mile Lake resulting in an impact to avifauna, invertebrate fauna and to the water quality of the saline / hypersaline ecosystem could result in a short term impact to an area of high conservation value. Therefore, the consequence is **major**.

8.5.7 Likelihood of Risk Event

Based on the specified ecosystem information (section 7.3), that Beyondie Lakes connects with Ten Mile Lake during extreme inundation events, the size of the WWTP (throughput of approximately 35 m³/day) and the WWTP emission standards the likelihood of an environmental impact from the discharge of treated wastewater to Ten Mile Lake will not occur in most circumstances. Therefore, the likelihood of the consequence is **unlikely**.

8.5.8 Overall rating of treated wastewater discharge to Ten Mile Lake

Comparison of the consequence and likelihood ratings described above with the risk rating matrix (Table 13) determines the overall rating of treated wastewater discharge to Ten Mile Lake to be **medium**.

8.6 Risk Assessment – Treated wastewater discharge to spray irrigation area during operation

8.6.1 Description of treated wastewater discharge to spray irrigation area during operation

Sewage from the accommodation camp will be treated through a WWTP with treated wastewater discharged to a 5.11 ha spray irrigation area.

8.6.2 Identification and general characterisation of emission

Treated wastewater may contain high levels of pathogens and nutrients which have been identified as key environmental hazards.

8.6.3 Description of potential adverse impact from the emission

Improperly treated sewage wastewater may have high biochemical oxygen demand, which can affect natural soil microbial activity, contain dangerous pathogens, excessive nutrients which promote growth of weeds on land or algal blooms in water, or suspended solids which contain toxic organic or inorganic compounds.

Potential for ponding in the spray irrigation area and impacts to vegetation / soils with the increase in nutrient levels and disposal of freshwater to a saline / hypersaline ecosystem.

8.6.4 Criteria for assessment

The wastewater output characteristics are shown in Table 4 (section 4.1).

Relevant land and groundwater quality criteria include *ANZECC and ARMCANZ, 2000* and the *ASC NEPM*.

8.6.5 Applicant controls

Table 18 outlines the Applicant's controls for the discharge of treated wastewater to a spray irrigation area during operation (Application, 2018 and Kalium, 2018).

Table 18: Applicant's controls for treated wastewater discharge to spray irrigation area during operation

Site infrastructure	Construction	Operation details
Irrigation pipelines	Constructed of HDPE.	Visual inspection on a regular basis for leaks or damage.
Spray irrigation area	<ul style="list-style-type: none"> 5.11 ha. Enclosed with a two strand 1.2 m high wire fence around the perimeter. Danger sign will be fitted to all sides of the fence. Fence will be a minimum of 5 m from the sprinkler spray pattern. 	<ul style="list-style-type: none"> Disposal of treated wastewater will occur as per DoH approval under the <i>Health Act 1911</i>. Volume of treated wastewater discharged to the spray irrigation area will be recorded. Run-off, spray drift or other discharge will not occur beyond the boundary of the irrigation area. Wastewater will be evenly distributed over the irrigation area to prevent soil erosion and pooling. Irrigation to spray irrigation area will not occur during significant rainfall events to prevent potential discharges to surface water flows.

8.6.6 Key findings

Regulatory Services (Water) has made the following recommendations if the Applicant is to discharge treated wastewater to a dedicated spray irrigation area:

- Spray irrigation area must be located at a minimum 100 m away from sensitive water resources (including Ten Mile Lake and water abstraction bores for potable water supply);
- Spray irrigation area must have a minimum 2 m vertical clearance from the highest known water table; and
- Spray irrigation area must not be subject to inundation or flooding.

The controls listed above will be applied to the Works Approval for the construction of the spray irrigation area.

8.6.7 Consequence

Based on the location of specified ecosystems from the spray irrigation area, the discharge of treated wastewater could result in low level on-site impacts and minimal off-site impacts on a local scale, therefore the consequence is **minor**.

8.6.8 Likelihood of Risk Event

Based upon the Applicant's controls, WWTP emission standards and conditions that will be imposed by DWER (Key findings above), an environmental impact due to the discharge of treated wastewater to the spray irrigation area will not occur in most circumstances. Therefore, the likelihood of the consequence is **unlikely**.

8.6.9 Overall rating of treated wastewater discharged to spray irrigation area

Comparison of the consequence and likelihood ratings described above with the risk rating matrix (Table 13) determines the overall rating of treated wastewater discharge to the spray irrigation area to be **medium**.

8.7 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 19 below. Controls are described further in section 9.

Table 19: Risk assessment summary

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)
	Emission	Source	Pathway/ Receptor (Impact)			
1.	Pipe ruptures and overtopping / tank failure of WWTP.	Rupture of pipes. Overtopping of tanks due to failure of equipment.	Discharges to land potentially causing soil contamination.	Refer to Applicant controls as detailed in section 8.4.5.	Minor consequence Unlikely likelihood Medium Risk	Acceptable subject to Applicant's control conditioned. Submission of compliance documentation to ensure that the infrastructure has been constructed as

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)
	Emission	Source	Pathway/ Receptor (Impact)			
						per assessed design. Operational and monitoring requirements for the licence.
2.	Treated wastewater discharge to Ten Mile Lake.	Irrigation of treated wastewater.	Discharges to a surface of Ten Mile Lake potentially altering the water quality of a saline ecosystem. Ponding at the discharge location. Potential impacts to fringing vegetation and the habitat of waterbirds, shorebirds and endemic invertebrate fauna.	Refer to Applicant controls as detailed in section 8.5.5.	Major consequence Unlikely likelihood Medium Risk	Acceptable subject to Applicant's controls conditioned. Submission of compliance documentation to ensure that the infrastructure has been constructed as per assessed design. Operational and monitoring requirements for the licence.
3.	Treated wastewater discharge to a spray irrigation area.	Irrigation of treated wastewater.	Discharges to a spray irrigation area potentially altering the water quality of a saline ecosystem. Ponding, facilitated growth of weeds and potential impacts to vegetation within the spray irrigation area.	Refer to Applicant controls as detailed in section 8.6.5.	Minor consequence Unlikely likelihood Medium Risk	Acceptable subject to Applicant's controls and additional construction requirements (imposed by DWER) conditioned. Submission of compliance documentation to ensure that the infrastructure has been constructed as per assessed design. Operational and monitoring requirements for the licence.

9. Regulatory controls

A summary of regulatory controls determined to be appropriate for the Risk Event is set out in Table 20. 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 Works Approval will be set to give effect to the determined regulatory controls.

Table 20: Summary of regulatory controls to be applied

		Controls (references are to sections below, setting out details of controls)		
		9.1.1 Infrastructure and Equipment	9.2.1 Operational requirements	9.2.2 Monitoring
Risk Items (see risk analysis in section 10)	1. Pipe ruptures and overtopping / tank failure of WWTP	•	•	•
	2. Treated wastewater discharge to Ten Mile Lake	•		•
	3. Treated wastewater discharge to a spray irrigation area	•		•

9.1 Works Approval controls

9.1.1 WWTP and disposal locations (Ten Mile Lake and spray irrigation area) infrastructure and equipment

The following infrastructure and equipment (Table 21) should be constructed to manage the WWTP and discharge locations:

Table 21: Infrastructure requirements for the management of the WWTP and disposal location (Ten Mile Lake and spray irrigation area)

Infrastructure	Requirements (Design and Construction)
WWTP	<ul style="list-style-type: none"> • Situated outside of the 1:100 year flood risk area. • WWTP tanks installed on an impermeable concrete pad. • Installed as per manufacturer specifications. • All storage components impermeable (i.e. fiberglass, concrete or lined with HDPE). • WWTP controlled by an electrical panel positioned in a control room, equipped with an audible and visual alarm

Infrastructure	Requirements (Design and Construction)																				
	<p>system.</p> <ul style="list-style-type: none"> Flow meter installed directly on the outlet of the treated wastewater tank. <p>WWTP consisting of:</p> <ul style="list-style-type: none"> 32 kL enclosed HDPE Balance Tank; 20 kL Sludge Thickening Tank; 32 kL enclosed HDPE Irrigation Tank with a minimum storage capacity of three days; and SBR contained within a 40 foot sealed sea container, which includes: <ul style="list-style-type: none"> Aneraobic Tank; Anoxic Tank; Aeration Tank; Clarifier Tank; Chlorine Contact Tank; and Control Room. Designed and constructed to meet the following emission standards: <table data-bbox="655 1055 1342 1653"> <tr> <td>Biochemical Oxygen Demand</td> <td><5 mg/L</td> </tr> <tr> <td>Chemical Oxygen Demand</td> <td><30 mg/L</td> </tr> <tr> <td>Total Suspended Solids</td> <td><5 mg/L</td> </tr> <tr> <td>Total Nitrogen</td> <td><15 mg/L</td> </tr> <tr> <td>Total Phosphorus</td> <td><8 mg/L</td> </tr> <tr> <td><i>E.coli</i></td> <td><1,000 cfu/100 mL</td> </tr> <tr> <td><i>Coliphages</i></td> <td><1 pfu/100 mL</td> </tr> <tr> <td><i>Clostridia</i></td> <td><1 cfu/100 mL</td> </tr> <tr> <td>Residual Chlorine</td> <td>0.2 – 2.0 mg/L</td> </tr> <tr> <td>pH</td> <td>6.5 – 8.5 pH units</td> </tr> </table> 	Biochemical Oxygen Demand	<5 mg/L	Chemical Oxygen Demand	<30 mg/L	Total Suspended Solids	<5 mg/L	Total Nitrogen	<15 mg/L	Total Phosphorus	<8 mg/L	<i>E.coli</i>	<1,000 cfu/100 mL	<i>Coliphages</i>	<1 pfu/100 mL	<i>Clostridia</i>	<1 cfu/100 mL	Residual Chlorine	0.2 – 2.0 mg/L	pH	6.5 – 8.5 pH units
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<i>Clostridia</i>	<1 cfu/100 mL																				
Residual Chlorine	0.2 – 2.0 mg/L																				
pH	6.5 – 8.5 pH units																				
Ten Mile Lake discharge point and pipeline.	<ul style="list-style-type: none"> Open HDPE pipeline. Discharge point on Ten Mile Lake at E232100 N7258619. 																				
Spray irrigation area and pipeline	<p>Spray irrigation area:</p> <ul style="list-style-type: none"> 5.11 ha. Located at a minimum 100 m away from sensitive water resources (including Ten Mile Lake and water abstraction bores for potable water supply). Minimum 2 m vertical clearance from the highest known 																				

Infrastructure	Requirements (Design and Construction)
	<p>water table.</p> <ul style="list-style-type: none"> • Not be subject to inundation or flooding. • Enclosed with a two strand 1.2 m high wire fence around the perimeter. • Danger signs fitted to all sides of the fence. • Fence will be a minimum of 5 m from the sprinkler spray pattern. <p>Pipelines constructed of HDPE.</p>

9.1.2 Works Approval reporting

The Applicant will be required to submit compliance documentation following the construction of the WWTP. A qualified person will be required to confirm that each item of infrastructure specified in the works approval has been constructed to the specified requirements.

Application, 2018 states that monitoring will be undertaken to validate, operate and verify the WWTP. Validation monitoring will be conducted during commissioning to ensure it adequacy to treat the wastewater to the emissions standards outlined above and to confirm the system is properly set up. This will be conducted by obtaining influent and effluent samples for at least six weeks. The Applicant will be required to analyse these results against the parameters and concentrations in Table 4.

Commissioning of the WWTP is authorised under the Issued Works Approval for a period of no longer than six months following submission of the compliance report.

The Applicant will require an Issued Licence, prior to the operation of the WWTP.

9.2 Licence controls

The following controls will be imposed as conditions on the Issued Licence to manage the risk of emissions during operation at the Premises. It should be noted that these controls are not final and will be subject to compliance with conditions of the Issued Works Approval and may change if additional information becomes available to further inform the risk assessment (as per *Guidance Statement: Risk Assessments*).

9.2.1 Operational requirements for the WWTP and disposal locations

Site Infrastructure	Management controls								
WWTP	<ul style="list-style-type: none"> • Design capacity of 52.5 m³/day. • The wastewater will be treated before being discharged for dust suppression; or to Ten Mile Lake; or to the spray irrigation area. • The WWTP will meet the following emission standards: <table style="width: 100%; border: none;"> <tr> <td style="padding-left: 20px;">Biochemical Oxygen Demand</td> <td style="text-align: right;"><5 mg/L</td> </tr> <tr> <td style="padding-left: 20px;">Chemical Oxygen Demand</td> <td style="text-align: right;"><30 mg/L</td> </tr> <tr> <td style="padding-left: 20px;">Total Suspended Solids</td> <td style="text-align: right;"><5 mg/L</td> </tr> <tr> <td style="padding-left: 20px;">Total Nitrogen</td> <td style="text-align: right;"><15 mg/L</td> </tr> </table>	Biochemical Oxygen Demand	<5 mg/L	Chemical Oxygen Demand	<30 mg/L	Total Suspended Solids	<5 mg/L	Total Nitrogen	<15 mg/L
Biochemical Oxygen Demand	<5 mg/L								
Chemical Oxygen Demand	<30 mg/L								
Total Suspended Solids	<5 mg/L								
Total Nitrogen	<15 mg/L								

Site Infrastructure	Management controls
	<p>Total Phosphorus <8 mg/L</p> <p><i>E.coli</i> <1,000 cfu/100 mL</p> <p><i>Coliphages</i> <1 pfu/100 mL</p> <p><i>Clostridia</i> <1 cfu/100 mL</p> <p>Residual Chlorine 0.2 – 2.0 mg/L</p> <p>pH 6.5 – 8.5 pH units</p> <ul style="list-style-type: none"> • 300 mm freeboard maintained within each tank to ensure overspill does not occur. • Irrigation Tank will have a minimum of three days storage capacity. • Telemetry to record the volumes discharged for disposal. • Sludge to be removed from the WWTP by a licensed carrier and taken for disposal at an appropriately licensed waste facility in accordance with the <i>Environmental Protection (Controlled Waste) Regulations 2004</i>.
Pipelines to Ten Mile Lake and spray irrigation area	Daily visual inspections.
Spray irrigation area	<ul style="list-style-type: none"> • Minimum 2 m vertical clearance from the highest known water table. • Wastewater to be evenly distributed over the spray irrigation area to prevent soil erosion and pooling.

9.2.2 Monitoring requirements for the WWTP

The following conditions may be imposed on the Issued Licence:

- Waste acceptance criteria (including waste type, quantity limit and specifications);
- Monitoring of inputs and outputs (volume – continuous and monthly cumulative); and
- Quarterly monitoring of the treated wastewater including emission standard limits for the discharge of treated wastewater to Ten Mile Lake and the spray irrigation area.

9.2.3 Licence reporting

An Annual Audit Compliance Report will be required to be submitted along with any monitoring data collected as a condition of the Issued Licence.

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*.

Table 22 provides a summary of the conditions to be applied to this works approval.

Table 22: Summary of conditions to be applied

Condition Ref	Grounds
Infrastructure and Equipment Conditions 1, 2, 3, 4 and 5	These conditions are valid, risk-based and contain appropriate controls to ensure linkage between the Works Approval and the EP Act.
Emissions Condition 6	This condition is valid, risk-based and consistent with the EP Act.
Monitoring and Reporting Condition 7 and 8	These conditions are valid, risk-based and reporting requirements to ensure compliance, consistent with the EP Act.
Record-keeping Condition 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 4 September 2018. The Applicant responded on 28 September 2018 (Preston, 2018b) requesting that the tenure of the Premises be changed from E69/3309 to M69/145. DWER has made these changes.

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 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.	Australian Standard AS 1940-2004 The storage and handling of flammable and combustible liquids	AS 1940	accessed at www.saiglobal.com
2.	Beyondie Potash Project, Preliminary Water Supply Assessment (201320-14624), prepared by Advisian for Kalium Lakes Potash Pty Ltd, 14 July 2017	Advisian, 2017	DWER records (A1671337)
3.	Beyondie Project WWTP Works Approval including: 180509 Beyondie SOP Project WWTP_Works approval form_FINAL; and 180509 Beyondie SOP Project WWTP_Works approval_supporting documentation_Final, received from Ayesha Edgar (Preston Consulting), 9 May 2018	Application, 2018	DWER records (A1671324)
4.	Beyondie Sulphate of Potash Project Assessment No. 2138 Minor or Preliminary Works Application, prepared by Preston Consulting Pty Ltd for Kalium Lakes Potash Pty Ltd, 22 March 2018	Preston, 2018a	accessed at www.epa.wa.gov.au
5.	Flora and vegetation survey for the Beyondie Sulphate of Potash Project (Final Report) prepared by Phoenix Environmental Sciences for Kalium Lakes Potash Pty Ltd, February 2018	Phoenix, 2018	DWER records (A1671341)
6.	<i>Guidance Statement: Regulatory principles</i> , Department of Environment Regulation, July 2015	Guidance Statement: Regulatory principles	accessed at www.dwer.wa.gov.au
7.	<i>Guidance Statement: Setting Conditions</i> , Department of Environment Regulation, October 2015	Guidance Statement: Setting conditions	
8.	<i>Guidance Statement: Licence duration</i> , Department of Environment Regulation, August 2016	Guidance Statement: Licence duration	
9.	<i>Guidance Statement: Risk Assessments</i> , Department of Environment Regulation,	Guidance Statement: Risk Assessments	

	Document title	In text ref	Availability
	February 2017		
10.	<i>Guidance Statement: Decision Making</i> , Department of Environment Regulation, February 2017	Guidance Statement: Decision Making	
11.	<i>Guidance Statement: Environmental Siting</i> , Department of Environment Regulation, November 2016	Guidance Statement: Environmental Siting	
12.	Kalium Lakes Spill Management Procedure	Spill Management Procedure	DWER records (A1693768)
13.	National Environment Protection (Assessment of Site Contamination) Measure 1999	ASC NEPM	accessed at www.legislation.gov.au
14.	National Water Quality Management Strategy, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000	ANZECC and ARMCANZ, 2000	accessed at www.environment.gov.au
15.	Northcote, K.H. with Beckmann, G.G., Bettenay, E., Churchward, H.M., Van Dijk, D.C., Dimmock, G.M., Hubble, G.D., Isbell, R.F., McArthur, W.M., Murtha, G.G., Nicolls, K.D., Paton, T.R., Thompson, C.H., Webb, A.A. and Wright, M.J. (1960-1968). Atlas of Australian Soils, Sheets 1 to 10. With explanatory data (CSIRO Aust. and Melbourne University Press: Melbourne)	Northcote, 1960-68	accessed at http://www.asris.csiro.au
16.	Notice of Decision to Consent to Minor or Preliminary Works under Section 41A(3) of the <i>Environmental Protection Act 1986</i> , issued 25 May 2018	CMS14379	accessed at www.epa.wa.gov.au
17.	RE: Applicant Notification – W6149/2018/1 – Draft Instrument and Decision Report, received from Ayesha Edgar (Preston Consulting), 28 September 2018	Preston, 2018b	DWER records (A1724142)
18.	RE: Internal referral to Water – Beyondie Sulphate of Potash Project, Department of Water and Environmental Regulation, Regulatory Services (Water), 6 July 2018	Water, 2018	DWER records (A1701470)
19.	Referral of a Works Approval – Request for comment, received from David Pickles (DBCA), 14 August 2018	DBCA, 2018	DWER records (A1711390)

	Document title	In text ref	Availability
20.	Request for additional information on works approval application for Beyondie Sulphate of Potash Wastewater Treatment Plant – W6149/2018/1, Kalium Lakes, 15 June 2018	Kalium, 2018	DWER records (A1693768)
21.	Terrestrial fauna survey for the Beyondie Potash Project (Draft Report), prepared by Phoenix Environmental Sciences for Kalium Lakes Ltd, March 2017	Phoenix, 2017a	accessed at www.epa.wa.gov.au
22.	Threatened and Priority Fauna List, Department of Biodiversity, Conservation and Attractions	Threatened and Priority Fauna List	accessed at https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals
23.	Waterbird and aquatic invertebrate survey for the Beyondie Potash Project (Final Report), prepared by Phoenix Environmental Sciences for Kalium Lakes Ltd, March 2017	Phoenix, 2017b	accessed at www.epa.wa.gov.au

Attachment 1: Issued Works Approval W6149/2018/1
