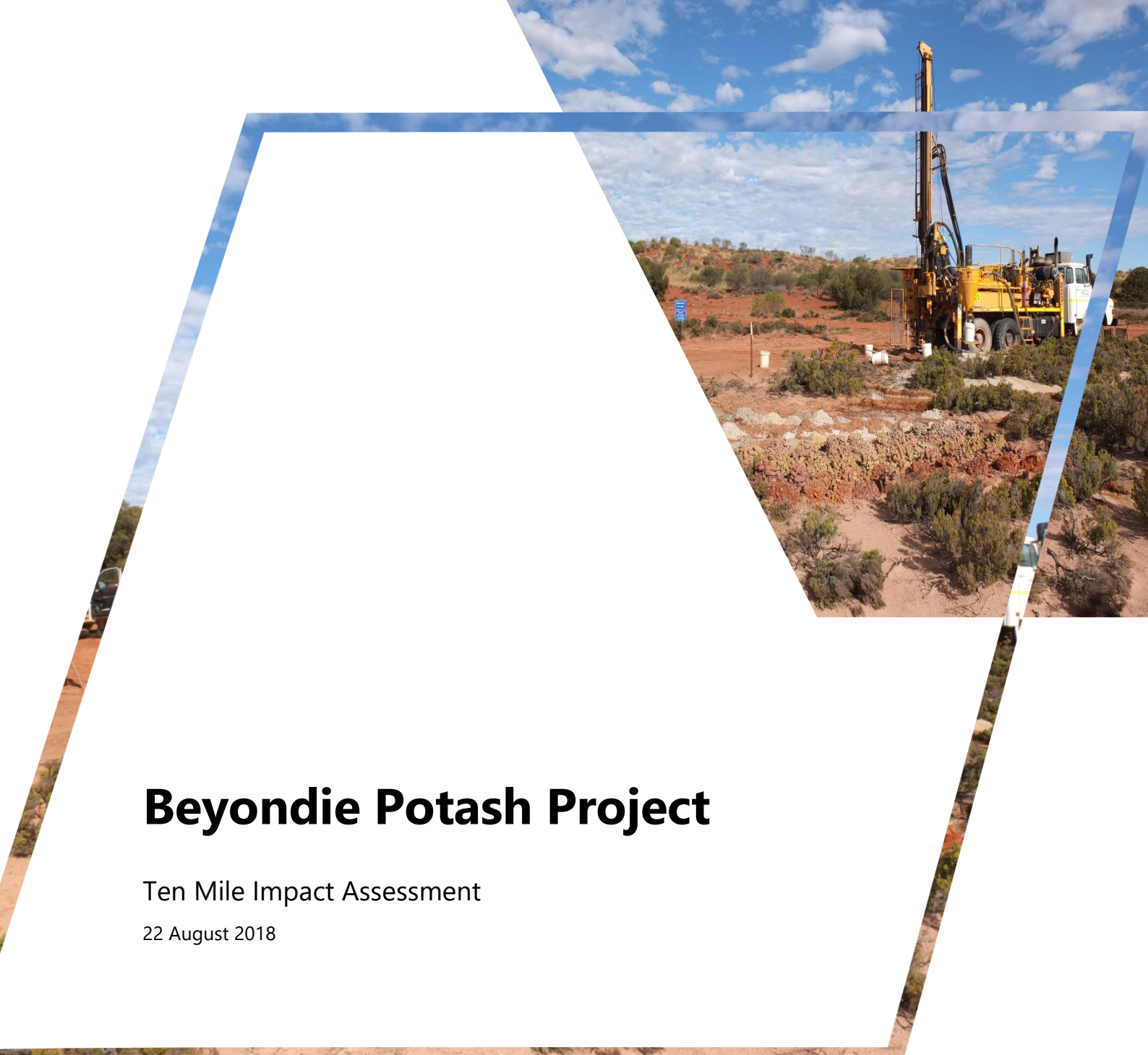




Beyondie Potash Project

Ten Mile Impact Assessment

22 August 2018

Level 4, 600 Murray St
West Perth WA 6005
Australia

201320-14624

www.advisian.com



Advisian

WorleyParsons Group



Disclaimer

This report has been prepared on behalf of and for the exclusive use of Kalium Lakes Ltd, and is subject to and issued in accordance with the agreement between Kalium Lakes Ltd and Advisian.

Advisian accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

Copying this report without the permission of Kalium Lakes Ltd and Advisian is not permitted.

Project No: 201320-14624 – Beyondie Potash Project: Ten Mile Impact Assessment

Rev	Description	Author	Review	Advisian Approval	Date
Rev0	Issued to Support H3 Reports	 A Lloyd	 L Siraz	 pp C Chalmers	23-08-2018



Table of Contents

1	Introduction	4
1.1	Background	4
1.2	Scope	6
2	Groundwater Dependent Vegetation	7
3	Subterranean Fauna	9
4	Groundwater Modelling	9
4.1	PFS Brine Model	9
4.2	BFS Brine Model	11
4.3	Ten Mile South Water Supply Model.....	11
5	Impact Assessment.....	12
6	Management Strategies	16
6.1	Ongoing Monitoring and Management Plan	17
7	Summary	21
8	References	23



1 Introduction

Kalium Lakes Ltd (KLL) has identified a brine resource for Sulphate of Potash (SOP) at its Beyondie SOP Project (BSOPP) in Western Australia. The BSOPP is located in the Eastern Pilbara, between approximately 80 and 280 km east of the Great Northern Highway, extending into the Little Sandy Desert. The BSOPP covers an area of approximately 2,400 km² of granted tenements. The township of Newman is approximately 150 km to the North along the Great Northern Highway, whilst Wiluna is approximately 240 km to the South along the Great Northern Highway. The location of the BSOPP is presented in Figure 1-1.

The BSOPP requires a brine supply to feed the evaporation ponds and a process water supply, as part of the processing of the salts following evaporation, to produce the product. The current estimated brine demand is between 7 and 15 Gigalitres / annum (GLpa) and a process water demand is between 0.7 and 1.5 GLpa for an equivalent 75,000 or 150,000 tonnes per annum (tpa) production rate of SOP.

The BSOPP is anticipated to commence at 75,000 tpa and expand up to 150,000 tpa within the first 3 to 7 years of operations. Abstraction of brine will be via borefields located within the deep palaeochannel and weathered bedrock aquifers and from trenches sunk within the surface of the lakes.

Process water supply borefields have been identified from shallow alluvial and calcrete aquifers at Ten Mile South, between 15 and 30 km to the south of the process plant and Kumarina, 80 km to the west near the Kumarina Roadhouse along the project's main access road.

1.1 Background

KLL have submitted H3 Level Hydrogeological Assessment Reports to the Department of Water and Environmental Regulation (DWER) in support of brine and process water supply abstraction licence applications. Preliminary comments were received from DWER on the Brine abstraction from Ten Mile Lake (Comments received in email from Chris O'Boy, via Mitchel Ong dated 04/07/2018 on Advisian 2017), these included:

- Abstraction from trenches in the Ten Mile Lake surficial aquifer (Figure 7-8) have predicted maximum drawdown impacts of about 0.5 to 1.5 m in areas where investigations indicate the groundwater in calcrete bodies is brackish to fresh. Acceptable impacts on potential stygofauna in this area will need to be formally evaluated now for the later stages of the project and then monitored as the project proceeds.
- On page 55, it is reported that there are no known ecosystems dependent on the surface expression of groundwater within 30 km radius of the Project. However, phreatophytes might be dependent on groundwater up to about 20 m below ground level. The extent of drawdown will need to be assessed to determine if any potential GDEs might be impacted.
- Section 8.1, Table 8-2, the recommended monitoring plan is very general and will need to be a lot more specific with regard to the monitoring program and the setting of trigger levels. The



proposed preliminary monitoring, Table 8-3, looks fine but does not mention subterranean fauna.

- The groundwater models appear to be acceptable but might need to be updated with additional scenarios run depending on the criteria for stygofauna or if new investigation data necessitates further work. A full review of each model is required to be reported on by the modellers in full accordance with Chapter 9, Reviews, of the Australian groundwater modelling guidelines (NWC, 2012).

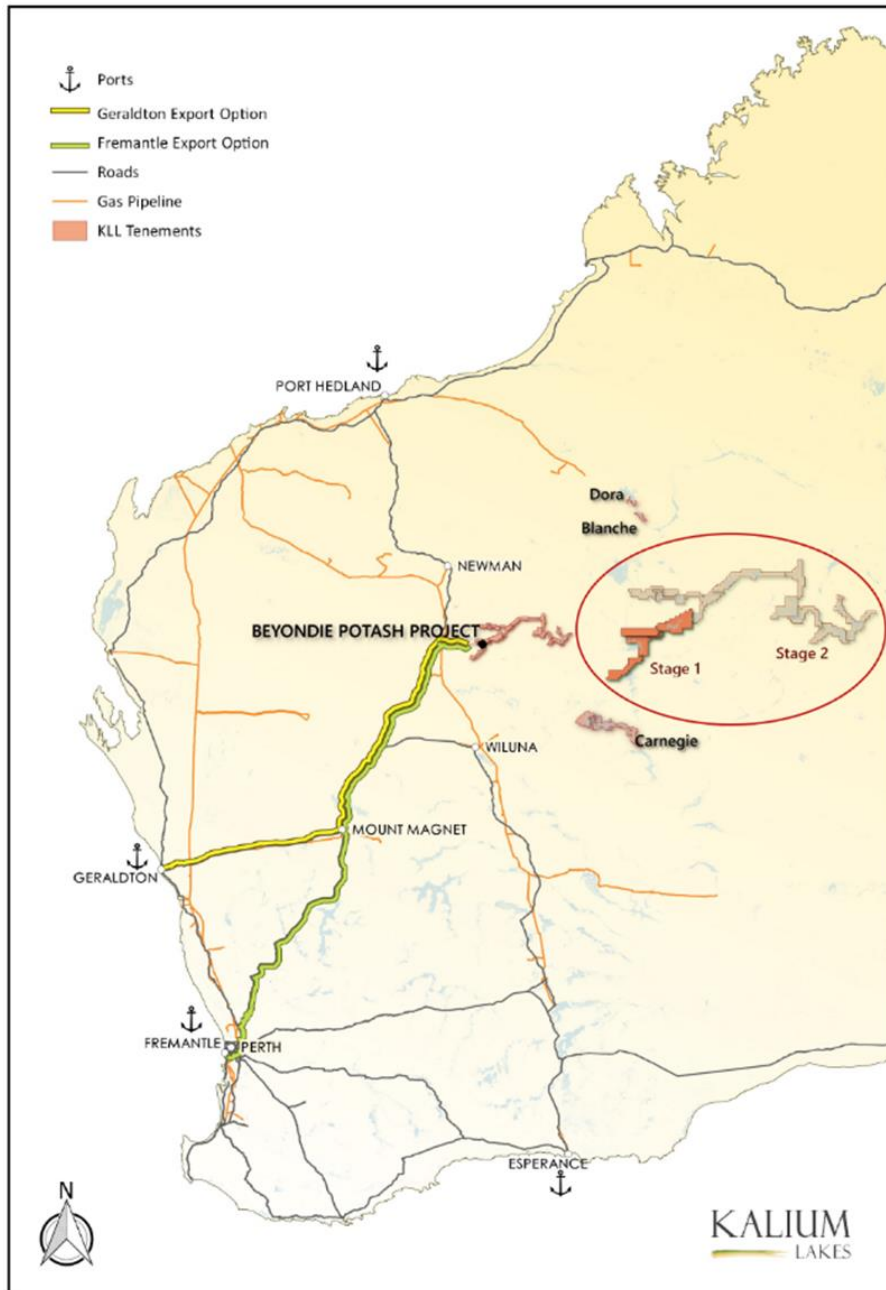


Figure 1-1: BSOPP Location

1.2 Scope

The scope of this document is to address the DWER comments by quantifying the impacts to potential groundwater vegetation and stygofauna due to the combined operation of the Ten Mile South Borefield and brine abstraction at Ten Mile Lake.

The following documents are referred to throughout this document:

- *Ten Mile South and Beyondie Water Supply Project, H3 Level Hydrogeological Report, 201220-14624-Ten MileS_Beyondie_H3Report, prepared by Advisian, July 2018.*
- *Beyondie Potash Project – Ten Mile and sunshine Lakes, Hydrogeological Assessment of Brine Abstraction, 201320-14624, Prepared by Advisian, December 2017.*

The BSOPP Bankable Feasibility Study (BFS) is nearing completion, as part of the BFS the brine models developed and presented in Advisian 2017 and 2018 have been updated to include a highly refined geological model and updated mine plan. This report is currently in preparation, however the following sections provide a review of the available data and recent modelling outputs.

Figure 1-2 shows the general location of the KLL exploration tenements and the tenement boundaries of the Project in the vicinity of Ten Mile and Beyondie Lakes.

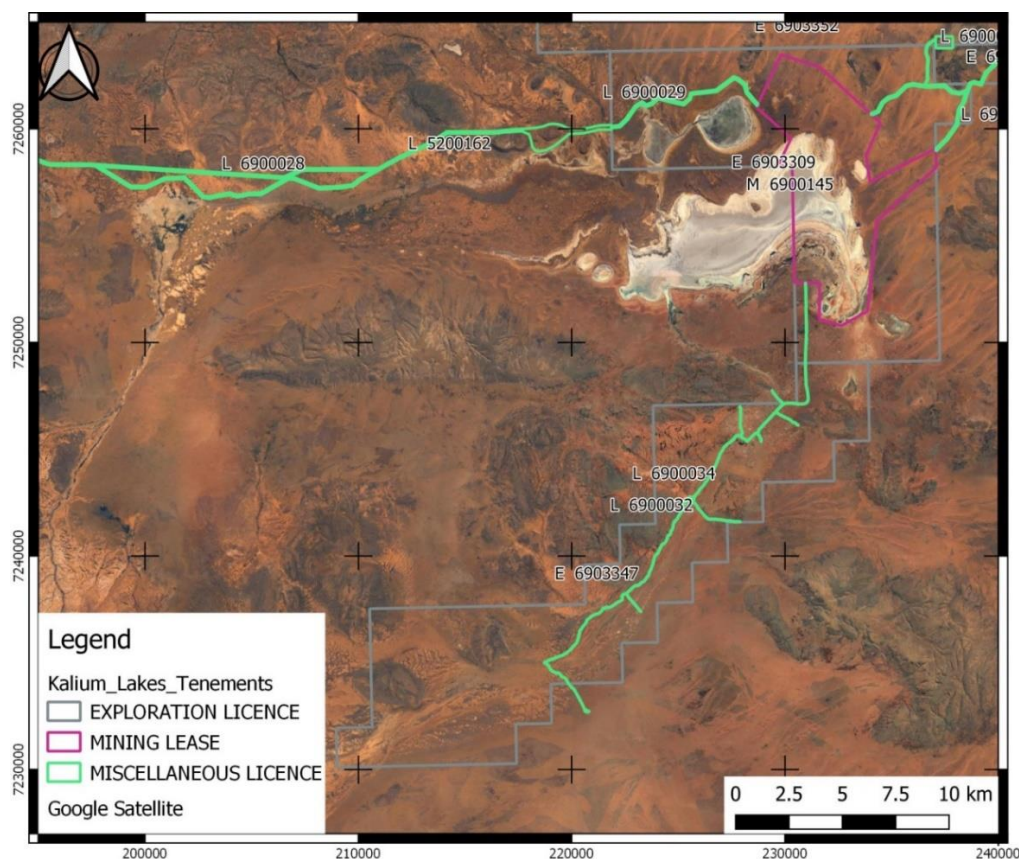


Figure 1-2: Project Location Map showing KLL's Tenements at Beyondie and Ten Mile Lakes



2 Groundwater Dependent Vegetation

The vegetation in the direct vicinity of Ten Mile Lake and Beyondie Lakes was documented in a flora and vegetation report prepared by Phoenix in 2015 (Phoenix, 2015b, 2017). The objectives of the surveys were to define the flora and vegetation values of the Lake areas, in particular with respect to conservation significant species and communities to inform planning and an environmental impact assessment of the Project. No Threatened Ecological Communities (TEC) or Environmentally Sensitive Areas (ESA) were located within close proximity to the study area. Regional vegetation mapping by Shepherd et al. (2002) were reported in the Flora and vegetation survey report by Phoenix Environmental (2017).

A total of 19 vegetation types were defined for the lake areas comprised of woodland communities, shrublands and grasslands. The majority of the vegetation in the study area was concluded to represent widespread communities, well represented at a regional level. Most of the area is dominated by *Low Acacia spp.* (mulga) woodland over low to mid shrubland over isolated low grasses. The area is dominated by Open *Acacia—Corymbia* shrubland, low woodland, *Triodia* grassland and open *Acacia aneura—A.pruinocarpa* shrubland. Large (to 15 m tall) trees such as *Eucalyptus victrix*, *Corymbia terminalis* also occur over an understorey (Phoenix, 2015b).

Eucalyptus victrix trees are usually found along the drainage features, the presence of which can indicate that a vegetation community may potentially be partially dependent on groundwater. *E. victrix* uses soil moisture content derived from surface water drainage into the unsaturated zone but may obtain some of their water requirements from the groundwater table where it is available, particularly large mature trees.

Mid *Eucalyptus camaldulensis* woodland over low open *Acacia aneura* and *A. pteraneura* forest over sparse mid *Acacia spp.* Shrubland are also reported. An assessment of water level ranges of Pilbara riparian species has found that the mean minimum groundwater level depth of *E. victrix* was greater than that for groundwater dependent species *Eucalyptus camaldulensis* (River Red Gum), providing support for the view that *E. victrix* is found in slightly drier areas than *E. camaldulensis* and may not be as responsive to water table fluctuations (Loomes, 2010).

The only areas that may have potentially groundwater dependent vegetation within the Project area is along the alluvial deposits of Ten Mile South Creek. Sparsely populated mature *Eucalyptus* trees are located within the dry creek bed for approximately 6 km downstream of the northern extent of the proposed Ten Mile South Borefield (Advisian 2018), as presented in Figure 2-1.



Figure 2-1: Potential Groundwater Dependent Vegetation within Ten Mile South



3 Subterranean Fauna

A subterranean fauna desktop review and Level 1 subterranean fauna survey was conducted by Phoenix Environmental Sciences Pty Ltd (Phoenix) for the BSOPP in March 2017 (Phoenix 2015 and 2018a). The Level 1 survey recorded stygofauna in the alluvial aquifers of the Beyondie and Ten Mile South Freshwater Development Envelope (FDE) areas. None of the species identified in the Level 1 survey were recorded species. This triggered the need for a Level 2 stygofauna survey for the FDE component of the BSOPP consistent with Environmental Protection Authority (EPA) guidelines for subterranean fauna. Subsequently, a Level 2 stygofauna survey was conducted (Phoenix, 2018) supplementary to the Level 1 survey.

The study concluded that within the Ten Mile South FDE the taxa were typically from those less widespread groups and were restricted to the southern half of a massive calcrete formation. These taxa were absent from the northern half of the calcrete formation (closer to Ten Mile Lake where groundwater salinity increases significantly) and to the south of the FDE area within the alluvial flood plain that feeds the calcrete formation.

It was recommended that precautionary approach should be taken when abstracting water from bores within the southern half of the Ten Mile South calcrete formation until further distributional information on the stygofauna community is available. Such an approach would likely involve the maintenance of a minimum level of calcrete saturation via trigger levels and groundwater monitoring (Phoenix, 2018).

4 Groundwater Modelling

4.1 PFS Brine Model

The predictive modelling from the PFS at Ten Mile Lake, as presented in Advisian (2017), indicated that brine recovery from trenches in the lake surface would decline from 170 Litres per second (L/s) in the first year to 70 L/s by year 10 and 46 L/s by year 20. The potassium grade recovered from within the Ten Mile Lake area was estimated to be 9,160 milligrams per litre (mg/L) in the first year, 8,200 mg/L in Year 5, 6,500 mg/L in Year 10 and 6,000 mg/L in Year 20. An additional simulation used a recharge of 165 mm over the lake surface for a single day each year to simulate the effects of inundation over the lake, and indicative of inundation level over the lake surface for an event with an annual exceedance probability of 63.2%. It showed the brine recovery from the trenches increased to an average of 134 L/s over the first 5 years, and had average rates of 93, 86 and 84 L/s over the subsequent 5 year periods. This simulation is considered representative of annual on lake flooding events.

The model indicated that an average 30 L/s of brine recovery from the confined palaeochannel aquifer was sustainable over 20 years. The potassium grade recovered from the indicated resource zone was 7,300 mg/L in the first year, declining to 6,900 mg/L in Year 5, 6,300 mg/L in Year 10 and 4,500 mg/L in Year 20.



At Ten Mile Lake, aquifer drawdown over the mine life of 23 years is up to 55 m in the confined aquifer and 6.5 m in the unconfined aquifer at the trench abstraction points. The two aquifer systems are considered separated by a thick confining sequence of clay. Surficial aquifer drawdown at the end of mine life is presented in Figure 4-1. Modelled maximum drawdowns from brine extraction have been overlaid on the mapped calcrete extents and water quality as Total Dissolved Solids (TDS).

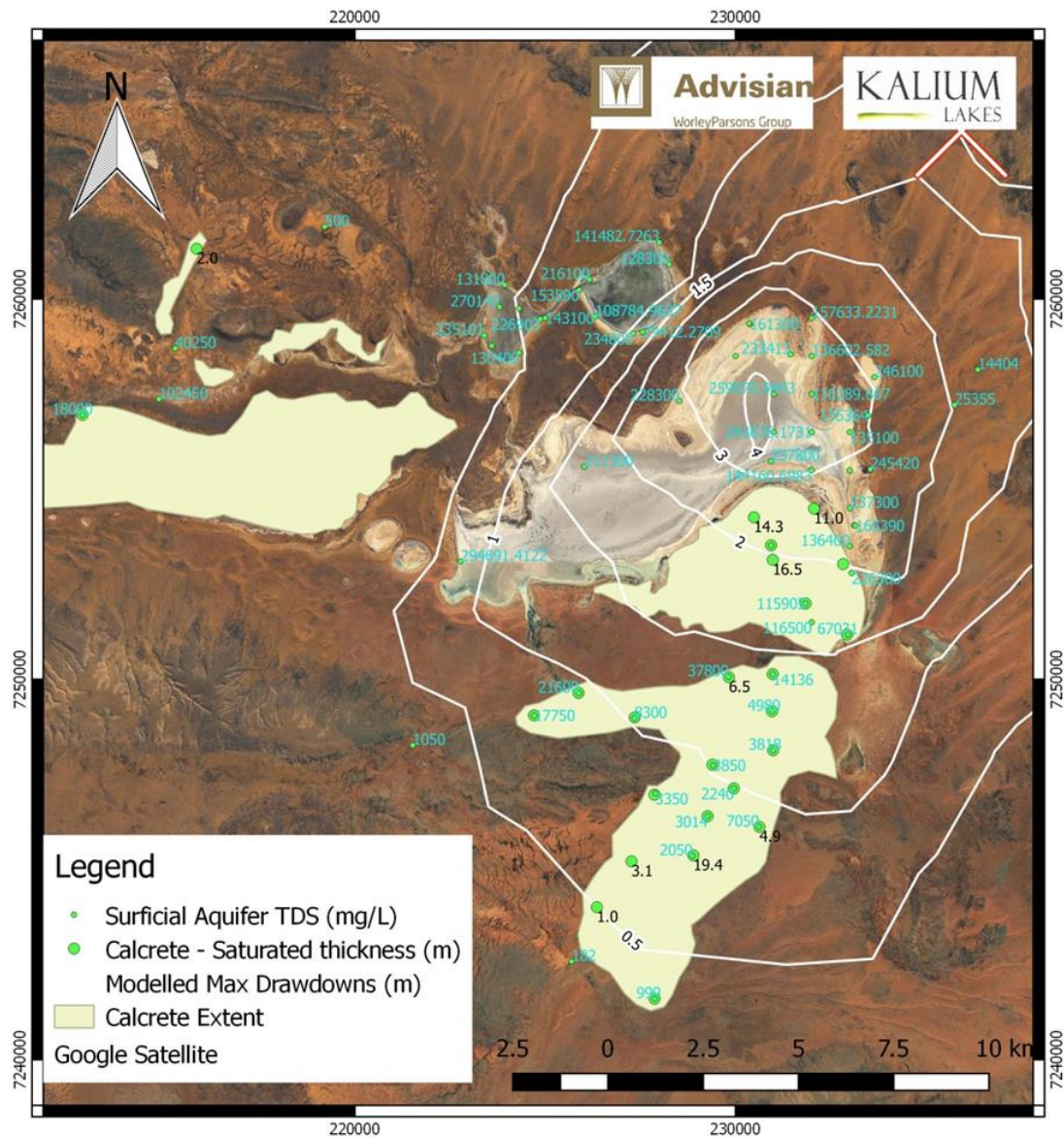


Figure 4-1: Surficial Aquifer Drawdown Simulated in the PFS (Advisian 2017)



4.2 BFS Brine Model

The Bankable Feasibility Study (BFS) brine model for Ten Mile has been updated with the geological modelling for the updated resource estimate based on an additional 95 exploration drill holes, six months' worth of additional pumping data and four borehole magnetic resonance (BMR) logs. The revised hydrogeological characterisation and model reports are in progress; however, the drawdown contours have been exported for the 75 ktpa and 150 ktpa scenarios; these are presented Figure 5-1 to Figure 5-4.

The main differences between the Pre-Feasibility Study (PFS) model and the BFS model is that drawdown extents have been reduced as a result of increased specific yield (Sy) in the surficial aquifer outside of the lake area. This has come about by the hydraulic properties measured by the BMR logging that was completed.

4.3 Ten Mile South Water Supply Model

The BFS model was refined in the area of the water supply borefield and used to complete the water supply calibration and simulation. Test pumping calibration was highly variable due to the large differences in pumping responses seen the calcreted alluvium bores and those in the alluvium to the south. The completed calibration was considered conservative given the simulated to observed responses in the calibration hydrographs.

A number of predictive abstraction scenarios were completed to understand the most optimal scenario for the borefield yield and impact assessment. The results from the 1.5 GLpa modified scenario (Scenario 3) was considered a potentially feasible option and was used to complete the impact assessment, based on the results from the modelling.

The borefield configuration was determined from Scenario 3 with the aim of reducing the modelled volume and drawdowns in the calcreted alluvium and increasing the number of bores and thereby abstraction volumes from the southern alluvium to maintain groundwater levels within the calcreted alluvium.

Modelled results indicate that the average loss in saturated thickness is between 30% and 40% in the calcreted alluvium at the end of 10 year and 23 year periods respectively. The saturated aquifer thickness after ten years of abstraction remains approximately >70% and at the end of the Life of Mine (LoM (23 years)) at approximately 60%, based on an abstraction volume on 1.5 GL/a.



5 Impact Assessment

The impact assessments presented in the Brine H3 (Advisian 2017) and Ten Mile South H3 (Advisian 2018) reports did not show the potential for interaction of drawdown cones between the two borefields during operations. This impact assessment presents the modelled drawdowns from both the brine abstraction and the freshwater abstraction scenarios at years 10 and 23 in the mine plan, as shown in Figure 5-1 to Figure 5-4.

For reference the salinity distribution in the Surficial Aquifer is presented in Figure 5-5. This shows that the brackish interface is at the northern edge of the southern calcrete.

These figures indicate that the predicted drawdown cones have very limited interaction for both the 75 and 150 ktpa scenarios over 23 years of operations. This is mainly due to the non-continuous nature of the calcrete directly to the south of Ten Mile Lake which propagates drawdown where present, but limits drawdown where not present, thereby creating a buffer to the Ten Mile South calcrete. The increase in abstraction from 75 to 150 ktpa is also only marginal from the Surficial Aquifer trenches, therefore equates to only a marginal increase in drawdown.

At the 150 ktpa SOP production rate the maximum predicted drawdown is less than 0.1 m from the brine abstraction in the vicinity of the potentially groundwater dependent vegetation and calcrete. It is therefore considered that the cumulative impacts between both drawdown cones are minor and the impact assessment presented in the Ten Mile South H3 (Advisian 2018) is applicable.

In addition, the drawdown cone for the Ten Mile South borefield is considered conservative as operationally the demand for the first 3 to 7 years will be 0.7 GLpa based on the initial 75 ktpa throughput of the processing plant, instead of the 1.5 GLpa used in the scenario modelling. Therefore, drawdown impacts at Ten Mile South during the early mine life are considered to be less than those presented.

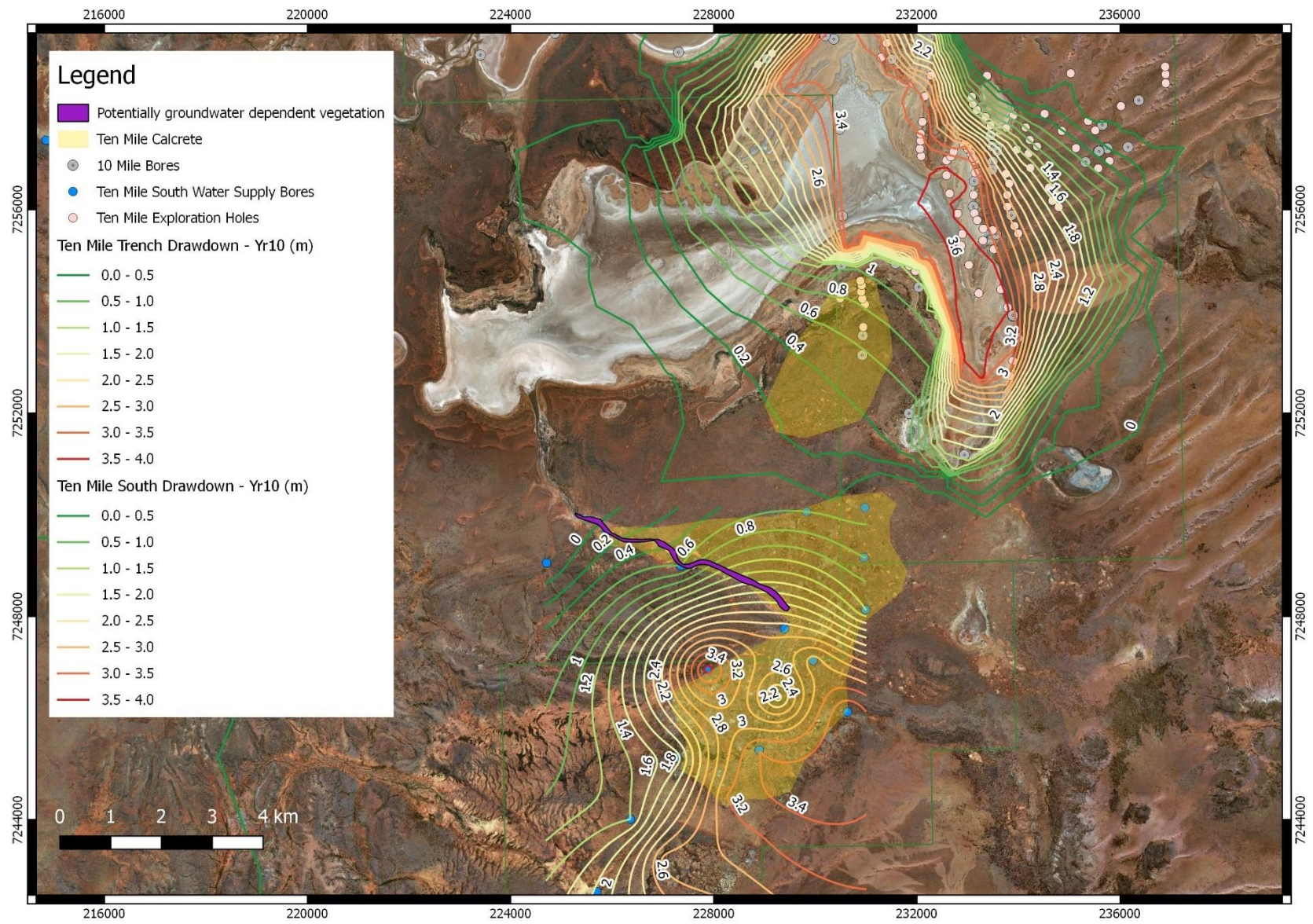


Figure 5-1: Projected surficial aquifer drawdown at Year 10 at 75 ktpa SOP production

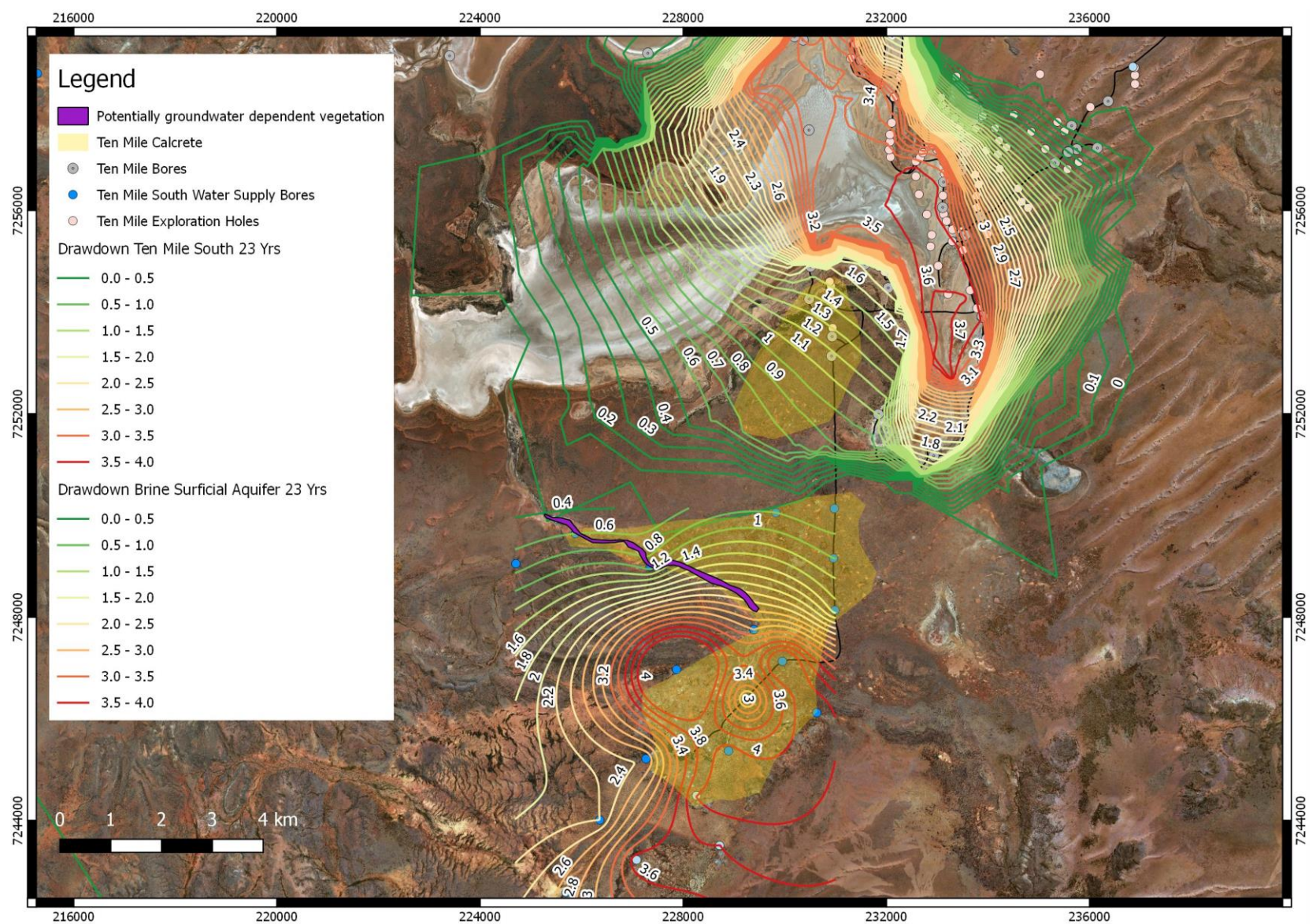


Figure 5-2: Projected surficial aquifer drawdown at Year 23 at 75 ktpa SOP Production

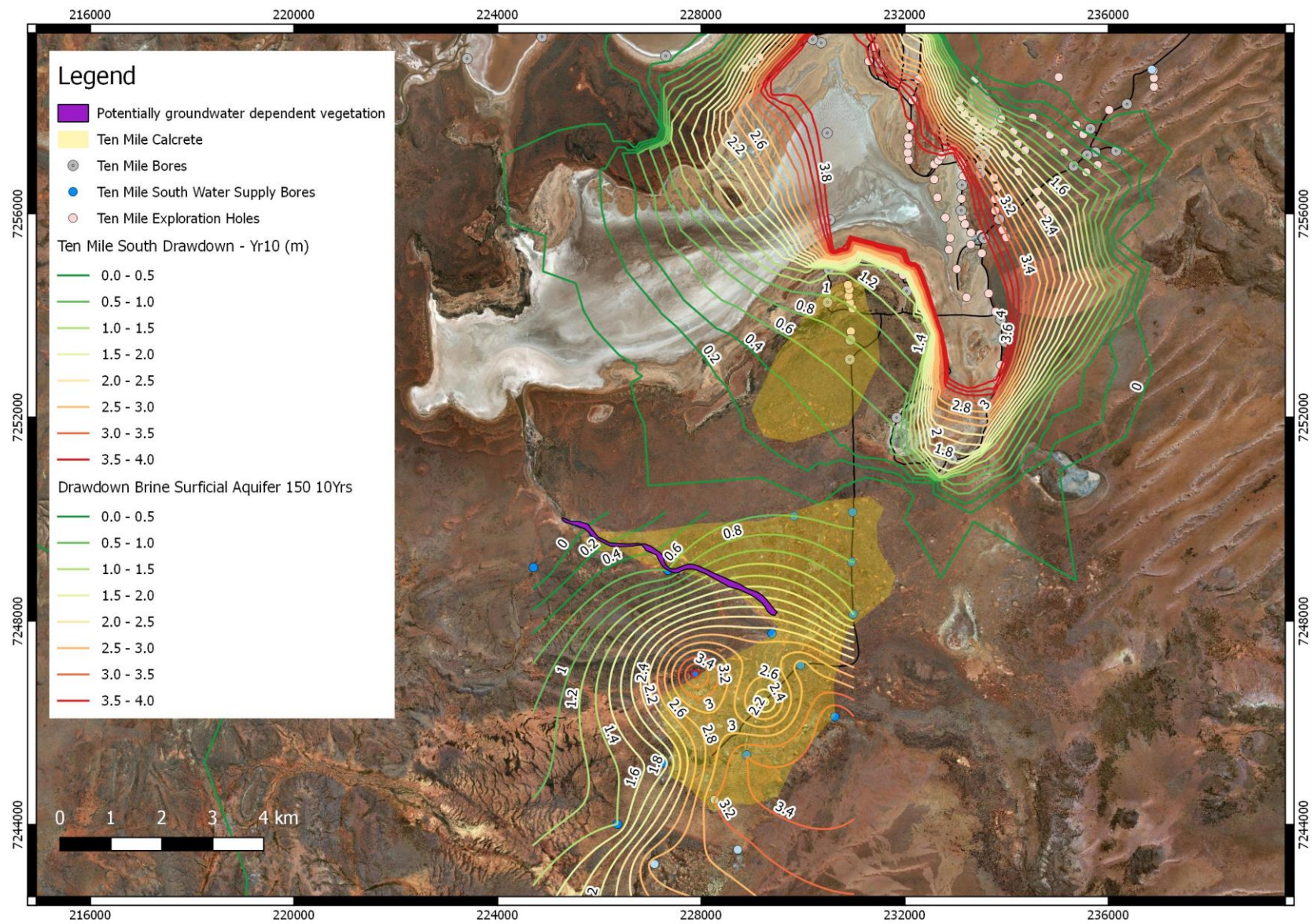


Figure 5-3: Projected surficial aquifer drawdown at Year 10 at 150 ktpa SOP Production

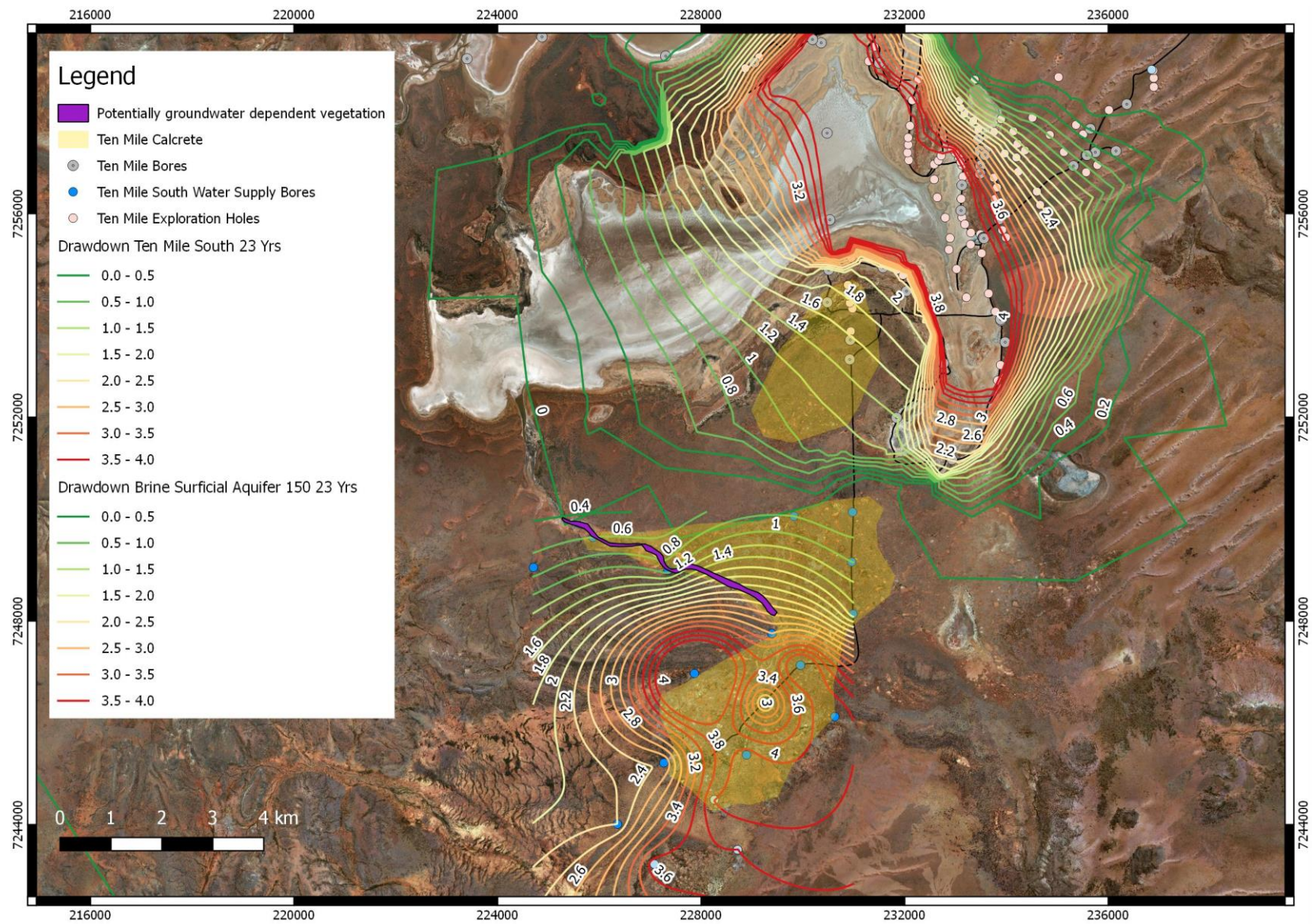


Figure 5-4: Projected surficial aquifer drawdown at Year 23 at 150 ktpa SOP Production

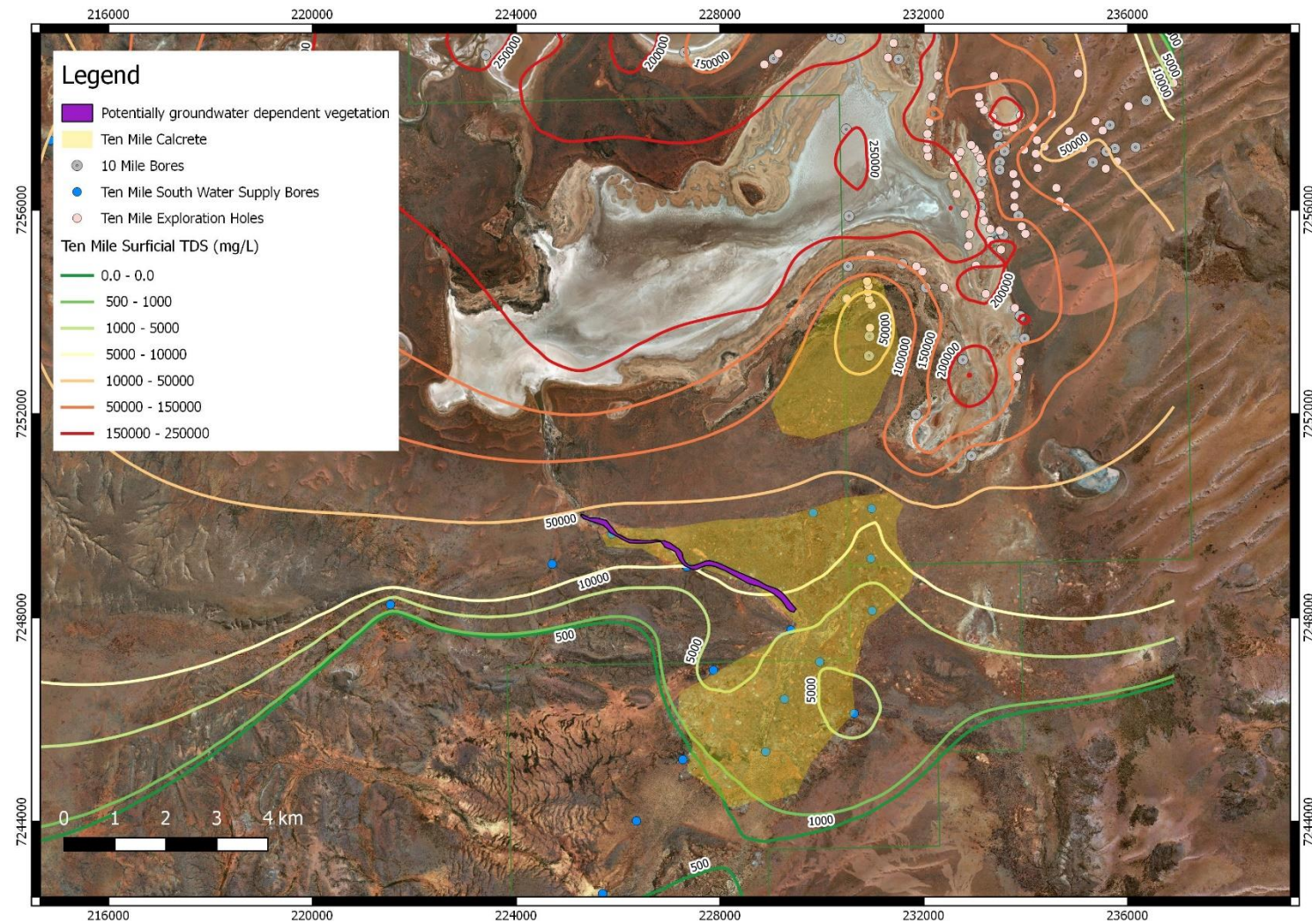


Figure 5-5: Surficial aquifer salinity distribution south of Ten Mile Lake

6 Management Strategies

KLL's management approach for minimising potential impacts is outlined in Table 6-1. This section is updated from the H3 Reports to reflect both the abstraction brine and water supply abstraction at Ten Mile and Ten Mile South respectively.

It is considered that this is a preliminary monitoring plan and a more detailed plan will be provided as part of a future Operating Strategy.

Table 6-1: Summary of Management Strategies

Potential Impact Identified	Recommendation	Management Strategy
Aquifer Drawdown	- Continue baseline monitoring - Undertake continuous monitoring of selected monitoring bores using loggers connected to the site wireless network - Undertake monthly monitoring of all completed monitoring bores - Set trigger levels (for calcreted alluvium) at all monitoring bores - Verify and re-calibrate the numerical model after one or two years of operation and revise drawdown predictions and reset trigger levels	- Borefield optimisation and management - Alter extraction volumes and schedules to manage drawdowns - Use the Ten Mile borefield in parallel with the Kumarina Borefield to optimise abstraction strategy, as needed
Groundwater availability and / or impacts to other groundwater users	- Undertake regional monitoring of station bores - Re-calibrate the numerical model after one or two years of operation and revise drawdown predictions	
Subterranean Fauna	- Set trigger levels - Undertake annual stygofauna monitoring for the first two years of operation to characterise the population and verify the sustainability of the population - Validate and if necessary, re-calibrate the numerical model after one to two years of operation of the borefield and revise	- Monitoring and sampling Plan - Use the Ten Mile borefield in parallel with the Kumarina Borefield to optimise abstraction strategy for water supply, as needed



Potential Impact Identified	Recommendation	Management Strategy
	drawdown predictions and revise trigger levels, if needed	
Potentially Groundwater Dependent Vegetation	- Set trigger levels based on the modelling provided in the H3 report and supplemental data presented in this document - Undertake seasonal vegetation condition monitoring program if drawdown is identified in the vicinity of potentially groundwater dependent vegetation - Validate and if necessary, re-calibrate the numerical model after one or two years of operation of the borefield and revise drawdown predictions and reset trigger levels, if needed	- Monitoring and sampling Plan - Use the Ten Mile borefield in parallel with the Kumarina Borefield to optimise abstraction strategy for water supply, as needed - optimise abstraction strategy
Contaminant risks to shallow aquifer and the environment from site operations	- Use solar power supply where appropriate - Appropriately contained and bunded fuel storage - Implement a spill- prevention and spill-response strategy - Include hydrocarbon- indicator analytes in the monitoring program near potential fuel storage areas - Assess contamination at regular intervals and analyse for indicator analytes in the vicinity of potential anthropogenic activities	- Contamination response plan - Spill response strategies

6.1 Ongoing Monitoring and Management Plan

The monitoring program shall be designed as outlined in Table 6-2 and Table 6-3.

Table 6-2: Recommended Monitoring Plan

Management Activity	Description
Undertake baseline monitoring	➤ A baseline monitoring network has been established for the site. Monthly monitoring of water levels and field chemistry to be undertaken in line with licence conditions. ➤ Continuous water level monitoring loggers will be used at key monitoring locations.



Management Activity	Description																		
	➤ Monitoring Locations include: - All production bores - Calcreted alluvial monitoring locations: - TMAC11M2, TMAC23M2, MB-S1, MB-S4, MB-S7, MB-S8, MB-S9, MB-S10, MB-S12, MB-S15, MB-S19, MB-S20, MB-S21, MB-S22, MB-S23 - Alluvium monitoring locations – All Ten Mile Surficial Aquifer Monitoring bores (TMAC24M2, TMAC26M2, TMAC09M2, TMAC12M2, TMAC13M2, TMAC14M2, TMAC21M2, TMAC22M2, TMAC16M2, TMAC28M2, WB11MBS, TMAC27M2), all Ten Mile South Alluvium Monitoring Bores (MB-S16, MB-S17, MB-S18, MB-S24, MB-S27, MB-S29, MB-W9, MB-W10, MB-W12, MB-W13) - Confined Aquifer monitoring locations – All Ten Mile deep aquifer monitoring bores (TMAC24M1, TMAC26M1, TMAC15M1, TMAC09M1, TMAC11M1, TMAC12M1, TMAC13M1, TMAC14M1, TMAC21M1, TMAC22M1, TMAC23M1, TMAC16M1, TMAC28M1, WB11MBD, WB12MBD, TMAC27M1)																		
Establish trigger Levels	➤ Stop pumping trigger levels for water levels have been proposed for consultation with DWER. ➤ Management trigger levels of water quality have been proposed based on a 30% increase in salinity (TDS) compared to baseline water quality, in key monitoring locations. ➤ Trigger levels will be documented in a Groundwater Licence Operating Strategy. ➤ Preliminary trigger levels are presented below based on the trigger levels in the calcreted alluvial aquifer monitoring bores. ➤ A stop pumping trigger is set to 4 m of drawdown in the calcreted alluvium, individual triggers for monitoring bores are proposed as below. The 4 m drawdown trigger is based on the modelling provided in Advisian (2018) and maintains an average of between 60 and 70% of the aquifer thickness throughout the proposed life of mine. ➤ The water level triggers presented below are derived from the measured static water level minus 4 m at each monitoring bore site. ➤ The salinity triggers presented below are derived from the measured total dissolved solids at each monitoring bore plus 30%. <u>Calcreted Alluvium Monitoring Bores</u> <table> <tr> <th>Monitoring Location</th><th>SWL (mbgl)</th></tr> <tr> <td>MB-S7</td><td>6.6</td></tr> <tr> <td>MB-S8</td><td>8.2</td></tr> <tr> <td>MB-S9</td><td>5.4</td></tr> <tr> <td>MB-S10</td><td>7.9</td></tr> <tr> <td>MB-S12</td><td>9.1</td></tr> <tr> <td>MB-S15</td><td>7.5</td></tr> <tr> <td>MB-S19</td><td>8.0</td></tr> <tr> <td>MB-S20</td><td>7.8</td></tr> </table>	Monitoring Location	SWL (mbgl)	MB-S7	6.6	MB-S8	8.2	MB-S9	5.4	MB-S10	7.9	MB-S12	9.1	MB-S15	7.5	MB-S19	8.0	MB-S20	7.8
Monitoring Location	SWL (mbgl)																		
MB-S7	6.6																		
MB-S8	8.2																		
MB-S9	5.4																		
MB-S10	7.9																		
MB-S12	9.1																		
MB-S15	7.5																		
MB-S19	8.0																		
MB-S20	7.8																		



Management Activity	Description	
	MB-S21	8.7
	MB-S22	8.5
	MB-S23	7.5
	Calcreted Alluvium Monitoring Bores	
	Monitoring Location	TDS (mg/L)
	MB-S7	12,500
	MB-S8	12,500
	MB-S9	1,100
	MB-S10	17,000
	MB-S12	900
	MB-S15	1,500
	MB-S19	7,100
	MB-S20	6,800
	MB-S21	5,600
	MB-S22	4,100
	MB-S23	12,500
Update and validate numerical models and undertake recalibration if deemed necessary	➤ The groundwater model shall be updated and recalibrated if more exploration data is obtained; and ➤ The model shall be validated after the first two years of operations and every five years thereafter, or when additional monitoring data becomes available to consolidate the conceptual model and recalibrate, if necessary.	



Table 6-3: Proposed Preliminary Monitoring Locations

Monitoring	Location	Frequency
Groundwater Level	All production and monitoring bores	Monthly
	Continuous logger monitoring at all production bores and adjacent monitoring bores	Continuous
Abstraction Volume	Each Production Bore	Monthly
Field water quality – EC, TDS, pH	During water level monitoring	Monthly
Laboratory Analysis of Groundwater chemistry	Production bores and above listed monitoring bores in the calcreted alluvium	Quarterly
Laboratory Analysis of Groundwater chemistry	Beyondie well, 12 mile well, Tupee Well, Garden well, Davids Well, No 77 East well	Annual
Stygofauna Sampling	All monitoring bores within the Calcreted alluvial aquifer	Annual for first 2 years and then review

7 Summary

The aim of this document is to address the DWER comments by quantifying the impacts to GDEs, including potential groundwater dependent vegetation and stygofauna, due to the combined operation of the Ten Mile South Borefield and brine abstraction at Ten Mile Lake. The Following preliminary comments were received from DWER on the Brine abstraction from Ten Mile Lake. Responses to each comment are provided below in context to this report.

- DWER Comment: Abstraction from trenches in the Ten Mile Lake surficial aquifer (Figure 7-8 (Advisian 2017)) have predicted maximum drawdown impacts of about 0.5 to 1.5 m in areas where investigations indicate the groundwater in calcrete bodies is brackish to fresh. Acceptable impacts on potential stygofauna in this area will need to be formally evaluated now for the later stages of the project and then monitored as the project proceeds.
 - Response:
 - The predicted interactions between the two abstractions appears to be minimal for up to the 150 ktpa production scenario (Figure 5-4). In addition, the 150 ktpa scenario has zero recharge and is therefore considered highly conservative.
 - Additional monitoring has been proposed in all surficial monitoring bores. Trigger levels have been proposed based on the Ten Mile South Water Supply H3 Report (Advisian 2018), which maintains between 60 and 70% of the aquifer thickness in the calcrete over the life of mine.
 - Stygofauna monitoring has been proposed on an annual basis for the first two years of operation to characterise the communities and quantify impacts. After the additional sampling and operation drawdown responses it is proposed to re-visit the trigger levels and ongoing monitoring program.
- DWER Comment: On page 55 (Advisian 2017), it is reported that there are no known ecosystems dependent on the surface expression of groundwater within 30 km radius of the Project. However, phreatophytes might be dependent on groundwater up to about 20 m below ground level. The extent of drawdown will need to be assessed to determine if any potential GDEs might be impacted.
 - Response:
 - Potentially groundwater dependent vegetation is present along the drainage south of Ten Mile Lake, this is presented in Figure 2-1.
 - Drawdown in this area is dominated by the abstraction at Ten Mile South borefield, it is predicted that up to 2.5 m of drawdown may occur at the southernmost area identified as potentially groundwater dependent at the end of 23 years of abstraction. This equates to an average of approximately 0.1 m of drawdown per year, as presented in the Ten Mile South H3 report (Advisian 2018).
- DWER Comment: Section 8.1, Table 8-2 (Advisian 2017), the recommended monitoring plan is very general and will need to be a lot more specific with regard to the monitoring program and the setting of trigger levels. The proposed preliminary monitoring, Table 8-3 (Advisian 2017), looks fine but does not mention subterranean fauna.



- Response:
 - The monitoring plan has been updated as outlined in Table 6-2 and Table 6-3.
- DWER Comment: The groundwater models appear to be acceptable but might need to be updated with additional scenarios run depending on the criteria for stygofauna or if new investigation data necessitates further work. A full review of each model is required to be reported on by the modellers in full accordance with Chapter 9, Reviews, of the Australian groundwater modelling guidelines (NWC, 2012).
 - Response:
 - Full Reviews as per the Australian groundwater modelling guidelines are provided separately to this report.

8 References

Advisian 2017, Ten Mile South and Beyondie Water Supply Project, H3 Level Hydrogeological Report, 201220-14624-Ten MileS_Beyondie_H3Report, prepared by Advisian, July 2018.

Advisian 2018, Beyondie Potash Project – Ten Mile and sunshine Lakes, Hydrogeological Assessment of Brine Abstraction, 201320-14624, Prepared by Advisian, December 2017.

Barnett, B., Townley, L.R., Post, V., Evans, R.E., Hunt, R.J., Peeters, L., Richardson, S., Werner, A.D., Knapton, A., and Boronkay, A. 2012. Australian groundwater modelling guidelines. Waterlines Report Series No 82, June 2012, National Water Commission, Australian Government, 191pp.

Loomes, R., 2010. Determining water level ranges of Pilbara riparian species, Environmental water report series, report no. 17, Department of Water, Government of Western Australia, Perth NWC, 2012

Phoenix. 2015a. Subterranean desktop assessment for the Beyondie Potash Project. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Kalium Lakes Ltd.

Phoenix. 2015b. Flora and vegetation survey for the Beyondie Potash Project Prepared for Kalium Lakes Potash Ltd, August 2015, Draft Interim Report, Project code: 1075-TM-KAL-BOT.

Phoenix. 2017. Flora and vegetation survey for the Beyondie Potash Project, Prepared for Kalium Lakes Ltd, Project code: 1075-TM-KAL-BOT, Draft Report March 2017.

Phoenix. 2018a. Level 1 subterranean fauna assessment for the Beyondie Sulphate of Potash Project. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Kalium Lakes Ltd.

Phoenix Environmental, 2018b. Level 2 stygofauna assessment for the Beyondie Sulphate of Potash Project, Prepared for Kalium Lakes Potash Pty Ltd, May 2018.

Shepherd, D. P., Beeston, G. R. & Hopkins, A. J. M. 2002. Native vegetation in Western Australia. Extent, type and status. Department of Agriculture, South Perth, WA. Resource Management Technical Report 249.