



# Works Approval

## *Environmental Protection Act 1986, Part V*

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**Works Approval Holder:**      **Kalium Lakes Potash Pty Ltd**

**Works Approval Number:**    **W5939/2015/1**

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**Registered office:**      8 St Georges Terrace  
PERTH WA 6000

**ACN:**                      601 436 060

**Premises address:**      Beyondie Potash Project  
Part exploration tenement E69/3309  
WILUNA WA 6646  
as depicted in Schedule 1.

**Issue date:**              21 January 2016

**Commencement date:**   25 January 2016

**Expiry date:**              25 January 2021

The following category/s from the *Environmental Protection Regulations 1987* cause this Premises to be a prescribed premises for the purposes of the *Environmental Protection Act 1986*:

Category number	Category description	Category production or design capacity	Approved premises production or design capacity
14	Solar salt manufacturing: premises on which salt is produced by solar evaporation	Not applicable	25 000 tonnes per annual period

### **Conditions**

This Works Approval is subject to the conditions set out in the attached pages.

Date signed: 5 May 2016

.....  
**Tim Gentle**

Manager – Industry Regulation (Resources Industries)  
Officer delegated under section 20  
of the *Environmental Protection Act 1986*



# Works Approval Conditions

## 1 General

### 1.1 Interpretation

1.1.1 In the Works Approval, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.

1.1.2 In the Works Approval, unless the contrary intention appears:

**'Act'** means the *Environmental Protection Act 1986*;

**'CEO'** means Chief Executive Officer of the Department of Environment Regulation;

**'CEO'** for the purpose of correspondence means;

Director General  
Department Administering the *Environmental Protection Act 1986*  
Locked Bag 33  
CLOISTERS SQUARE WA 6850  
Telephone: (08) 9333 7510  
Facsimile: (08) 9333 7550  
Email: info@der.wa.gov.au;

**'Premises'** means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Works Approval;

**'Schedule 1'** means Schedule 1 of [this](#) Works Approval unless otherwise stated;

**'Works Approval'** means this Works Approval numbered W5393/2015/1 and issued under the *Act*;

**'Works Approval Holder'** means the person or organisation named as the Works Approval Holder on page 1 of the Works Approval;

1.1.3 Any reference to an Australian or other standard in the Works Approval means the relevant parts of the standard in force from time to time during the term of this Works Approval.

1.1.4 Any reference to a guideline or code of practice in the Works Approval means the current version of the guideline or code of practice in force from time to time, and shall include any amendments or replacements to that guidelines or code of practice made during the term of this Works Approval.



## 1.2 General conditions

- 1.2.1 The Works Approval Holder shall construct the works in accordance with the documentation detailed in Table 1.2.1:

**Table 1.2.1: Construction Requirements<sup>1</sup>**

Document	Parts	Date of Document
Works Approval Application Form – KLP Salt Processing Facility.	All	22 October 2015
Works Approval Amendment Application – W5939/2015/1, Preston Consulting on behalf of Kalium Lakes Potash Pty Ltd.	All	14 April 2016

Note 1: Where the details and commitments of the documents listed in condition 1.2.1 are inconsistent with any other condition of this works approval, the conditions of this works approval shall prevail.

## 2 Information

### 2.1 Reporting

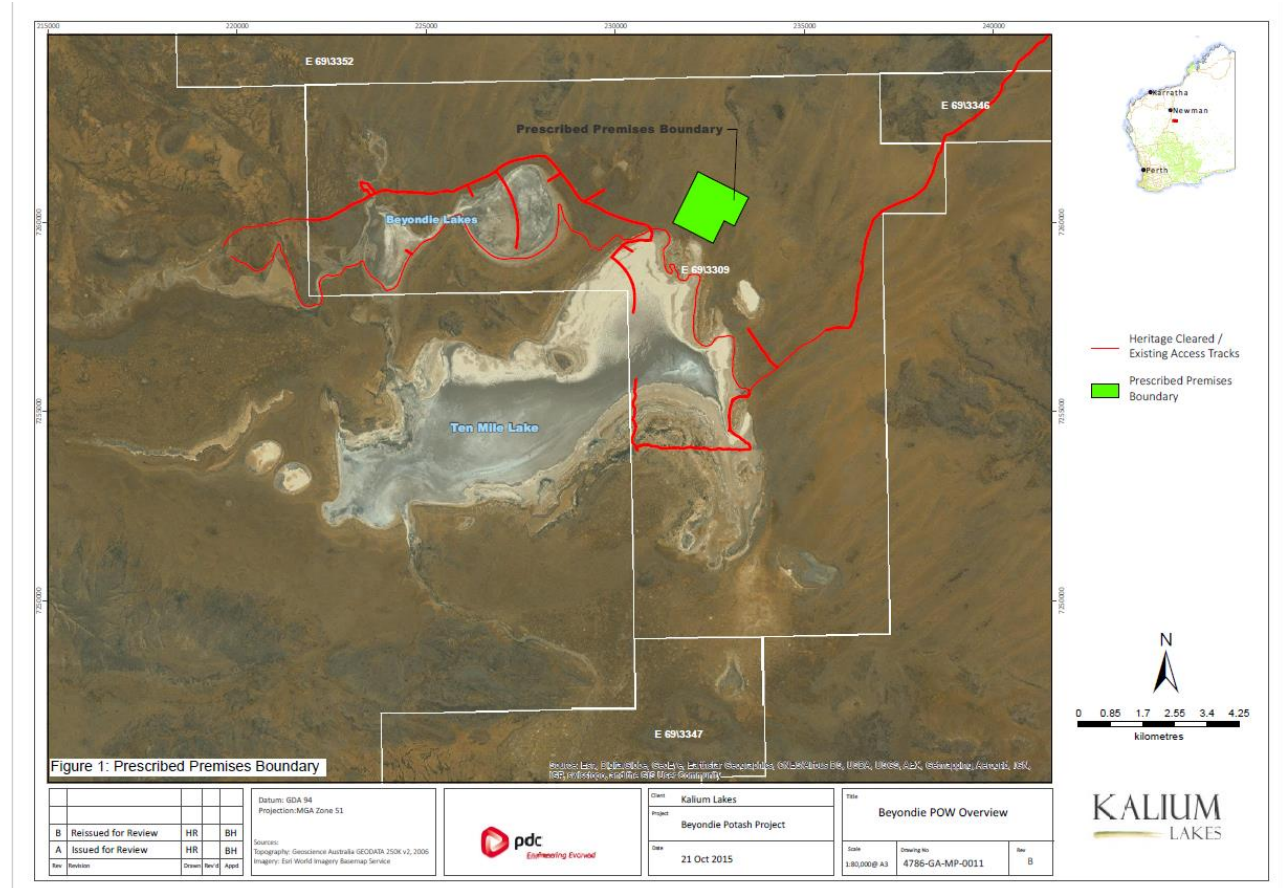
- 2.1.1 The Works Approval Holder shall submit a compliance document to the CEO, following the construction of the works and prior to commissioning of the same.
- 2.1.2 The compliance document shall:
- (a) certify that the works were constructed in accordance with the conditions of the works approval;
  - (b) be signed by a person authorised to represent the Works Approval Holder and contain the printed name and position of that person within the company.



## Schedule 1: Maps

### Premises map

The Premises is shown in the map below. The green shading depicts the Premises boundary.





# Decision Document

## *Environmental Protection Act 1986, Part V*

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**Works Approval:** W5939/2015/1

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### Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER), has decided to issue a works approval. DER considers that in reaching this decision, it has taken into account all relevant considerations and legal requirements and that the Works Approval and its conditions will ensure that an appropriate level of environmental protection is provided.

Decision Document prepared by: Fiona Sharpe  
Licensing Officer

Decision Document authorised by: Tim Gentle  
Delegated Officer



## Contents

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## 1 Purpose of this Document

This decision document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986*. Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

## 2 Administrative summary

Administrative details		
Application type	Works Approval <input type="checkbox"/> New Licence <input type="checkbox"/> Licence amendment <input type="checkbox"/> Works Approval amendment <input checked="" type="checkbox"/>	
Activities that cause the premises to become prescribed premises	<b>Category number(s)</b>	<b>Assessed design capacity</b>
	14 – solar salt manufacturing	25 000 tonnes per year
Application verified	Date: 4 December 2015	
Application fee paid	Date: 16 December 2015	
Works Approval has been complied with	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	
Compliance Certificate received	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	
Commercial-in-confidence claim	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Commercial-in-confidence claim outcome		
Is the proposal a Major Resource Project?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No:





<i>Environmental Protection Act 1986?</i>		Managed under Part V <input type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Is the proposal subject to Ministerial Conditions?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Ministerial statement No: EPA Report No:
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the <i>Environmental Protection Act 1986</i> )?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Department of Water consulted Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If Yes include details of which EPP(s) here.		
Is the Premises subject to any EPP requirements? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If Yes, include details here, eg Site is subject to SO <sub>2</sub> requirements of Kwinana EPP.		

### 3 Executive summary of proposal and assessment

Kalium Lakes Potash Pty Ltd (KLP) is proposing to undertake a 12 month pumping and evaporation trial, known as the Trial Extraction Programme) to test the production of potassium sulphate via an evaporation operation at Beyondie Lakes and Ten Mile Lake (Beyondie Potash Project – the Project). The Trial Extraction Programme will also establish critical operational and resource parameters and enable the conversion of Exploration Licenses to Mining Leases through Department of Mines and Petroleum.

The Trial Extraction Programme will initially involve small scale test pumping of the groundwater resource from 4 – 6 bores, positioned in the Beyondie and Ten Mile paleodrainage channel system and subsequent evaporation of brines in a sequential series of ponds covering up to 145 ha, to recover potassium sulphate. The second component of the Trial Extraction Programme will test the production process that relies on evaporation, concentration, product cleaning and handling. This requires the construction of a small scale series of trial evaporation ponds where the extracted groundwater can be directed and the evaporation and precipitation process tested.

No processing of mixed salts will occur during the Trial Extraction Programme and no bitterns are to be disposed of during the trial period. Trial brine extraction will be used to prove results obtained from laboratory and pilot testwork progress and the steps required to separate the primary salt groups. The initial brine is predominately a mixture of Na-salts, K-salts and Mg-salts. As the brine concentration increases testwork has confirmed that the Na-salts crystallise first and precipitate leaving the K-salts and a mixture of others including Mg-salts. The aim of the trial evaporation ponds is to separate the Na-salts from the remainder, and to create a concentration of K and Mg rich salt crystals ready for final processing into products.

Process water from the bore field will be pumped into Concentrator Ponds at a combined estimated flow rate of around 60 L/s. Three Concentrator Ponds will be consecutively filled. It is expected that a pond will be filled to a depth of 0.5 m in 5 - 7 weeks. Once the Concentrator Pond is filled it will be allowed to evaporate until the original volume has been reduced by 50-60%, which will create a brine with salt concentrations just below the NaCl Crystallisation point.



Trial evaporation ponds will be constructed using local materials with the aim of neat cut to fill and nominal 100 mm top soil removed and stored for closure. The ponds will have a nominal working depth of 1 000 mm and freeboard of 500 mm. The concentrator ponds will have a nominal 1:500 grade while the remainder all have flat bottoms to allow even precipitation and safe harvesting.

An amendment application for the Works Approval was submitted to DER in April 2016 to provide a revised layout of trial ponds within the supporting documentation. The revised layout is as follows:

Original Ponds (Approved in W5939/2015/1)	Original Total Hectares	Updated Ponds (this Works Approval Amendment)	Updated Total Hectares	Reasons for the Change
3 x 20 ha Concentrator Ponds	60	4 x 12 ha Concentrator Ponds	48	Allows two parallel trains to be developed.
2 x 20 ha Sodium Chloride (NaCl) Crystalliser Ponds	40	2 x 6.9 ha NaCl Crystalliser Ponds 2 x 4.8 ha NaCl Crystalliser Ponds	23.4	Allows variations in testing across the two trains.
5 x 6 ha Potassium (K)-salt Crystalliser Ponds	30	2 x 17 ha Leonite Ponds 2 x 6.5 ha KTMS Ponds 2 x 3.6 ha Carnalite Ponds	54.1	These ponds are now defined based on German test work on 3 different K types – Leonite, KTMS and Carnalite. Leonite has a fair amount of NaCl present and therefore the new layout will allow each K type to be treated individually.
-	-	2 x 4.0 ha Mixers	8.0	These ponds have been included to help steady the system during days of high or low evaporation. No treatment occurs within these ponds.
-	-	2 x 0.2 ha Brine Feeder Ponds	0.4	
-	-	2 x 0.2 ha Brine Feeder Ponds	0.4	
<b>TOTAL</b>	<b>130</b>	<b>TOTAL</b>	<b>134.3</b>	

As described in the table, the revised pond layout now includes two parallel trains. The original layout has now been split into two and optimised, thus resulting in a number of smaller ponds to enable testing different parameters in parallel with each other. This greatly improves data that is able to be collected during the trial. The technical process remains the same, in that a mixture of Na-salts, K-salts and MG-salts are progressively evaporated. This amendment does not affect the nature of emissions or discharges for this proposal, hence the original risk assessment is still valid, as outlined in the Decision Table.

The Concentrator Ponds will hold brines extracted from the bore field as the density increases up to “salting point”. This is the point when brines reach sodium chloride (NaCl) saturation point and salt begins to crystallise around the edges of the Concentrator Ponds. At this point the brines would be moved to the NaCl Crystalliser Ponds where NaCl would be deposited. The Concentrator Ponds would be connected to allow brine flow. As evaporation progresses the bore field would input brine into the series of Concentrator Ponds to maintain volume levels. Calcium sulphate (gypsum) would be deposited in Concentrator Ponds in a thin layer over the floor.





The NaCl Crystalliser Ponds will be designed as part of the overall trial evaporation pond series and operated so that NaCl would deposit on the floor of the ponds. The sodium chloride deposited may not economically be feasible to harvest, wash and sell.

The brine leaving the Mixing Pond is pumped via Brine Pump to the K-salt Crystalliser Ponds which is a Leonite, Kainite Type Mixed Salt and finally Carnallite crystalliser in sequential ponds. These raw salts are harvested by the Raw Salt Surface and transported to the purification plant feed stockpile. Harvesting operations would leave a K-salt floor in place of approximately 100-200 mm thickness.



## 4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L = Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
General conditions	No conditions	<b>Construction</b> General conditions for this Works Approval include construction of the trial evaporation ponds in accordance with the Works Approval supporting documentation and submission of a compliance document. This has been amended to include the Works Approval Amendment Application to reflect the revised layout of the ponds.  <b>Operation</b> There are no general conditions required for the licence.	General provisions of the <i>Environmental Protection Act 1986</i>
Premises operation	Conditions	DER's assessment and decision making are detailed in Appendix A.	Application supporting documentation  General provisions of the <i>Environmental Protection Act 1986</i>
Emissions general	No conditions	No general emissions conditions are required.	N/A



<b>Point source emissions to air including monitoring</b>	No conditions	<b>Construction and Operation</b> There are no significant point source air emissions expected from the construction and operation of the trial evaporation ponds. No conditions relating to point source emissions to air or monitoring of these emissions are required for the Works Approval or Licence.	Application supporting documentation  General provisions of the <i>Environmental Protection Act 1986</i>
<b>Point source emissions to surface water including monitoring</b>	No conditions	<b>Construction and Operation</b> There will be no point source emissions to surface water during the construction and operation of the trial evaporation ponds. Containment infrastructure assessment is covered under 'premises operation' section of this table which includes the risk of containment failure. The nearest surface water body is the salt lake, 300 m south of the ponds. The Beyondie March (an ephemeral freshwater lake) is located approximately 10 km to the west of the prescribed premises and will not be affected by the trial ponds. No conditions relating to point source emissions to surface water or monitoring of these emissions are required for the Works Approval or Licence.	Application supporting documentation  General provisions of the <i>Environmental Protection Act 1986</i>
<b>Point source emissions to groundwater including monitoring</b>	No conditions	<b>Construction and Operation</b> There are no significant point source emissions to groundwater expected from the construction and operation of the trial evaporation ponds. No conditions relating to point source groundwater emissions or monitoring of these emissions are required for the Works Approval or Licence.	Application supporting documentation  General provisions of the <i>Environmental Protection Act 1986</i>
<b>Emissions to land including monitoring</b>	No conditions	<b>Construction and Operation</b> There are no significant point source emissions to land expected from the construction and operation of the trial evaporation ponds. No conditions relating to point source emissions to land or monitoring of these emissions are required for the Works Approval or Licence.	Application supporting documentation  General provisions of the <i>Environmental Protection Act 1986</i>



<b>Fugitive emissions</b>	No conditions	<b>Construction and Operation</b> Some fugitive dust may be generated during construction of the ponds via earthworks and traffic movement. However, it is not expected these emissions will be significant and given the remoteness of the site (nearest sensitive receptor is approximately 70 km west of the project area) the risk is low. No conditions are required for the Works Approval or Licence.	Application supporting documentation  General provisions of the <i>Environmental Protection Act 1986</i>
<b>Odour</b>	No conditions	<b>Construction and Operation</b> Odour emissions are expected to be negligible due to the nearest sensitive receptor being the Kumarina Roadhouse, approximately 70 km west of the project area. No conditions are required for the Works Approval or Licence.	Application supporting documentation  General provisions of the <i>Environmental Protection Act 1986</i>
<b>Noise</b>	No conditions	<b>Construction and Operation</b> Noise emissions are expected to be negligible due to the nearest sensitive receptor being the Kumarina Roadhouse, approximately 70 km west of the project area. No conditions are required for the Works Approval or Licence.	Application supporting documentation  General provisions of the <i>Environmental Protection Act 1986</i>
<b>Monitoring general</b>		<b>Construction and Operation</b> No monitoring is required for the construction or operation of the trial evaporation ponds. Therefore no general monitoring conditions apply.	N/A
<b>Monitoring of inputs and outputs</b>	No conditions	<b>Construction and Operation</b> No monitoring of inputs and outputs is required for the Works Approval or Licence.	N/A
<b>Process monitoring</b>	No conditions	<b>Construction and Operation</b> No process monitoring is required for the Works Approval or Licence.	N/A



<b>Ambient quality monitoring</b>		<b>Construction</b> No ambient quality monitoring is required for the construction of the trial evaporation ponds.  <b>Operation</b> As the ponds will be constructed to ensure there is no discharge to the environment, as assessed under 'premises operation', no ambient quality monitoring is required for the operation of the trial evaporation ponds.	N/A
<b>Meteorological monitoring</b>	No conditions	<b>Construction and Operation</b> No meteorological monitoring is required for the Works Approval or Licence.	N/A
<b>Improvements</b>	No conditions	<b>Construction and Operation</b> No improvement conditions are required for the Works Approval or Licence.	N/A
<b>Information</b>	W2.1.1 – 2.1.2  L - conditions	Standard conditions are listed on the Works Approval for the submission of a compliance document at the end of construction.  Standard conditions will be included on the Licence relating to the management of records and complaints, notification requirements and the submission of an annual audit compliance report and annual environmental report are included on the Licence.	N/A
<b>Licence Duration</b>	N/A	The duration of this Works Approval is one year.	<i>Guidance Statement: Licence duration</i>



## 5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
21/12/2015	Application advertised in West Australian (or other relevant newspaper)	No comments	N/A
19/01/2016	Proponent sent a copy of draft instrument	Minor amendments	Amendments made
28/04/2016	Proponent sent a copy of draft amended instrument	No comments	N/A





## 6 Risk Assessment

*Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management*

**Table 1: Emissions Risk Matrix**

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High



## Appendix A

### Premises Operation

#### Emission Description

*Emission:* Potential seepage from the ponds creating groundwater mounding.

*Impact:* This hypersaline leachate may impact on surrounding soil and vegetation.

*Controls:* Ponds will be lined with either HDPE or clay liners in accordance with Department of Water guidelines to achieve a permeability of  $10^{-9}$  m/s. To improve permeability and strength characteristics of the proposed clay liner, a liquid polymer is currently being tested on representative materials from the identified pond site. This polymer effectively changes the surface of clay plates so that instead of being a natural dispersive, clay aggregation is promoted which significantly improves the bearing capacity of clay (ie making it more durable) whilst reducing the permeability of the material. If the test work proves successful then it is likely all evaporation ponds will be clay lined and treated with the polymer. If the required permeability cannot be achieved, then further investigations will be undertaken to establish the risk of impact on the environment from higher seepage rates, and if deemed unacceptable then HDPE liners will be used to mitigate these impacts.

#### Risk Assessment

*Consequence:* Moderate

*Likelihood:* Unlikely

*Risk Rating:* Moderate

#### Regulatory Controls

Containment infrastructure conditions will be included in the licence to ensure a permeability of  $10^{-9}$  m/s is achieved for the lining of the ponds to prevent seepage.

#### Residual Risk

*Consequence:* Moderate

*Likelihood:* Unlikely

*Risk Rating:* Moderate

#### Emission Description

*Emission:* Potential overflow of the ponds caused by over pumping or an extreme rainfall event.

*Impact:* Release of saline concentrate into the surrounding soil and vegetation.

*Controls:* Ponds are designed with an overflow system, which means that ponds will flow into an adjacent pond rather than overflowing into the environment. All ponds will be designed and constructed with a 500 mm freeboard. KLP have taken into account the 1 in 100 year – 72 hour rainfall event in determining the freeboard.

#### Risk Assessment

*Consequence:* Moderate

*Likelihood:* Unlikely

*Risk Rating:* Moderate

#### Regulatory Controls

A freeboard condition will be included in the Licence to ensure it is maintained along with daily inspections of the ponds.



Residual Risk

*Consequence:* Moderate

*Likelihood:* Rare

*Risk Rating:* Moderate

Emission Description

*Emission:* Pond wall failure would lead to spillage of concentrated groundwater

*Impact:* Release of saline concentrate into the surrounding soil and vegetation.

*Controls:* The final pond in the chain will have an emergency overflow to prevent embankment failure. In the event of an overflow, water will be routed along a purpose built drain to Ten Mile Lake. As the ponds are designed to operate with a minimum freeboard of 500 mm, if this were to be exceeded it would be caused by a 1 in a 5 000 year rainfall event. In such an event, the impact to the salt lake is not expected to be significant as there would be massive runoff from the catchment providing dilution.

Risk Assessment

*Consequence:* Moderate

*Likelihood:* Unlikely

*Risk Rating:* Moderate

Regulatory controls

Visual daily inspections of ponds to ensure embankment integrity is intact will be included in the Licence.

Residual Risk

*Consequence:* Moderate

*Likelihood:* Rare

*Risk Rating:* Moderate

Emission Description

*Emission:* Process water from the bore field will be pumped into Concentrator Ponds

*Impact:* Birdlife may be impacted (such as salt encrustation or illness) by the presence of concentrated salts in the ponds as the water evaporates.

*Control:* The chemistry of the ponds will involve the concentrations of contained salts as the water evaporates, which occurs naturally in the lake. The difference will be that the evaporation will be managed so that the majority of the Sodium chloride will precipitate out first, then the Potassium salts and finally the Magnesium salts in different ponds. As all of these salts are pre-existing in the lake and they all precipitate out naturally, there is nothing in the proposed ponds that would not occur naturally at stages in the normal rainfall and evaporation cycle. Thus no impacts are expected for birdlife. There may be some subsurface salts that the birds do not naturally come into contact with due to the extraction, however because of the hypersaline nature of the water and the resultant heat of the fluid, and the fact the water will not contain food for birds, they are unlikely to spend any time in the ponds and therefore the risk from any salts would be low.

Risk Assessment

*Consequence:* Moderate

*Likelihood:* Unlikely

*Risk Rating:* Moderate

Regulatory controls

No specified conditions required. Daily inspections of ponds will provide a visual tool for any impact on birdlife.



Residual Risk

*Consequence:* Moderate

*Likelihood:* Unlikely

*Risk Rating:* Moderate