Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W6236/2019/1
Applicant	Saracen Gold Mines Pty Ltd
ACN	116 649 122
File Number	DER2018/001523
Premises	Carosue Dam Operations Mining tenements M28/269, M31/220, M31/295
Date of Report	17June 2019
Status of Report	Final

Table of Contents

1. Definitions of terms and acronyms

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

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CS Act	*Contaminated Sites Act 2003* (WA)
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER). DWER was established under section 35 of the *Public Sector Management Act 1994* and is responsible for the administration of the *Environmental Protection Act 1986* along with other legislation.
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Licence Holder	Saracen Gold Mines Pty Ltd
m^3	cubic metres
Minister	the Minister responsible for the EP Act and associated regulations
MS	Ministerial Statement
mtpa	million tonnes per annum
NEPM	National Environmental Protection Measure

Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Primary Activities	as defined in Schedule 2 of the Revised Licence
Risk Event	As described in *Guidance Statement: Risk Assessment*
TDS	Total dissolved solids
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)
WAD cyanide	Weak acid dissociable cyanide
Works Approval Holder	Saracen Gold Mines Pty Ltd

2. Purpose and scope of assessment

2.1 Application details

On 12 October 2018, Saracen Gold Mines Pty Ltd submitted an application for a works approval to raise the embankment heights of Cells 1 and 2 of their Tailings Storage Facility (TSF) at Carosue Dam Operations. Known also as the Stage 7 lift, the embankments will increase in height from 375.5 m RL to 378 m RL.

Carosue Dam is a gold mine, producing a gold ore concentrate, from which tailings (ore processing waste) is disposed to Tailings Storage Facilities. Carosue Dam has an above ground paddock style TSF and an in-pit TSF at Luvironza Pit. The Luvironza In-pit TSF is not active.

The above ground TSF was originally constructed in 2000 with two cells, 1 and 2. Cells 1 and 2 were constructed with a partial basin underdrainage system and a central decant to return tailings water (decant) back to the processing plant. Cells 1 and 2 were operated from 2000 – 2005 at which time four raises of the height of the embankments had been completed. Following a period of care and maintenance, the TSF was recommissioned in 2009 and a stage 5 embankment raise approved via Works Approval W4539/2009/1. A Stage 6 embankment raise of TSF Cell 1 and 2 was approved via Works Approval W4901/2011/1. In 2013 a further third cell (cell 3) was constructed adjoining the original two cells. The location of these cells in relation to the processing plant and underground mine is depicted below in Figure 1.

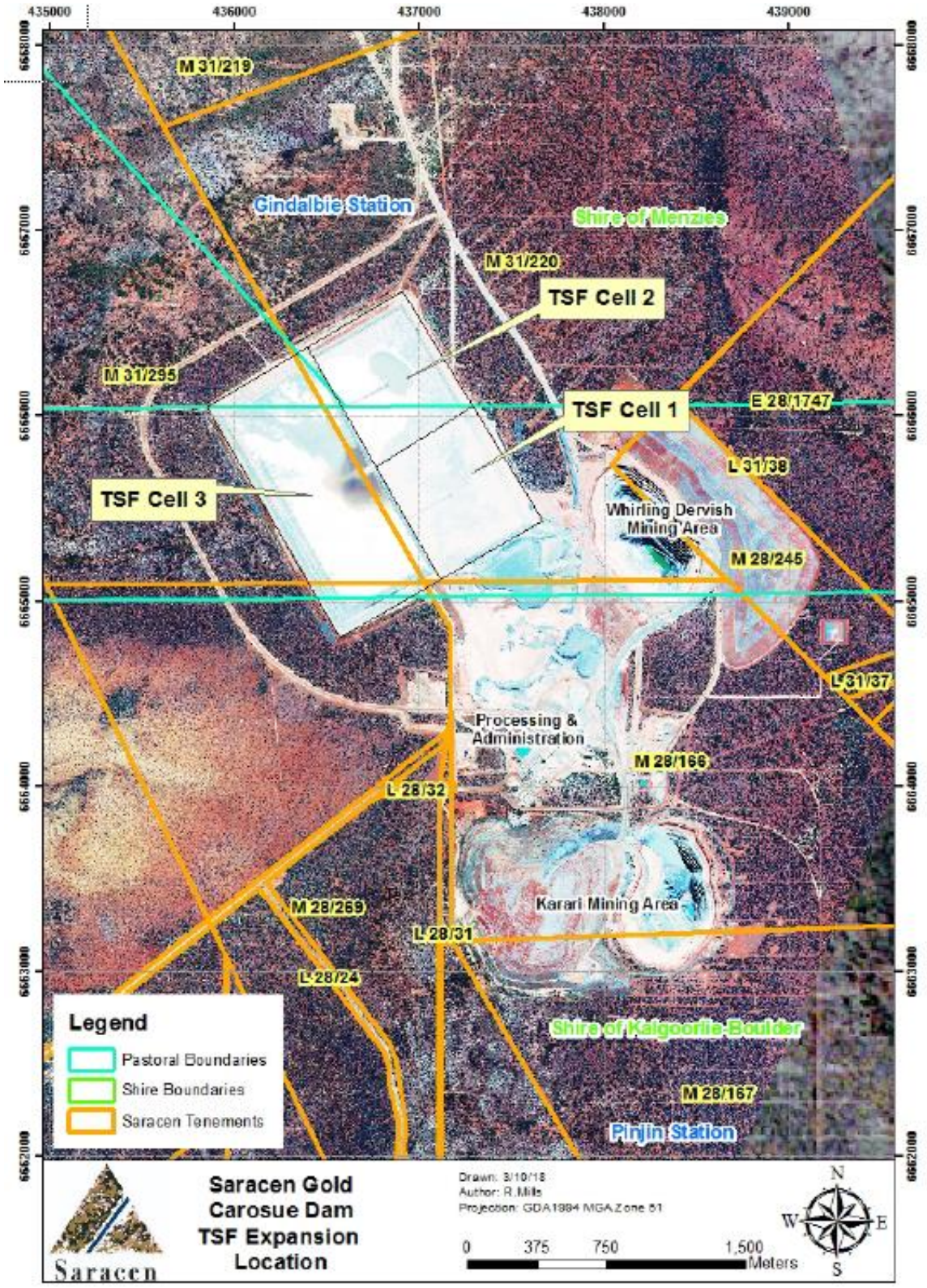

Figure 1: Location of the above ground TSF (Cells 1, 2 and 3) at Carosue Dam Operations

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
Saracen Gold Mines (2018) *Application for a Works Approval*, dated 12 October 2018	12 October 2018
Saracen Gold Mines (2013) Saracen Gold Mines Cell 3 Tailings Storage Facility Works Approval Application Supporting Document, 13 March 2013	5 October 2018
Knight Piesold (2013) *Saracen Gold Mines Tailings Storage Facility Permitting Design,* March 2013	5 October 2018
Golder (2019) *Tailings Storage Facility 3 Investigation into damp patches on external embankments*, unpublished report for Saracen Gold Mines, April 2019	10 April 2019

No changes to the existing prescribed premises categories on accompanying Licence L7465/1999/8 have been applied for.

3. Overview of Premises

3.1 Operational aspects

Concurrent with this application, investigations were ongoing to determine the source of wetting (damp patches) through the TSF Cell 3 embankment, first identified in May 2018 and reported to DWER in July 2018. The wetting front reappeared in February 2019 during a follow up investigation to determine the root cause. The investigation took core samples of the embankment to determine whether the road construction material had been left in place between stage 1 and 2 of Cell 3 causing lateral seepage to flow to the outer embankment. The investigation instead determined that the damp patches were likely due to surficial rainfall infiltration through the more permeable outer embankment, with the seepage expression occurring at the interface between stage 1 and 2 of Cell 3, due to a difference in hydraulic conductivity between the two stages of the embankment (Golder 2019).

3.2 Infrastructure

The Carosue Dam TSF infrastructure, as it relates to Category 5 activities, is detailed in Table 3 and with reference to the Site Plan (attached in the Works Approval W6236/2019/1).

Table 3 lists infrastructure associated with each prescribed premises category.

Table 3: Carosue Dam Above Ground TSF - Category 5 infrastructure

	Infrastructure
	Prescribed Activity Category 5
Embankment Raise of TSF Cell 1 and Cell 2	
1	Removal of tailings delivery and decant return pipelines
2	Raise the TSF embankment to design levels and grade
3	Install underdrainage pipework and toe drains through the western embankment of Cell 1/2/
4	Create new decant area for combined cell 1/2, raise decant tower and underdrainage tower

	Infrastructure
5	Reinstate tailings delivery and return pipelines

4. Location and siting

4.1 Siting context

Carosue Dam is located 120 km north east of Kalgoorlie in the Goldfields. The mine site is located adjacent to the saline lake, Lake Rebecca. The mine site is situated on two pastoral stations, Pinjin Station and Gindalbie Station within the Shire of Menzies. Refer to Figure 2 and 3 below.

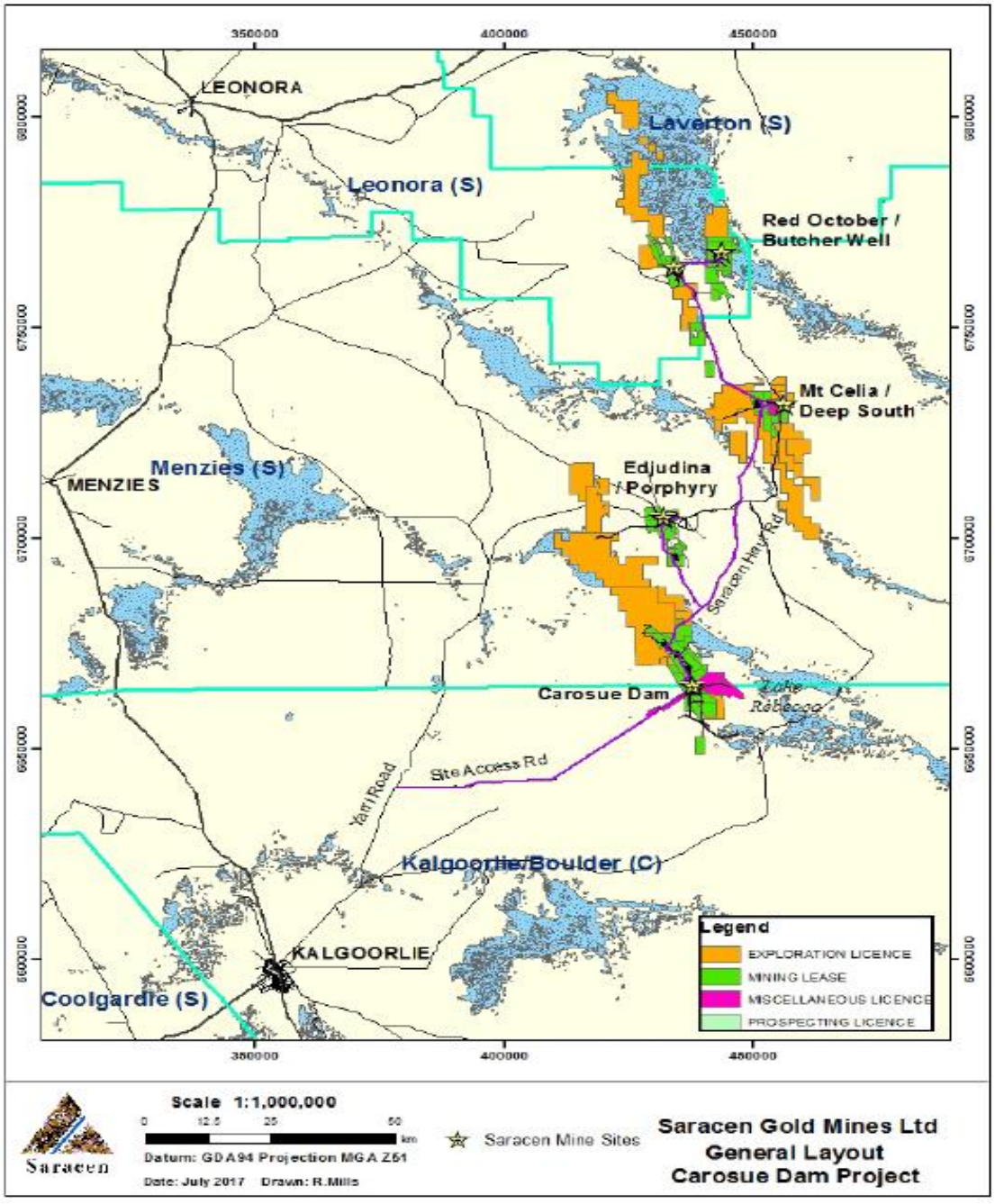

Figure 2: Carosue Dam Project regional location

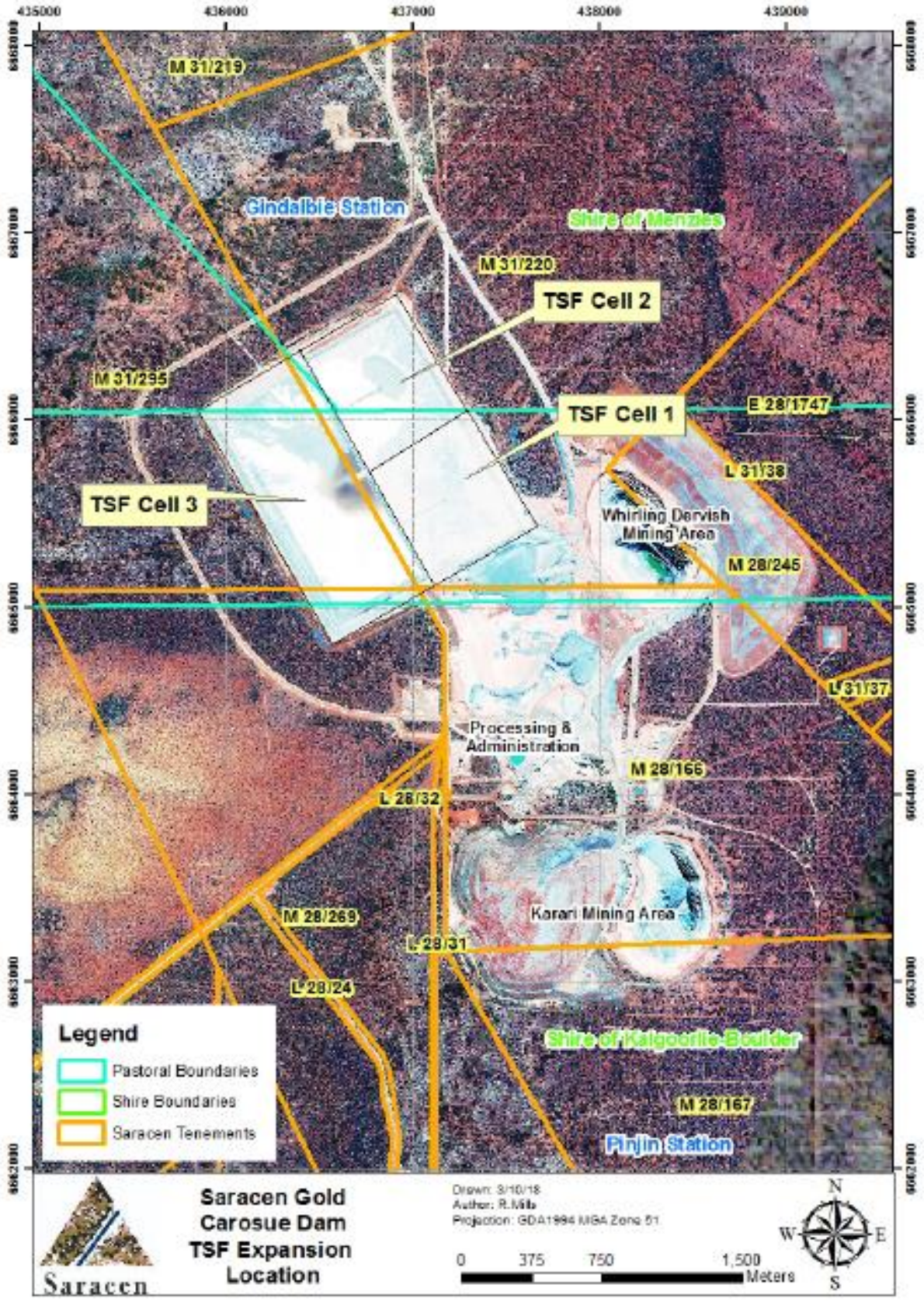

Figure 3: Above ground TSF location at Carosue Dam, in relation to the station boundaries and mining tenements

4.2 Residential and sensitive Premises

The distances to residential and sensitive receptors are detailed in Table 4.

Table 4: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Pinjin Station	Approximately 37 km from the premises.

4.3 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 5. Table 5 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 5: Environmental values

Specified ecosystems	Distance from the Premises
Ramsar Sites in Western Australia	Lake Toolibin (40k east of Narrogin, 670km south west of Carosue Dam)
Important wetlands – Western Australia	Lake Ballard (approximately 180 km west north west of Carosue Dam)
Threatened Ecological Communities and Priority Ecological Communities	None
Biological component	**Distance from the Premises**
Threatened/Priority Flora	Two priority flora species recorded within the project site – one plant of *Spartothamnella* sp. Helena & Aurora Range (priority 3) and 100 plants of *Eremophila arachnoides* subsp. Tenera (priority 1)
Threatened/Priority Fauna	Malleefowl are active on the Premises. Three active mounds and three inactive mounds were located during the 2012 survey for TSF 3.
Other relevant ecosystem values	**Distance from the Premises**
Lake Rebecca is considered a sensitive environmental receptor. Particularly after intense rainfall when fresh water on the lake surface triggers biological activity.	7 km north east of the TSF

4.4 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 6.

Table 6: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental value
Pastoral bores	Relief Hill Well – 1.5 km of Whirling Dervish Pit (5.5km east of the TSF)	Stock water use

	Y4 bore – 3.4 km to the northwest of Twin Peaks pit (refer to Figure x below for locations of these pits)	
Major watercourses/waterbodies	Lake Rebecca (7km north east of Carosue Dam)	Salt lake, waterbirds and invertebrates habitat
Groundwater		Groundwater resources at Carosue Dam are primarily located within hypersaline fractured rock aquifers (Saracen 2019). A hypersaline palaeochannel drainage is also associated with the adjacent saline Lake Rebecca. Groundwater in the location of the TSF has been modified by operation of the existing TSF as well as dewatering and mining of the nearby Whirling Dervish open pit. Groundwater mounding is evident with water levels rising in the north and west. However in the south east corner, dewatering at the Whirling Dervish pit has created a groundwater sink, with water levels falling 26 m. The highest standing level in monitoring bore MB6 was measured at 7.57 mbgl in August 2016, indicating water levels are within the licence limit of 4mbgl.

5. Legislative context

Table 7 summarises approvals relevant to the assessment.

Table 7: Relevant approvals and tenure

Legislation	Number	Subsidiary	Approval
Part V of the *EP Act* (WA)	L7465/1999/8	Saracen Gold Mines Pty Ltd	Categories 5, 6, 52, 63, 64, 73, 85
Mining Act 1978	Mining Proposal	Saracen Gold Mines Pty Ltd	Registered ID - *TBA*
Rights in Irrigation and Water Act 1914	5C Licences to take groundwater	Saracen Gold Mines Pty Ltd	GWL157428 (Carosue Dam GWL) GWL 103538 (Carosue Dam Southern Borefield Lake Rebecca Palaeochannel)

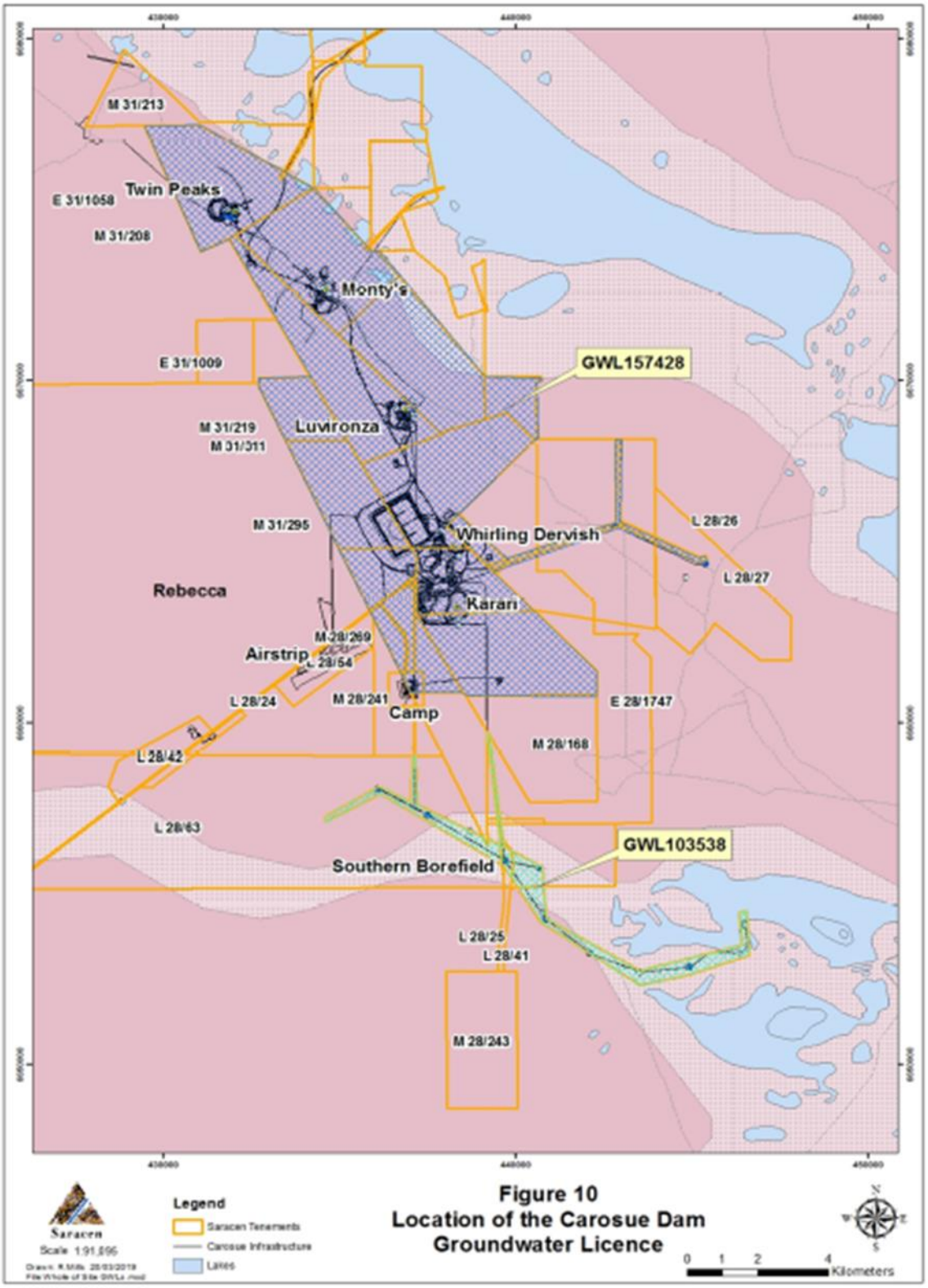

Figure 4: Location of the Carosue Dam groundwater licences (Saracen 2019)

5.1 Part V of the EP Act

5.1.1 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: Decision Making (February 2017)*
- *Guidance Statement: Risk Assessments (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

5.1.2 Works approval and licence history

Table 8 summarises the works approval and licence history for the premises.

Table 8: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
W4539/2009/1	16/02/2009	TSF Cell 1 and 2 (previously Cell A and B) Stage 5 embankment raise; recommission TSF
W4780/2010/1	23/12/2010	Works approval to convert Luvironza open pit into an In-pit TSF
W4901/2011/1	12/05/2011	TSF Cell 1 and 2 Stage 6 embankment raise
W5421/2013/1	16/05/2013	Works approval to construct TSF Cell 3
L7465/1999/8	24/10/2013	Licence reissue
L7465/1999/8	18/12/2014	Licence amendment to REFIRE format and to include new tailings storage facility
L7465/1999/8	26/11/2015	Licence amendment to remove condition 1.3.7 and update into version 2.9
L7465/1999/8	29/04/2016	Notice of Amendment to Licence Expiry Dates - to extend the duration of the Licence from 31/10/18 to 31/10/21
L7465/1999/8	02/06/2016	Licence amendment to include tenements L28/24, L28/29, L28/30, M28/269 and M31/295 within the premises boundary and to remove the Karari pit monitoring bores KRMB03 and KRHY4.
L7465/1999/8	08/12/2016	Amendment Notice 1 Licence amendment for TSF Cell 3 stage 2 embankment raise and new turkey's nest.
L7465/1999/8	04/10/2017	Amendment Notice 2 New works – six additional generators and one new evaporation pond for the WWTP
L7465/1999/8	17/09/2018	Amendment Notice 3 Amendment to construct and operate a series of new leach drains to provide relief for the current wastewater system. Amendment to allow for the discharge of groundwater that potentially will be intercepted during upcoming exploration drilling

L7465/1999/8	26/03/2019	Amendment Notice 4 Amendment to increase capacity of category 85 (wastewater treatment) from 95m^3/d to 99m^3/d.
W6236/2019/1	17/06/2019	Works approval to authorise stage 7 embankment raise of TSF Cells 1 and 2.

6. Modelling and monitoring data

6.1 Tailings Geochemistry

The tailings slurry is discharged at a pH of approximately 8.4 – 8.5 and WAD cyanide concentration of 60 – 70 mg/L, with the supernatant at pH of 7.5 and WAD cyanide concentration of 10 mg/L/ (Saracen 2013). Salinity of the process water is 250 000 mg/L TDS (Sracaen 2013).

6.2 Monitoring of seepage impacts to groundwater

Underlying groundwater at Carosue Dam is hypersaline (TDS > 40,000 mg/L), therefore the key potential impact from tailings deposition is inundation of the rootzone of surrounding vegetation by rising groundwater levels. Secondary impacts may arise from acidic shallow groundwater expressing itself at the adjacent claypans and saline playas including Lake Rebecca, however this is less likely due to the groundwater's slow hydraulic gradient. Localised groundwater mounding in the vicinity of the above ground TSF occurs due to tailings seepage. Groundwater monitoring results near TSF Cells 1 and 2 indicate standing water levels are stable, with the shallowest standing water level at bore MB6S at 7.6 mbgl. MB6 is located at the north west corner of the TSF, in the pathway of the aquifer's hydraulic gradient towards Lake Rebecca (Saracen 2018). It should be noted that during 2018 tailings was discharged to Cell 3 only.

Groundwater in the TSF area has been modified by the construction and operation of the existing TSF as well as dewatering and mining of the Whirling Dervish open pit. Groundwater mounding is evident in the TSF area with water levels raising around 8m in MB4D and 5m in MB5D to the north and west; in contrast dewatering at Whirling Dervish has created a groundwater sink with water levels in the south east corner (MB1D) falling 26m. Water levels around the existing TSF vary depending on which cell is in use (Saracen 2013).

It is noted that the pH of the deep bores at MB6, MB7 and MB8 is acidic at 3.44 – 4.00. Previous investigations in 2012 have concluded that the pH acidity is due to ferrolysis, influenced by local groundwater abstraction which has created oxidising conditions. WAD cyanide was detected in all groundwater bores surrounding the above ground TSF, indicating the presence of tailings seepage (Saracen 2018). The highest concentrations of WAD cyanide in 2018 was recorded at bore MB7D, 0.321 mg/L. Nickel concentrations in bores MB8D and MB7D are also elevated, with 0.405 – 0.53 mg/L recorded at MB8D and 0.121 mg/L – 0.17 mg/L at MB7D.

Modelling of seepage analysis conducted as part of the design of TSF Cell 3, indicated that seepage rates would be around <0.002L/s for the first lift, increasing to 0.8 L/s once the final design height is reached.

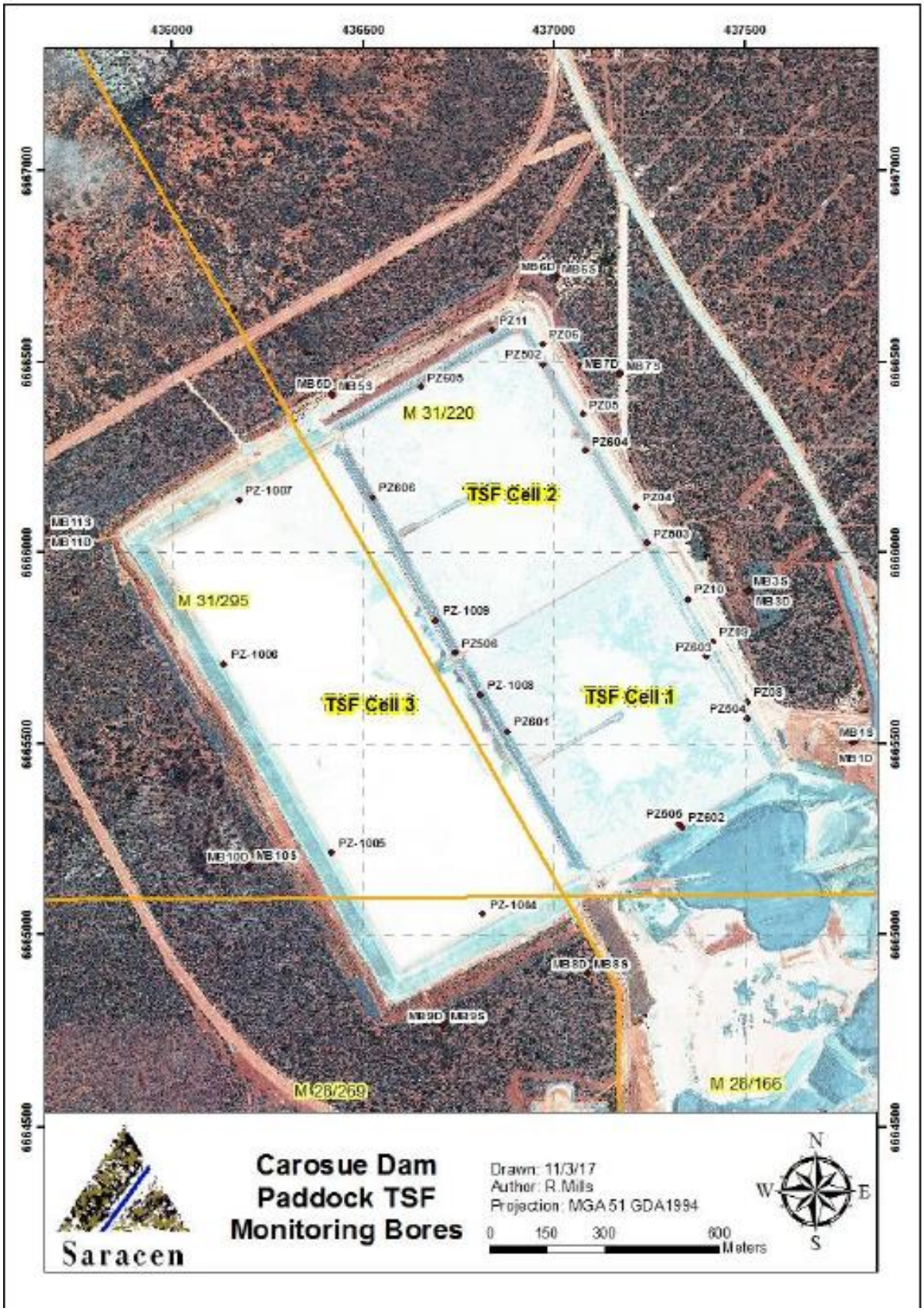

Figure 5: Location of groundwater monitoring bores and piezometers at the Carosue Dam Paddock TSF

7. Consultation

Saracen Gold Mines has conducted consultation with the Department of Mines, Industry Regulation and Safety (DMIRS) in regard to this application. Further geotechnical investigation was required by DMIRS in relation to potential impacts on the adjacent underground mine and commitments have been made to improve the stability of the embankment and to conduct follow up monitoring prior to commissioning the TSF, post embankment construction.

8. Risk assessment

8.1 Determination of emission, pathway and receptor

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

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through Table 10.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Tables 9 and 10 below.

Table 9: 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**		
Category 5 **TSF Cells 1/ 2, Stage 7 Embankments construction**	Embankments construction	Noise	No receptors	Air / wind dispersion	Amenity impacts	No	No receptor
		Dust			Amenity impacts	No	No receptor

Table 10: Identification of emissions, pathway and receptors during operation

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Category 5 **TSF Cells 1/2, Stage 7 operation**	Tailings deposition to stage 7 of the TSF Cell 1 and Cell 2	Tailings seepage	Adjacent native vegetation	Via groundwater	Rising hypersaline groundwater inundating vegetation rootzones	Yes	Potential to impact on adjacent vegetation if groundwater levels in vicinity of TSF not managed.
			Groundwater	Direct discharge	Groundwater contamination	No	Groundwater is hypersaline (30 000 – 100 000 mg/L TDS) so only a resource for mining use
		Tailings overtopping	Surrounding terrestrial ecosystems – vegetation, resident fauna, drainage lines feeding Lake Rebecca	Direct discharge	Site contamination of adjacent terrestrial ecosystem and potential to impact the saline Lake Rebecca.	No	TSF Design unchanged from the TSF Design as per Knight Piesold 2013. TSF design previously assessed and approved with capacity for a 1 in 100 year, 72 hour rainfall event plus 300 mm operational freeboard via Licence L7465/1999/8.

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 11 below.

Table 11: 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 12 below.

Table 12: Risk criteria table

Likelihood		**Consequence**		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		**The following criteria has been used to determine the consequences of a Risk Event occurring:**		
			Environment	**Public health* and amenity (such as air and water quality, noise, and odour)**
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite impacts wider scale:** mid-level or above • Mid to long-term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **onsite impacts**: high level • **offsite impacts local scale**: mid-level • **offsite impacts wider scale**: low level • Short-term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **onsite impacts**: mid-level • **offsite impacts local scale**: low level • **offsite impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for public health) met

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

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

"onsite**"** means within the Prescribed Premises boundary.

8.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment table 13 below:

Table 13: 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 – Tailings seepage impacting vegetation

8.4.1 Identification and general characterisation of emission

Hypersaline groundwater with elevated metal(loid)s and trace WAD cyanide concentrations, due to tailings seepage mixing with local groundwater within fractured rock aquifers. The total dissolved solids concentration of the groundwater in aquifers surrounding the TSF (shallow and deep) ranges from 42 600 mg/L – 280 000 mg/L (Saracen 2018).

8.4.2 Description of potential adverse impact from the emission

Rising groundwater levels may inundate adjacent vegetation rootzones with saline water, resulting in vegetation death. The local area is also Malleefowl habitat; destruction of vegetation may impact on Malleefowl's reproduction and health.

8.4.3 Applicant/Licence Holder controls

The following engineering controls are proposed as part of this proposed embankment raise:

- combined underdrainage system to collect seepage at stage 7 for cell 1/2;
- toe drains under the western wall.

Existing controls for groundwater monitoring and decant pond management that are currently in place will continue for operation of TSF cells 1/2 at the new height of up to 378 m RL.

8.4.4 Consequence

If seepage impacts on local vegetation occur, then the Delegated Officer has determined that the impact is a mid level impact to an on site receptor. Therefore, the Delegated Officer considers the consequence to be **moderate**.

8.4.5 Likelihood of seepage impacts on vegetation

With consideration of the results from the groundwater monitoring program, with the highest standing water level sitting at 7.6 mgbl at MB7, and noting that these levels are affected by the dewatering associated with Whirling Dervish Mine, the Delegated Officer has determined that the likelihood of seepage impacts on vegetation occurring is **possible**.

8.4.6 Overall rating of seepage impacts on vegetation

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 11) and determined that the overall risk rating is **medium**.

8.5 Summary of acceptability and treatment of Risk Events, including regulatory controls

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 14 below. Controls are described further in section 8.6.

Table 14: Risk assessment summary

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)	Regulatory Controls
	Emission	**Source**	**Pathway/ Receptor (Impact)**				
1.	Tailings seepage	Increased seepage head due to increased tailings deposition	Rising hypersaline groundwater levels inundating native vegetation rootzone.	Progressive installation of underdrainage system and toe drains; decant recovery; internal standing water limit of 6 mbgl in all monitoring bores surrounding the TSF.	Moderate consequence Possible likelihood **Medium risk**	Acceptable subject to proponent controls conditioned in Works Approval and existing Licence controls for operation.	Works Approval: • Underdrainage collection system for combined cell 1/2 • Toe drain installation • Relocation of decant pond to the centre of the combined cell Licence: • Standing water level limit of 4 mgbl (existing condition 1.2.8); • Requirement to design and implement a groundwater recovery plan in the event that standing water levels reach 6.0 mgbl (existing condition 1.2.9 of Licence L7465/1999/8) plan to be in accord with existing condition 1.2.10 of the Licence; • Annual water balance required to be reported for the TSF (existing condition 1.2.7); and • Groundwater monitoring program to assess changes in groundwater levels (existing condition 3.4.1).

8.6 Works Approval/Licence controls

8.6.1 Works Approval Controls – seepage management

The works approval will condition:

- the installation of the combined underdrainage system for combined TSF Cell 1/2 at Stage 7 height;
- the relocation of the decant tower into the centre of combined cells 1/2; and
- the toe drains under the western wall

in accordance with the approved TSF design by Knight Piesold (Knight Piesold 2013). Evidence of the installation of these controls will be required to be submitted to the CEO in a construction compliance report prior to operation of the facility.

8.6.2 Licence controls – seepage management

Existing Licence controls as per Licence L7465/1999/8 will apply; that is, conditions 1.2.5, 1.2.6, 1.2.7, 1.2.8, 1.2.9 and 1.2.10. Condition 1.2.8 specifies a standing water level limit in groundwater of 4 mbgl.

8.6.3 Monitoring requirements

Monitoring requirements are as set by Licence conditions 1.2.7 (water balance over the TSF) and 3.4.1 (groundwater monitoring) of Licence L7465/1999/8. These conditions will apply for operation of the TSF at stage 7. There may be a review of the analytes subject to condition 3.4.1 pending review of the current tailings being generated from the Carosue Dam processing plant. This review will ensure consistency across the Licence in terms of monitoring requirements and that the parameters are representative of the potential leachable contaminants in the tailings.

9. Applicant's comments

The Applicant was provided with the draft Decision Report and draft Works Approval on 14 June 2019. The Applicant did not provide comments on the draft documents and waived the remaining works approval consultation period.

10. Conclusion

This assessment of the risks of activities on the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Decision Report (summarised in Appendix 1).

Based on this assessment, it has been determined that the Works Approval will be granted subject to conditions.

Tim Gentle
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.	Licence L7465/1999/8 Carosue Dam Operations	L7465/1999/8	accessed at www.der.wa.gov.au
2.	Works Approval W4901/2011/1	W4901/2011/1	DWER records (A396353)
3.	Works Approval W5421/2013/1	W5421/2013/1	DWER records (A631550)
4.	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	DER 2015a	accessed at www.dwer.wa.gov.au
5.	DER, November 2016. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	DER 2016b	
6.	DER, November 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.	DER 2016c	
7.	Golder (2019) *Tailings Storage Facility 3 Investigation into damp patches on external embankments*, unpublished report for Saracen Gold Mines, April 2019	Golder 2019	DWER records (A1780851)
8.	Knight Piesold (2013) *Saracen Gold Mines Tailings Storage Facility Permitting Design,* March 2013	Knight Piesold 2013	DWER records (A1728289)
9.	Saracen Gold Mines (2018) *Carosue Dam Operations Annual Environmental Report 2018*	Saracen 2018	DWER records (A1777399)
10.	Saracen Gold Mines (2019) *Carosue Dam Operations Combined Groundwater Operating Strategy*, Version 7, March 2019	Saracen 2019	DWER records (DWERDT148242)

Attachment 1: Works Approval W6236/2019/1