Decision Report

Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W6316/2019/1
Applicant	Silver Lake (Integra) Pty Ltd
ACN	093278436
File Number	DER2019/000477
Premises	Salt Creek Processing Facility TSF2 Mount Monger Road EMU FLAT WA 6431 Being Mining Tenements M25/347 and L25/31
Date of Report	13 January 2020
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
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.
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of, and during this Review
m^3	cubic metres
mtpa	million tonnes per annum
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
Risk Event	As described in *Guidance Statement: Risk Assessment*
Works Approval Holder	Silver Lake (Integra) Pty Limited

2. Purpose and scope of assessment

An Application for a Works Approval was submitted by Silver Lake (Integra) Pty Ltd (Applicant) for the construction of a new tailings storage facility (TSF2) at the Salt Creek Processing Facility within mining tenement M25/347 (the Premises), located approximately 60 kilometres (km) south east of Kalgoorlie.

The Applicant has applied for prescribed premises Category 5 to allow for the construction of TSF2 at the Salt Creek Processing Facility. This assessment is for the construction of Stages 1 (starter embankment) to 3 (2 embankment lifts) of TSF2.

This Decision Report presents and assessment of the potential environmental and public health risks from emissions and discharges from the construction and operation of the new TSF2 at the Premises. As a result of this assessment, a Works Approval has been granted (Issued Works Approval) (Attachment 1).

2.1 Application details

The Application was received on 4 September 2019. Table 2 lists the documents submitted during the assessment process.

Table 2: Documents and information submitted during the assessment process

Document/information description	Date received
Application form and supporting documentation (A1820341).	4 September 2019
Response to DWER request for further information under validation, including attachment (A1834648).	23 October 2019

3. Background

Salt Creek Processing Facility is a gold mining and minerals processing operation which sources ore from four pits (Lucky Bay, Salt Creek, Maxwell's and Cock-eyed Bob) and processes the ore by carbon-in-pulp (CIP) methods. The premises currently hold a licence (L8457/2010/2) and have a current throughput for the processing plant of 1.7 million tonnes per annum (mtpa).

The project area contains an integrated waste landform (IWL), which is constructed adjacent to the Salt Creek ore body. The IWL has a footprint of 54.59 hectares (ha); a maximum height of 20 metres (m) (RL 323 m); and consists of a tailings storage facility (TSF) surrounded by a waste rock landform, which has since been replaced by the Salt Creek In-Pit TSF (SCITSF). Eight groundwater monitoring bores were installed by the Applicant around the IWL TSF perimeter and adjacent to the Salt Creek pit to monitor standing water levels. There are conditions on the licence for groundwater quality monitoring and for standing water level limits.

The SCITSF was constructed in accordance with Works Approval W5678/2014/1 and is currently licensed to accept tailings from the Salt Creek Processing Facility, replacing the IWL TSF, which in the past displayed evidence of seepage.

In May 2015, DWER approved the implementation of a Groundwater Recovery Plan that aimed to reduce standing water levels around the IWL TSF by discharging approximately 100,000 kL per year of recovered groundwater from three production bores located in the vicinity of groundwater mounding to the SCITSF. However, all but one of the recovery bores had been found to produce insufficient yields that would allow for a reduction in the water

table. In addition, standing water levels appear to be naturally attenuating at a satisfactory rate. On 13 November 2015, DWER notified the Applicant that allowing standing water levels around the IWL TSF to naturally attenuate was preferable to discharging recovered water to the active Salt Creek In-pit TSF.

4. Proposal Overview

4.1 Category 5 – construction of TSF2

The proposed TSF2 (surrounding the existing SCITSF) will be an above ground 'side-hill' facility and will be located approximately 1 km south-west of the plant site and adjacent to the south of the waste dump.

The new TSF2 will borders the existing IWL to provide 3 years additional tailings storage capacity when the SCITSF reaches its capacity in late 2020. Figure 1 shows the location of the new TSF 2. The storage area will be formed by the construction of a perimeter embankment (in 3 stages) to enclose a surface area of approximately 38.4 ha at the Stage 3 embankment crest height RL 314m. The embankment will be constructed in three stages with Stage 1 embankment crest height of RL 308m (8 m above ground level) and raised in two lifts of 3 meters each to Stage 3 embankment crest height of RL 314m (14 meters above ground level), using a downstream construction method. The facility will provide an additional 1.9M tonnes of storage to the existing 3.2M tonnes in the SCITSF. This works approval is for the construction of all 3 stages of embankment construction (staged compliance documents will be required to be submitted at the end of each stage of construction.

Table 3 below outlines the storage capacity of TSF2 at each stage of construction. The details have been estimated using and adopted dry density of 1.4t/m^3, average tailings beach slope of 1% and production rate of 1.3 Mtpa.

Table 3: Summary of in-pit TSF and TSF2 storage characteristics (Application, 2019)

Stage	Embankment Crest RL (m)	Storage Area (ha)	Storage Volume (Mm^3)	Cumulative Storage Volume (Mm^3)	Cumulative Storage Capacity (Mt)	Cumulative Storage Life (Years)
Existing Salt Creek In-pit TSF (SCITSF)						
-	-	13	1.87	**1.87**	**2.15**	**1.7**
Proposed TSF2						
1	436	29.1	1.39	1.39	1.94	1.40
2	439	33.4	0.86	2.24	3.14	2.40
3	445	38.4	0.42	**3.18**	**4.46**	**3.40**
Total (SCITSF and TSF2)				**5.06**	**6.61**	**5.1**

Approximately 25ha of native vegetation will be cleared to facilitate the construction of the facility. This is permitted under native vegetation clearing permit NVCP 8519 approved under the *Mining Act 1978*.

The perimeter embankment will comprise of zoned earth fill with an upstream Zone A (compacted dry tailings), a transition Zone B (traffic compacted oxidised / selected mine waste and/or borrow fill with maximum particle size of 300mm) and a downstream Zone C (traffic compacted general mine waste rock with maximum particle size of 800mm). A cut-off trench with a 3m wide base will be excavated beneath the perimeter embankment (Zone A) and backfilled with dry tailings to reduce horizontal seepage losses. The trench will be excavated

to a nominal depth of 1m below the stripped surface. A downstream toe drain system will be also constructed to capture any seepage flow through the perimeter embankment. Seepage collected via the toe drain system will drain by means of gravity to collection sumps.

A north-east bench embankment with a crest width varying from 8m (Stage 1) to 6m (Stage 3) shall be constructed against the southern side of the existing waste dump, using compacted dried tailings, to reduce horizontal seepage losses. A rip rap rock layer (with a separator layer of geotextile Bidim A44) will constructed over the upstream face of the north-east bench embankment to mitigate the potential erosion along this embankment section. The north-east bench embankment will be raised in stages (along with the perimeter embankment) using downstream construction method.

The base of the proposed TSF2 will be unlined and untreated. Test pits were dug within the TSF2 footprint as part of a geotechnical investigation carried out in 2009 by Golder and Associates (Golder, 2009). Results from this investigation indicated the permeability of the upper foundation horizon at the TSF2 area is in the order of 10^{-6} m/s to 2 x 10^{-8} m/s (i.e. 10^{-7} m/s average). These values indicate low permeability.

Supernatant water (from both rainfall events and operation) will be removed by a dedicated pumping system (i.e. floating pontoon mounted pump) and pumped back to the process water pond in the plant site for re-use.

The applicant has stated that, as part of the TSF2 operation, bore field water will be added into the new TSF2 on a daily basis to provide the minimum supernatant pond size required to return “clear water” to the processing plant. The pond will be controlled during operation such that it will be maintained away from the northern, western and southern perimeter embankments at all times (i.e. not less than 200m from the perimeter embankments).

Operation of TSF2

There are no proposed changes to the Salt Creek Processing Facility processing operations. Ore types continue to be a blend from the Mount Morgan underground mines and open pits with tailings being delivered to the TSF2 by existing infrastructure.

Tailings will continue to be discharged sub-aerially and cyclically via multi spigots into TSF2 in nominal 300mm layers to gain optimum density subjecting each layer to a drying cycle. Tailings will be deposited to allow the beach to form maintaining the supernatant pond to the NE side of the facility and away from the IWL embankment wall. Beaching will allow a ‘depressed cone’ to form in the top surface allowing for water storage away from the embankment wall whilst maintaining freeboard requirements.

A groundwater monitoring programme for the TSF2 will be implemented and incorporated into the existing monitoring programme. A network of existing groundwater monitoring bores around the site and the three new proposed monitoring bores around the TSF2 is shown on Figure 3.

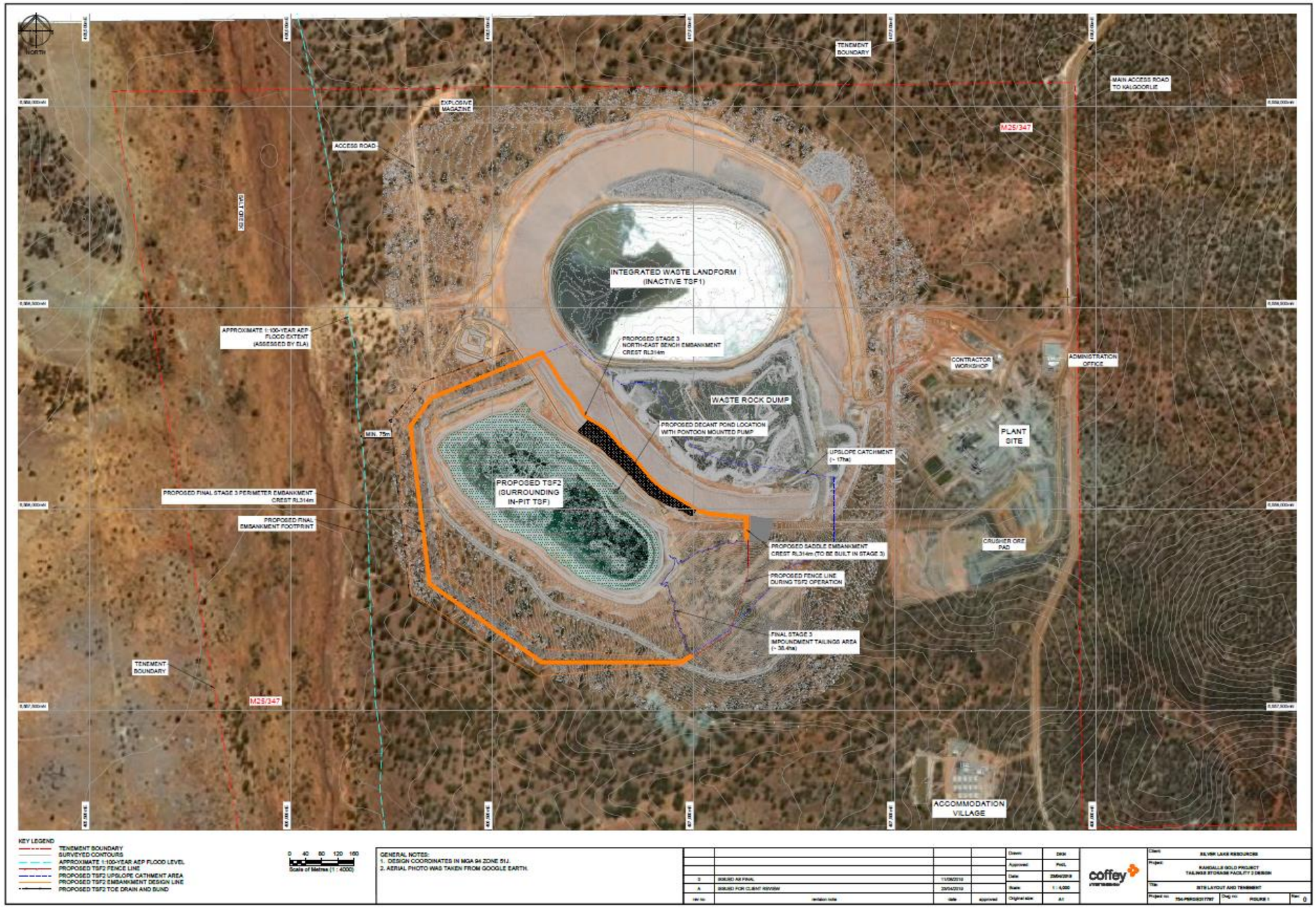
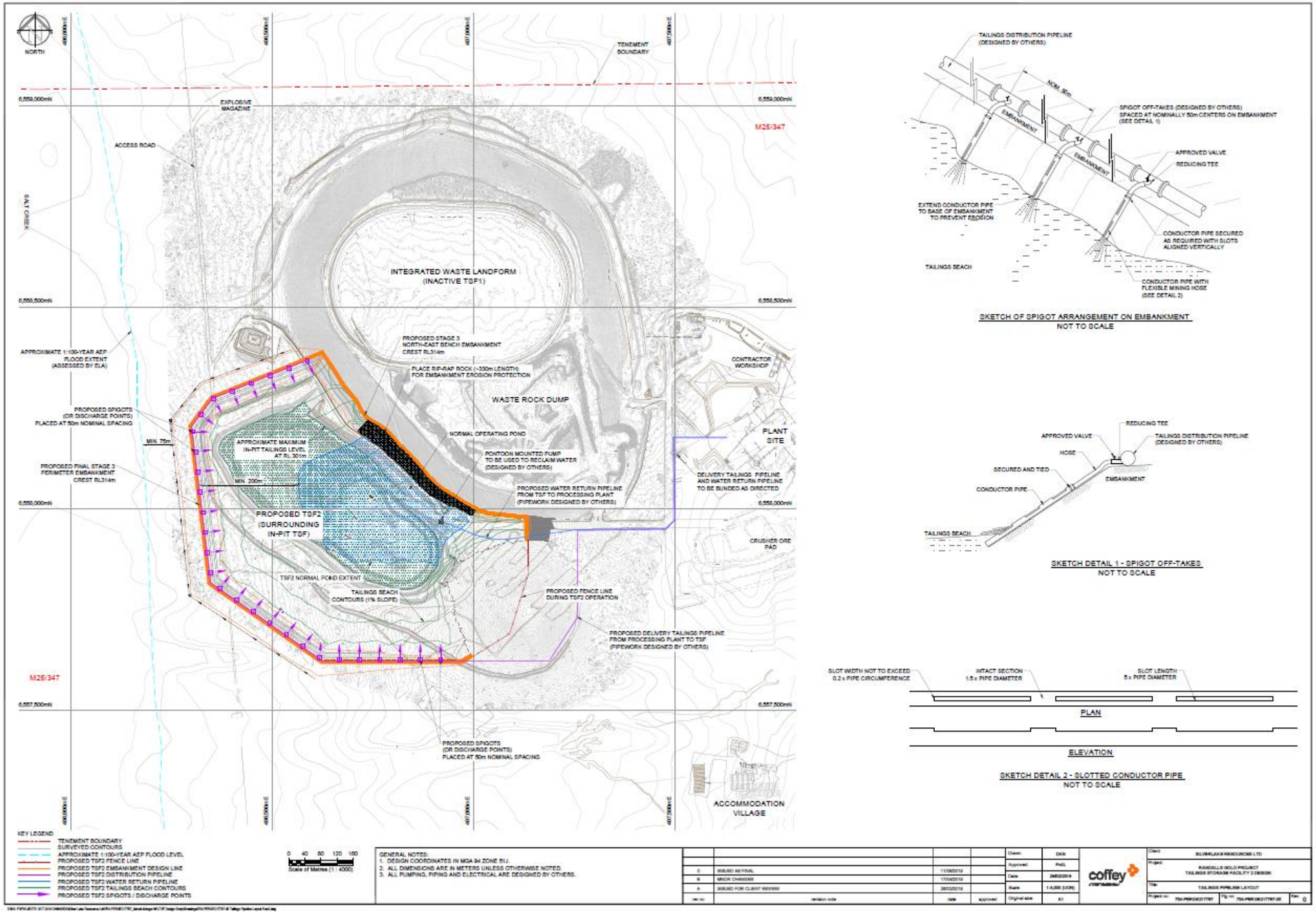


Figure 1: Location of the new TSF2



SKETCH OF SPIGOT ARRANGEMENT ON EMBANKMENT
NOT TO SCALE

SKETCH DETAIL 1 - SPIGOT OFF-TAKES
NOT TO SCALE

SKETCH DETAIL 2 - SLOTTED CONDUCTOR PIPE
NOT TO SCALE

Figure 2: Location of the tailing/return water pipeline (shown in purple).

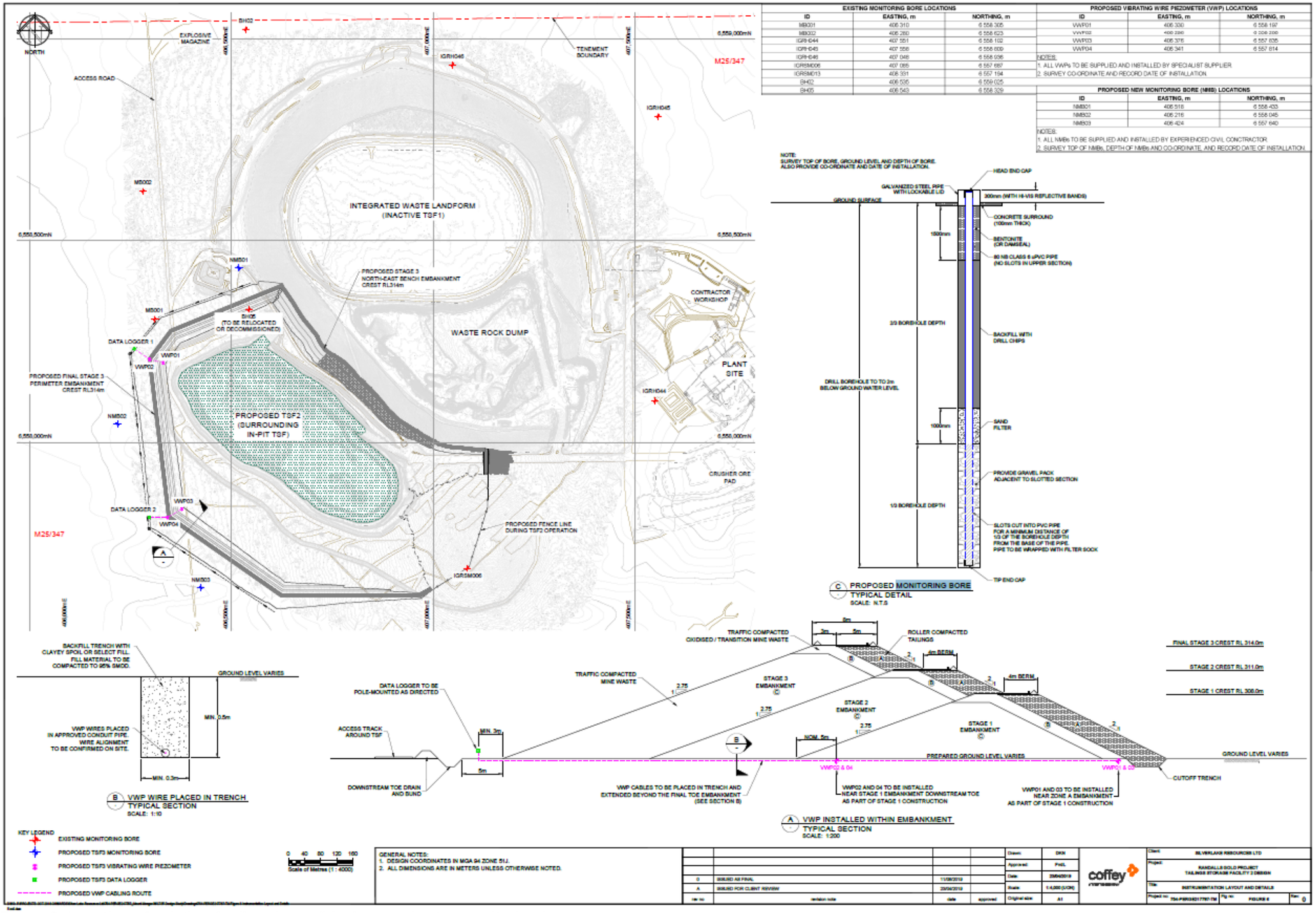


Figure 3: Location of existing (red) and new (blue) groundwater monitoring bores.

4.2 Infrastructure

The TSF 2 infrastructure, as it relates to Category 5 activities, is detailed in Table 4 and with reference to the Site Plan (Figure 1).

Table 4 lists infrastructure associated with each prescribed premises category.

Table 3: TSF2 Category 5 infrastructure

	Infrastructure	**Site Plan Reference**
	Prescribed Activity Category 5 – new TSF2	
1	New above ground 'side hill' TSF – Stage 1 embankment crest at RL308 m. Including cut-off trench under embankment, downstream toe drain system and decant pumping system.	Figure 1 – TSF 2 location
2	Decant infrastructure, tailings slurry and return water pipelines	Figure 2 – Location of tailings/return water pipeline
3	3 new groundwater monitoring bores and 4 new piezometers within the TSF2 embankment.	Figure 3 – Location of groundwater monitoring bores surrounding TSF2

5. Legislative context

Table 5 summarises approvals relevant to the assessment.

Table 4: Relevant approvals and tenure

Legislation	**Number**	**Approval**
Mining Act 1978	*NVCP 8519*	Native vegetation clearing permit approved under the Mining Act 1978 for clearing of vegetation within footprint of TSF2
	Mining Proposal	Mining Proposal is required for new and alternate disposal of tailings on M25/347. Proposal was approved on 29/11/2019.

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: Setting Conditions (October 2015)*
- *Guidance Statement: Decision Making (February 2017)*
- *Guidance Statement: Risk Assessments (February 2017)*

5.1.2 Works approval and licence history

Table 6 summarises the works approval and licence history for the premises.

Table 5: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
L8457/2010/1	02/09/2010	Licence for Salt Creek Processing Facility
L8457/2010/2	04/09/2013	Licence reissue and transfer to new format licence
L8457/2010/2	23/01/2014	Licence amendment to construct and undertake the cyclonic tailings deposition trial
L8457/2010/2	21/08/2014	Licence amendment to remove total cyanide monitoring and include an improvement condition for submission and implementation of a Groundwater Recovery Plan. Standard conditions 1.3.5 and 2.6.2 have also been added to the Licence
L8457/2010/2	21/05/2015	Licence amendment to allow simultaneous dewatering and tailings deposition to Salt Creek in-pit Tailings Storage Facility (SCITSF)
L8457/2010/2	31/12/2015	Licence amendment to increase nominated throughput
L8457/2010/2	06/10/2016	Licence amendment to include mobile crusher and increase nominated throughput, to include two new dewatering discharge points and reduce dewatering throughput
L8457/2010/2	10/2/2017	Amendment Notice 1: Licence amendment to include Fingals pit as a dewatering discharge location, increase the dewatering throughput to 400,000 tonnes per annum and update the premises boundary address and map
L8457/2010/2	16/10/2017	Amendment Notice 2: Licence amendment to increase the Category 6 design capacity from 400,000 tonnes per annum to 700,000 tonnes per annum
L8457/2010/2	03/09/2019	Amendment Notice 3: Licence amendment to include category 64 putrescible landfill as a prescribed activity.
W6316/2019/1		Works approval for the construction of TSF2.

6. Consultation

The application was advertised in the West Australian newspaper on 11/11//2019 for a comment period ending on 02/12/2019. No comments were received.

A letter inviting comment was sent to the City of Kalgoorlie Boulder on 15/11/2019. No comments were received.

7. Location and siting

7.1 Residential and sensitive Premises

The proposed TSF2 is located within the Mount Monger Pastoral Lease. The distances to residential and sensitive receptors are detailed in Table 7.

Table 6: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Mount Monger Station Homestead	Over 30km from the proposed TSF2 location.

7.2 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 8. Table 8 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem. The table has also been modified to align with the *Guidance Statement: Environmental Siting.*

Table 7: Environmental values

Specified ecosystems	Distance from the Premises
DBCA (Department of Biodiversity, Conservation and Attractions) Managed Land	The Randall Timber Reserve is located approximately 13km to the north east.
Threatened Ecological Communities and Priority Ecological Communities	None within a 5 km radius.
Biological component	**Distance from the Premises**
Threatened/Priority Flora	Priority 1 flora have been located approximately 1km from TSF2.
Threatened/Priority Fauna	None within a 5km radius.

7.3 Groundwater and water sources

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

Table 8: Groundwater and water sources

Groundwater and water sources	Distance from Premises
RIWI Act 1914 proclaimed Area - Goldfields Groundwater Area.	The site falls within the Goldfields Groundwater Area and is also managed under the Goldfields Groundwater Area Management Plan, 1994.
watercourses/waterbodies	An ephemeral flowing drainage channel known as Salt Creek is located approximately 150m west of the proposed TSF2 location terminating at a salt lake south of the Premises. The creek flows as sheet wash during significant local rainfall events. Un- named salt lake located approximately 5km south of TSF2 location.
Groundwater	Pre-mining groundwater levels surrounding the Salt Creek pit was approximately RL286m (12 meters below ground level (mbgl)). Recent groundwater data from 2018 indicates

	that groundwater depth on site ranges from 5 – 25mbgl. Some mounding of groundwater has occurred due to past tailings deposition into the decommissioned Integrated Waste Landform (IWL) TSF. Groundwater levels have naturally recovered over time since deposition into the IWL TSF has stopped. Previous efforts to recover groundwater levels using recovery bores were unsuccessful. No groundwater receptors (groundwater dependent ecosystems or registered third-party groundwater users) have been identified within 6 km of the TSF2 proposed site. Groundwater has an average TDS of 80 000 mg/L (AER, 2019).

7.4 Native vegetation

There are no conservation significant species or vegetation communities within the vicinity of the TSF and no Groundwater Dependent Ecosystems have been identified.

The locations of other receptors are shown in Table 10.

Table 10: Other landscape features, relevant factors or receptors

Other receptors or areas of concern	Location
Native Vegetation surrounding the proposed TSF2	Vegetation in the vicinity of the TSF2 location is of 'degraded' condition and consists mainly of *Eucalyptus* and *Casuarina* Woodlands and associated Shrub lands.(Outback Ecology, 2009)

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 13.

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		
Category 5 Processing or beneficiation of metallic or non-metallic ore.	Construction of TSF2 infrastructure.	Dust	Terrestrial ecosystems adjacent to the TSF The nearest residential receptor is Mount Monger Station Homestead 30km away.	Air: Particulate matter (fugitive dust)	Adverse impacts to the health and survival of remnant vegetation. Suppression of respiratory function (human health).	No	Minimal dust is expected to occur during the construction of TSF2. Construction activities will be short term. Water carts will be utilised to supress dust during construction if required. The separation distance between TSF2 and the residential receptor is too great to be considered a pathway for impacts to occur. The Delegated Officer has considers the risk from dust impacts to be negligible. The general provisions of the *Environmental Protection Act 1986* and the *Environmental Protection (Unauthorised Discharges) Regulations 2004* are also applicable.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		Noise	The nearest residential receptor is Mount Monger Station Homestead 30km away	Air: Noise generated by the operation of equipment during construction	Amenity impacts	No	Some noise emissions are expected to be generated during construction of TSF2. However, the distance to residential receptors is considered to be too great for noise impacts to occur. The Delegated Officer considers the risk of impact from noise emissions during construction of the TSF2 infrastructure to be acceptable given the distance to sensitive receptors. The provisions of the *Environmental Protection (Noise) Regulations 1997* are also applicable.

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		
Category 5 Processing or beneficiation of metallic or non-metallic ore	Deposition of tailings into TSF2	Dust lift off from tailings surface	Terrestrial ecosystems adjacent to the TSF The nearest residential receptor Mount Monger Station Homestead 30km away	Air: Transport and dispersion of particles (fugitive dust)	Adverse impacts to the health and survival of remnant vegetation. Suppression of respiratory function (human health).	No	Tailings will be kept at a slurry density of between 45% to 50% solids. This wet state will minimise dust lift off during operation of TSF2. Rotation of spigot points around the TSF to maintain damp breaches will occur during operations if dust lift off is observed. The Delegated Officer has considers the risk from dust impacts to be negligible. The general provisions of the *Environmental Protection Act 1986* and the *Environmental Protection (Unauthorised Discharges)*

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
							Regulations 2004 are also applicable.
		Seepage of leachate from base and walls of TSF2	Groundwater dependent ecosystems / groundwater users	Seepage through base and/or embankments of TSF into groundwater	Reduction in groundwater quality.	No	No groundwater receptors (groundwater dependent ecosystems or registered third-party groundwater users) have been identified within 6 km of the TSF2 proposed site. An unnamed salt lake is located approximately 5 km south of the TSF. The Delegated Officer considers that the separation distance between TSF2 and the salt lake receptor is too great to be considered a pathway for impacts to occur. The general provisions of the *Environmental Protection Act 1986* are applicable.
			Vegetation in close proximity to the proposed TSF2	Seepage through base and/or embankments of TSF into groundwater	Mounding of groundwater table resulting in impacts to surface vegetation.	Yes	Refer to section 8.4
		Rupture of pipelines causing tailings / decant water to discharge to land.	Localised soils and vegetation located adjacent to process plant and tailings pipeline	Land: Direct discharge to land	Soil contamination through release of tailings or saline/hypersaline water.	Yes	Refer to section 8.5
		Overtopping of TSF embankments resulting in tailings	Terrestrial ecosystems adjacent to the TSF	Direct discharge to land and infiltration to soil	Soil contamination inhibiting vegetation growth and survival and health impacts to	Yes	Refer to section 8.6

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		release.			fauna.		
		Tailings decant water containing cyanide (ranging from 64 -122 mg/L) or other toxic substances (e.g. arsenic, elevated heavy metals) with a TDS of approximately 145,600 mg/L.	Bids, bats or other wildlife	Birds or wildlife ingesting TSF 2 decant water (high salinity and elevated metal/metalloid concentrations)	Decline in health / death of birds or other wildlife	No	Research conducted on birds and bats in the context of gold mines in the Goldfields (and cyanide toxicity) has determined that birds will not drink hypersaline solutions (i.e. above 50,000 mg/L) (Adams, 2008). Recent decant water samples from the SCITSF indicate TDS concentrations approximately 145,600 mg/L from field testing in situ. Lucky Bay borefield water has a TDS around 250 000 mg/L (Annual groundwater monitoring summary, 2019) The Delegated Officer has considers the risk to birds and wildlife from TSF 2 decant water is negligible.

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	• **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 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 – TSF2 leachate seepage causing mounding of groundwater table (Risk Event 1).

8.4.1 Description of Risk Event 1

Tailings will be deposited into TSF2 on a continuous basis. Seepage of leachate from TSF2 into the surrounding groundwater will occur over time with the potential to cause mounding of the groundwater table close to the surface. This may impact localized native vegetation due to the saline quality of the groundwater.

Groundwater in the area surrounding the proposed TSF2 has an average TDS concentration of 80,000 mg/L (range between 48,000-130,000 mg/L TDS) and a pH range between 3.3 - 7.0.

Groundwater mounding has occurred in the past around the north eastern edge of the IWL TSF (located adjacent to the TSF2 location) due to tailings deposition and subsequent seepage. Groundwater levels had exceeded the licence limit of 4mbgl for SWL with groundwater mounding to less than 2mbgl between 2012 and 2016 (AER, 2019). Groundwater recovery bores were installed but produced little yield believed to be due to the geology in the area. Once the IWL TSF reached capacity and deposition of tailings ceased groundwater levels naturally attenuated back to below the licence limit and are currently around 5-6 mbgl.

There are no groundwater users or groundwater dependent ecosystems within 6km of the project.

8.4.2 Identification and general characterisation of emission

Recent geochemical tailings test work (Silverlake, 2019) indicates that the tailings are non-

acid forming (NAF) with some acid neutralizing capacity (all positive ANC results). The tailings have a WAD cyanide concentration between 64-122 mg/L and a TDS of apprimately 219,000 mg/L. Tailings decant water has a TDS of approximately 145,600 mg/L from field testing in situ.

The Applicant plans to add Lucky Bay bore field groundwater to TSF2 as the TSF supernatant (TDS of around 250 000 mg/L) decant volume is insufficient for the processing facility requirements and needs to be supplemented. The Applicant currently and temporarily adds bore-field water to the SCITSF to allow a short residence time for settling out of suspended solids including magnesium salts. This significantly reduces scaling within pipes, pumps and infrastructure at the plant and allows for a 'clear water' supernatant pond to be decanted back to the plant. The Applicant has stated that only enough water will be deposited from the bore-field that is required to 'top up' the supernatant volumes required at the plant.

Water balance

The Applicant provided a water balance based on the outputs of a steady state seepage modelling undertaken by Coffey Services Australia Pty Ltd in 2019 which includes the input of water from the Lucky Bay Bore.

Water inflow to the tailings storage facility is estimated to be 200 m^3/h (150 m^3/h of water contained in tailings plus 50 m^3/h of water from the Lucky Bay Bore), with an outflow of 150 m^3/h (decant return).

Table 16 presents results from the water balance which show annual seepage volume from Stage 3 of the TSF presented as a percentage of the storage volume. Seepage volume is expected to be 10.9% to 43.9% of the net input of water to TSF2. Scenario B is considered a more realistic scenario (exponentially decreasing seepage rate over 50 years) however the rate of decrease is unknown in the absence of undertaking more detailed seepage modelling. It is considered that Scenario A (Steady seepage rate over 50 yrs) and Scenario B likely provide an upper and lower bound to the actual seepage profile that would be observed for the site.

Table 16: Water balance showing inflow (tailings water storage) and simulated seepage volumes at 50 years as a percentage of the original water storage (ELA, 2019).

	Input Tailings Water Storage	Outflow Seepage Scenario A	Outflow Seepage Scenario B
Seepage Rate (m^3/d)	NA	34	Exponential decrease from 34 to 0 over 50 years
Seepage Time (years)	NA	50	50
Total Volume (m^3)	1,411,000	620,500	154,286.2
Percentage of Original Tailings Water Input (%)	-	43.9	10.9

8.4.3 Description of potential adverse impact from the emission

Hydrogeological modelling assessment

In 2019 Eco Logical Australia Pty Ltd (ELA, 2019) was engaged by the Applicant to undertake a hydrogeological modelling assessment to support the geotechnical design and expansion of the existing Salt Creek In- pit TSF (TSF2). Four scenarios were modelled (see Table 17). Scenarios were constructed using an analytical modelling approach (Aquifer Test Solver (AQTESOLV) software) and involve the simulation of a multi-well injection test to allow the prediction of cumulative head displacement due to seepage from tailings disposal, and the temporary residence of water from Lucky Bay bore within TSF2.

Table 17: Summary of scenarios modelled (ELA, 2019)

Property	Scenario 1A	Scenario 1B	Scenario 2A	Scenario 2B
No. Injection Wells	28	28	56	56
Injection Well Screen (m)	0 - 20	0 - 20	0 - 20	0 - 20
Seepage Rate (m^3/d)	34 (Constant)	Exponential Decrease (34, 28, 21, 14, 8, 2, 0.5)	34 (Constant)	Exponential Decrease (34, 28, 21, 14, 8, 2, 0.5)
Seepage Time (years)	50	0-5.1; 5.1-6; 6-10; 10-15; 15-20; 20-30; 30-50	50	0-5.1; 5.1-6; 6-10; 10-15; 15-20; 20-30; 30-50
Aquifer Thickness (m)	50	50	50	50
Kh (m/d)	0.0864	0.0864	0.00173	0.00173
Kh/Kv	1	1	1	1
Sy	0.05	0.05	0.05	0.05

Seepage rate was determined by data provided by Coffey (2019) who undertook steady state seepage modelling which included the addition of the Lucky Bay bore water (discussed under 'water balance' heading). Hydraulic conductivity (K) values were chosen based on the local hydrogeology at the site (weathered bedrock and palaeosediment hydrogeological units). A standing water level of 286 m RL (14 mbgl) and ground surface elevation of 300 m RL was used in the modelling simulations and is based on available groundwater monitoring data for the site.

The groundwater modelling assessment indicated that groundwater mounding is likely to occur and suggests that groundwater mounding is only expected to be notable within the immediate vicinity of the TSF2 boundary. It is predicted that mounding may spread to a maximum extent of approximately 0.8 km from the pit (TSF2).

Mounding is predicted at a maximum of 11 metres (3 mbgl) at the TSF2 boundary under the most conservative scenario (Scenario 2A – constant seepage rate over 50 years, includes the temporary storage of bore-water in TSF2). The predicted groundwater level remains below the existing ground surface at the Stage 3 TSF2 embankment by approximately 3 metres. This scenario is conservative and is unlikely to occur as seepage rates will not remain at a constant rate but will decrease over time. At 100 meters from the boundary of TSF2 (where the new monitoring bores are proposed to be constructed) groundwater levels are predicted to rise between 0.75m (13.25mbgl) to 7.5m (6.5mbgl). It is unlikely that the maximum rise in SWL will occur as the model is assuming a constant rate of seepage over 50 years. Realistically seepage rates will decrease over time. Therefore it is assumed that SWL at 100m from the TSF boundary (where monitoring bores will be placed) is expected to be somewhere between 13.25 and 6.5mbgl (assuming a starting level of 14mbgl).

Current groundwater levels

June 2019 groundwater monitoring data indicates that standing water level (SWL) in the SCITSF vicinity, range from 5 mbgl to 32 mbgl. Most of the monitoring bores surrounding the current SCITSF (where TSF2 will be constructed) indicate a SWL greater than 12 mbgl with the exception of 2 northern bores located close to IWL TSF which have SWL around 5 - 6 mbgl.

The groundwater mounding assessment has not taken into account the shallower groundwater levels north of the TSF2 location where the TSF2 footprint butts up against the IWL TSF. Groundwater levels here are apprimately 5-6mbgl. The groundwater mounding model assumes a SWL of 14mbgl so may not accurately represent groundwater levels surrounding all sections of the proposed TSF2. Therefore there is the potential for groundwater levels to exceed the licences groundwater SWL limit of 4mbgl. In the event of this happening the Applicant has committed to developing a groundwater recovery plan.

To address this possibility conditions will be placed on the licence to implement a target of 6mbgl for standing water levels surrounding TSF2. A condition will also be added to ensure actions to reduce SWL will take place if the target is exceeded. A condition requiring monitoring of the vegetation surrounding TSF2 will also be added to the licence.

8.4.4 Applicant controls

Supernatant water will be removed by a dedicated pumping system (i.e. floating pontoon mounted pump designed by others) and pumped back to the process water pond in the plant site for re-use. Water inflow to the tailings storage facility is estimated to be 200 m^3/h (150 m^3/h of water contained in tailings plus 50 m^3/h of water from the Lucky Bay Bore), with an outflow of 150 m^3/h (decant return).

The pontoon pump used during the operation of the current SCITSF will be reused if appropriate. The decant pond will be controlled during operation such that it will be maintained away from the northern, western and southern perimeter embankments at all times (i.e. not less than 200m from the perimeter embankments).

A cut-off trench under the Stage 1 perimeter embankment will be constructed to reduce horizontal seepage losses from the facility. A downstream toe drain system will be also constructed to capture any seepage flow through the perimeter embankment. Seepage collected via the toe drain system will drain by means of gravity to collection sumps.

The TSF2 foundation will have top soil removed and the ground compacted. The results from the hydraulic (fallings head) tests indicated that the in situ permeability of the upper foundation horizon at the SCITSF site is 10^{-6} m/s to 2 x 10^{-8} m/s (10^{-7} m/s average). These values indicate low permeability.

Currently there is a network of groundwater monitoring bores surrounding the IWLTSF and the SCITSF. With the construction of TSF2 around the SCITSF (in-pit TSF) three new monitoring bores are proposed to be constructed to allow ongoing monitoring of groundwater quality and standing water levels.

The licence also has existing conditions which require a limit of 4mbgl to be maintain within the TSF groundwater monitoring bores. This condition will be updated to include the new groundwater monitoring bores surrounding TF2.

8.4.5 Key findings

The Delegated Officer has reviewed the information regarding Risk Event 1 and has found:

1. Additional water from Lucky Bay bore-field will be added to the decant pond of TSF2 to allow ‘clean’ water to be pumped back to the processing plant.
2. Groundwater mounding may occur. At 100 meters from the boundary of TSF2 (where the new monitoring bores are proposed to be constructed) groundwater levels are predicted to rise between 0.75m (13.25mbgl) to 7.5m (6.5mbgl) (ELA, 2019).
3. Mounding due to seepage has been modelled to be localised to TSF2 (ELA, 2019).
4. The groundwater mounding assessment has not taken into account the shallower groundwater levels north of the TSF2 location where the TSF2 footprint butts up against the IWL TSF. Groundwater levels here are apprimately 5-6mbgl. The groundwater mounding model assumes a SWL of 14mbgl so may not accurately represent groundwater levels surrounding all

sections of the proposed TSF2. Therefore there is the potential for groundwater levels to exceed the licences groundwater SWL limit of 4mbgl.

5. There are no conservation significant species or vegetation communities within the vicinity of the TSF and no Groundwater Dependent Ecosystems have been identified.

8.4.6 Consequence

The Delegated Officer has determined that groundwater mounding close to the surface would cause mid-level on-site impacts. The consequence would therefore be considered **Moderate**.

8.4.7 Likelihood

The Delegated Officer has determined that based on information provided in the Application the likelihood of groundwater mounding impacting vegetation is **Possible** (event could occur at some time).

8.4.8 Overall rating of Risk Event 1

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 13) and determined that the overall rating for this risk event is **Medium**.

8.5 Risk Assessment – Rupture of tailings/ return water pipelines (Risk Event 2)

8.5.1 Description of Risk Event 2

Release of tailings slurry and/or supernatant to land and subsequent contamination of soil or vegetation as a result of pipeline failures.

8.5.2 Identification and general characterisation of emission

Recent geochemical tailings test work (Silverlake, 2019) indicates that the tailings are non-acid forming (NAF) with some acid neutralizing capacity (all positive ANC results). The tailings has a WAD cyanide concentration between 64-122 mg/L and a TDS of approximately 219,000 mg/L.

Tailings decant water has a TDS of approximately 145,600 mg/L from field testing in situ.

8.5.3 Description of potential adverse impact from the emission

The release of tailings into the surrounding environment would be detrimental to the vegetation and soil through physical smothering and from the toxicity of the tailings. Release of return water which is saline/hypersaline could impact the health of nearby vegetation.

Figure 2 outlines the route (in purple) from the processing plant to TSF2.

8.5.4 Applicant controls

The Applicant has committed to the following; all pipelines (tailings and return water) will be bunded and have scour sumps installed along the pipeline route. The tailings line will also have telemetry installed where a fall in pressure within the pipe will trigger an alarm and the tailings pump will be switched off. Return water pipeline will also have a flow meter installed which will help in the detection of leaks (will be bunded). Pipelines will also be inspected for leaks once per shift.

8.5.5 Key findings

The Delegated Officer has reviewed the information regarding the risk of pipeline rupture and has found:

1. Tailings solids contain metals/metalloids, have a WAD cyanide concentration between 64-122 mg/L and a TDS of approximately 219,000 mg/L.
2. Supernatant water (return water) has is hypersaline (TDS approximately 145,600 mg/L).
3. All pipelines will be contained within an earthen bund with scour pits. Tailings pipelines will be fitted with telemetry and return water pipeline will be fitted with a flow meter. Control room to monitor flow rates and pressure losses to enable rapid shutdown (not automatic).
4. Pipelines will be inspected for leaks daily.

8.5.6 Consequence

The Delegated Officer has determined that rupture of tailings/return water pipelines would cause low level on-site impacts. The consequence would therefore be considered **Moderate**.

8.5.7 Likelihood

The Delegated Officer has determined that the likelihood of tailings/return water being released to land from leaks and spills from pipelines is considered **Unlikely** due to the Applicant's proposed controls.

8.5.8 Overall rating of Risk Event 2

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 13) and determined that the overall rating for this risk event is **Medium.**

8.6 Risk Assessment – Overtopping of TSF2 (Risk Event 3)

8.6.1 Description of Risk event 3

Overtopping of the TSF releasing tailings supernatant or tailings slurry to surrounding land or surface water due to a storm event or operator error.

8.6.2 Identification and general characterisation of emission

Recent geochemical tailings test work (Silverlake, 2019) indicates that the tailings are non-acid forming (NAF) with some acid neutralizing capacity (all positive ANC results). The tailings has a WAD cyanide concentration between 64-122 mg/L and a TDS of apprimately 219,000 mg/L.

Tailings decant water has a TDS of approximately 145,600 mg/L from field testing in situ.

8.6.3 Description of potential adverse impact from the emission

Contamination of surrounding land with toxic metals and metalloids, dissolved solids and cyanide affecting soil quality inhibiting vegetation growth and survival and health impacts to fauna.

Contamination of a nearby (150m from TSF2) surface water drainage line (only flows during rain events) leading to downstream impacts.

8.6.4 Applicant controls

The TSF2 has been designed to temporarily store storm-water from a 1:100 year Annual Exceedance Probability (AEP), 72 hour storm event plus a minimum operational freeboard of 300mm and a beach freeboard of 200mm.

The Applicant has committed to maintaining a total freeboard of 500mm to ensure overtopping of embankments does not occur. Daily inspection of the TSF freeboard will also occur.

8.6.5 Key findings

The Delegated Officer has reviewed the information regarding the risk of TSF2 overtopping and has found:

1. Tailings solids contain metals/metalloids, have a WAD cyanide concentration between 64-122 mg/L and a TDS of approximately 219,000 mg/L.
2. There are no human receptors within the vicinity of the Premises, however surrounding vegetation and surface water drainage line could be impacted if this event was to occur.
3. A 500mm total freeboard will be maintained in order to allow for a 1 in 100 year ARI, 72 hour storm event.

8.6.6 Consequence

The Delegated Officer has determined that overtopping of the TSF would cause mid-level on-site impacts. The consequence would therefore be considered **Moderate**.

8.6.7 Likelihood

The Delegated Officer has determined that the likelihood of Overtopping of TSF2 occurring will be **Unlikely** due to the Applicant's proposed controls.

8.6.8 Overall risk rating for overtopping of Risk Event 3

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 13) and determined that the overall rating for this risk event is **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 18 below. Controls are described further in section 9.

Table 18: Risk assessment summary

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)
	Emission	**Source**	**Pathway/ Receptor (Impact)**			
1.	Tailings Seepage	TSF2	Infiltration through underlying soils to groundwater with the potential for groundwater mounding close to the surface to occur	No engineered liner is proposed –The foundation will be compacted and will have a hydraulic conductivity of $1x10^{-7}$ m/s (average). A cut-off trench under the Stage 1 perimeter embankment A downstream toe drain system Supernatant water will be removed back to the process water pond.	Medium	The Applicants controls will be conditioned in the works approval. Additional conditions to manage this risk will be added to the licence (inclusion of a 6m target for SWL and the requirement to monitor vegetation surrounding TSF2).
2.	Release of tailings/supernatant through rupture of pipeline	Tailings/ decant return pipeline	Direct discharge to land	Pipelines (tailings and return water) will be bunded and have scour sumps installed along the pipeline route. The tailings line will have telemetry installed. Return water pipeline will have a flow meter installed Pipelines will also be inspected for leaks once per shift.	Medium	The Applicants controls will be conditioned in the works approval
3.	Overtopping of TSF2	TSF2	Direct discharge to land	TSF will be inspected during each shift. A 500 mm freeboard will be maintained in order to allow for a 1 in 100 year ARI, 72 hour storm event.	Medium	Acceptable subject to further regulatory controls.

9. Regulatory controls

The regulatory controls are outlined in this section. DWER will determine controls having regard to the adequacy of controls proposed by the Applicant. The conditions of the Works Approval and Licence will be set to give effect to the determined regulatory controls.

9.1 Works Approval controls

9.1.1 TSF2 Infrastructure

The TSF 2 infrastructure is required to be constructed in accordance with the application documents. Infrastructure will include;

- Staged construction of TSF 2 embankments (Stages 1 to 3)
- Decant pump system – floating pontoon mounted pump.
- Tailings delivery and return water pipelines and bunded pipeline corridor.
- 3 new groundwater monitoring bores in locations surrounding TSF2.

9.1.2 Reporting

A report detailing compliance with the construction requirements for TSF 2 infrastructure for each stage of construction must be submitted prior to operation (tailings deposition).

9.2 Licence controls (by amendment to Existing Licence L8457/2010/2)

9.2.1 Containment infrastructure

Condition 1.2.2 (Table 1.2.1) will be updated to include TSF 2 and remove reference to Salt Creek IPTSF. A requirement to operate the supernatant decant infrastructure to minimise the volume of supernatant water within the TSF will be applied to TSF2.

9.2.2 Dewatering water disposal into SCITSF

Conditions 1.2.6 & 1.2.7 will be removed from the licence as dewatering water from the Lucky Bay pit is no longer discharged to the SCITSF.

9.2.3 Tailings and return water pipelines

Existing licence condition 1.2.1 provide adequate regulatory controls for the operation of TSF2 pipelines.

9.2.4 Freeboard and Inspections

Existing condition 1.2.3 relating to the freeboard of the SCITSF will be updated to reference TSF2.

Existing condition 1.2.5 provide adequate regulatory controls for the operation of TSF in regards to frequency of inspections. It will be updated to include inspection of TSF2.

9.2.5 Ambient environmental quality monitoring

Condition 3.3.1 (Table 3.3.1) to be updated to include the three new monitoring bores surrounding TSF2 and the removal of monitoring bores that will be decommissioned/lost (Bores SC01, SC02, SC03 and possibly MB001) as a result of the construction of TSF2. A SWL limit of a minimum of 4mbgl will be applied to the three new monitoring bores.

A target SWL of 6 meters will be added to the licence. Conditions requiring specific management actions to reduce SWLs if this target is exceeded will also be added to the licence.

9.2.6 Monitoring of vegetation condition surrounding TSF2

A condition requiring photographic monitoring of the vegetation surrounding TSF2 will be added to the licence as there is the possibility of groundwater mounding occurring leading to impacts to native vegetation.

9.2.7 Water balance for TSF2

A condition requiring a monthly water balance for TSF2 is to be submitted as part of the annual environmental report. This will help determine whether the addition of the lucky bay bore water into TSF2 is being managed appropriately and that excess seepage from TSF2 is not occurring.

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

Table 19: Summary of conditions to be applied

Condition Ref	Grounds
Infrastructure and Equipment 1, 2 and 3	These conditions are valid, risk-based and contain appropriate controls.
Emissions 4	This condition is valid, risk-based and consistent with the EP Act.
Record Keeping 5 and 7	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 approvals under the EP Act.

11. Applicant's comments

The Applicant was provided with the draft Decision Report and draft Works Approval on 19 December 2019. The Applicant responded on 13 January 2020 with no comments.

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

Tim Gentle

Digitally signed by Tim Gentle
Date: 2020.01.13 15:27:33 +08'00'

Tim Gentle
Manager – Resource Industries
Regulatory Services
Delegated Officer under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

	Document title	In text ref	Availability
1.	Application form and supporting documentation for Salt Creek Processing Facility TSF2 ,submitted 4 September 2019, Silver Lake Resources	Application	DWER records (A1820341)
2.	Email correspondence received 23/10/2019 10:04 AM, Application for a works approval response to request for further information, Joanna Kiddie – Environmental Manager, Silverlake Resources (includes attachment).	Silverlake, 2019	DWER records (A1834648)
3.	Adams MD, 2008, Cyanide ecotoxicity at hypersaline gold operations, MERIWA report no273, Volume I – Phase I (Preliminary Investigation), Volume II– Phase II (Definitive Investigation), Volume III – Appendices to Phase II, August (Minerals and Energy Research Institute of Western Australia: Perth)	Adams, 2008	Can be found at https://www.cyanidecode.org/sites/default/files/pdf/GoldFieldsStIvesStudyFindings_0.pdf
4.	Eco Logical Australia Pty Ltd, Silver Lake Resources Mount Monger Operation – Groundwater Assessment – Update, 9 August 2019	ELA, 2019	DWER records (A1820341)
5.	Golder Associates, Geotechnical and Hydrogeological Investigation Report, Report No. 097641008 010 R Rev1, June 2009.	Golder, 2009	DWER records (A1820341)
6.	Outback Ecology services for Integra mining limited, April 2009, Randalls Gold Project, Salt Creek Level 2 and Maxwells and Cock-Eyed Bob Level 1 Flora and Vegetation Survey	Outback Ecology, 2009	DWER records (A1820341)
7.	SilverLake Resources Annual Environmental Report for annual period 2018, submitted 29/3/2019.	AER, 2019	DWER record (A1837215)
8.	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.		accessed at www.dwer.wa.gov.au
9.	DER, November 2016. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.		
10.	DER, November 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.		

Attachment 1: Issued Works Approval