Government of Western Australia
Department of Water and Environmental Regulation

# Amendment Notice 1

| | |
|---|---|
| **Licence Number** | L7815/2001/11 |
| **Licence Holder** | Saracen Metals Pty Ltd |
| **ACN** | 107 154 727 |
| **File Number:** | 2012/006911 |
| **Premises** | North Eastern Goldfields Operations<br><br>Mining tenements L36/155, L36/157, L36/158, L36/181, L36/193, L36/199, L36/202, L37/61, L37/73, L37/142, L37/166, L37/181, L37/199, L37/215, L37/216, M36/35, M36/421, M36/428, M36/462, M36/473, M36/494, M36/503, M36/504, M36/512, M36/525, M36/527, M36/541, M36/542, M36/582, M37/339, M37/340, M37/356, M37/357, M37/358, M37/359, M37/360, M37/361, M37/465, M37/367, M37/368, M37/437 and M36/599 |
| **Date of Amendment** | 31 October 2017 |

**Amendment**

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended the above Licence in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act) as set out in this Amendment Notice. This Amendment Notice constitutes written notice of the amendment in accordance with section 59B(9) of the EP Act.

Date signed: 31 October 2017

**Tim Gentle**

**Manager Licensing (Resource Industries)**

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

# Definitions and interpretation

## Definitions

In this Amendment Notice, 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 |
| Amendment Notice | refers to this document |
| Category/ Categories/ Cat. | categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations |
| CEO | means Chief Executive Officer.<br>CEO for the purposes of notification means:<br>Director General<br>Department Administering the *Environmental Protection Act 1986*<br>Locked Bag 33 Cloisters Square<br>PERTH WA 6850<br>info-der@dwer.wa.gov.au |
| CS Act | *Contaminated Sites Act 2003* (WA) |
| 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 |
| EPA | Environmental Protection Authority |
| EP Act | *Environmental Protection Act 1986* (WA) |
| EP Regulations | *Environmental Protection Regulations 1987* (WA) |
| Licence Holder | Saracen Metals Pty Ltd |
| $m^3$ | cubic metres |

| | |
|---|---|
| mbgl | metres below ground level |
| 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. |
| PMP | Probable Maximum Precipitation |
| Prescribed Premises | has the same meaning given to that term under the EP Act. |
| Premises | refers to the premises to which this Amendment Notice applies, as specified at the front of this Amendment Notice. |
| Risk Event | as described in *Guidance Statement: Risk Assessment* |
| RL | Reduced level – survey datum point |
| TSF | Tailings Storage Facility |

# Amendment Notice

This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend the Licence issued under the EP Act for a prescribed premises as set out below. This notice of amendment is given under section 59B(9) of the EP Act.

This notice is limited only to an amendment for works to be constructed under category 5. No other changes to the existing Licence have been requested by the Licence Holder.

The following guidance statements have informed the decision made on this amendment

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Decision Making (November 2016)*
- *Guidance Statement: Risk Assessment (November 2016)*
- *Guidance Statement: Environmental Siting (November 2016)*

## Amendment description

DWER received an application to amend Licence L7815/2001/11 to construct an embankment lift to Cell A of the tailings storage facility (TSF) from the current height of RL509.0 m to RLx m. this is also referred to as the stage 6 lift.

The TSF at Thunderbox Gold Mine (part of Saracen's North Eastern Goldfields Operations) consists of 2 above ground paddock facilities, cell A and B designed with basin underdrainage and a central pump out decant system. The TSF was constructed in 2002 and operated until 2007, where the facility went into care and maintenance. The TSF was recommissioned in 2016, with stage 5 lifts for Cell A and B constructed in 2015 and 2017 respectively. The previous construction works for each cell are summarised in Table 2 below.

**Table 2: TSF Construction Summary**

| Stage | Cell A | | Cell B | |
|---|---|---|---|---|
| | Crest RL | Construction completed | Crest RL | Construction completed |
| 1 | RL497.0m | October 2002 | RL493.5m | October 2002 |
| 2 | RL499.5m | July 2003 | RL496.0m | September 2003 |
| 3 | RL502.0m | October 2004 | RL498.5m | October 2005 |
| 4 | RL504.5m | November 2006 | RL501.0m | March 2007 |
| 5 | RL509.0m | December 2015 | 503.5m | April 2017 |

The Stage 5 embankment lift was authorised under Works Approval W5794/2015/1. The Stage 6 embankment raise adheres to the Tailings Storage Facility design that was the basis of the works approval (Saracen 2014). Knight Piesold have completed a technical specification for the scope of works for the embankment raise, consistent with the design report by Coffey (Knight Piesold 2017a; Knight Piesold 2017b). The scope of the works are as shown in Figures 1, 2 and 3 following.

Additionally Saracen have noted that groundwater monitoring bore MB1 has been destroyed by the Eastern Waste Rock Dump and requires removal from the monitoring suite. Landfill locations have also been updated at this amendment.

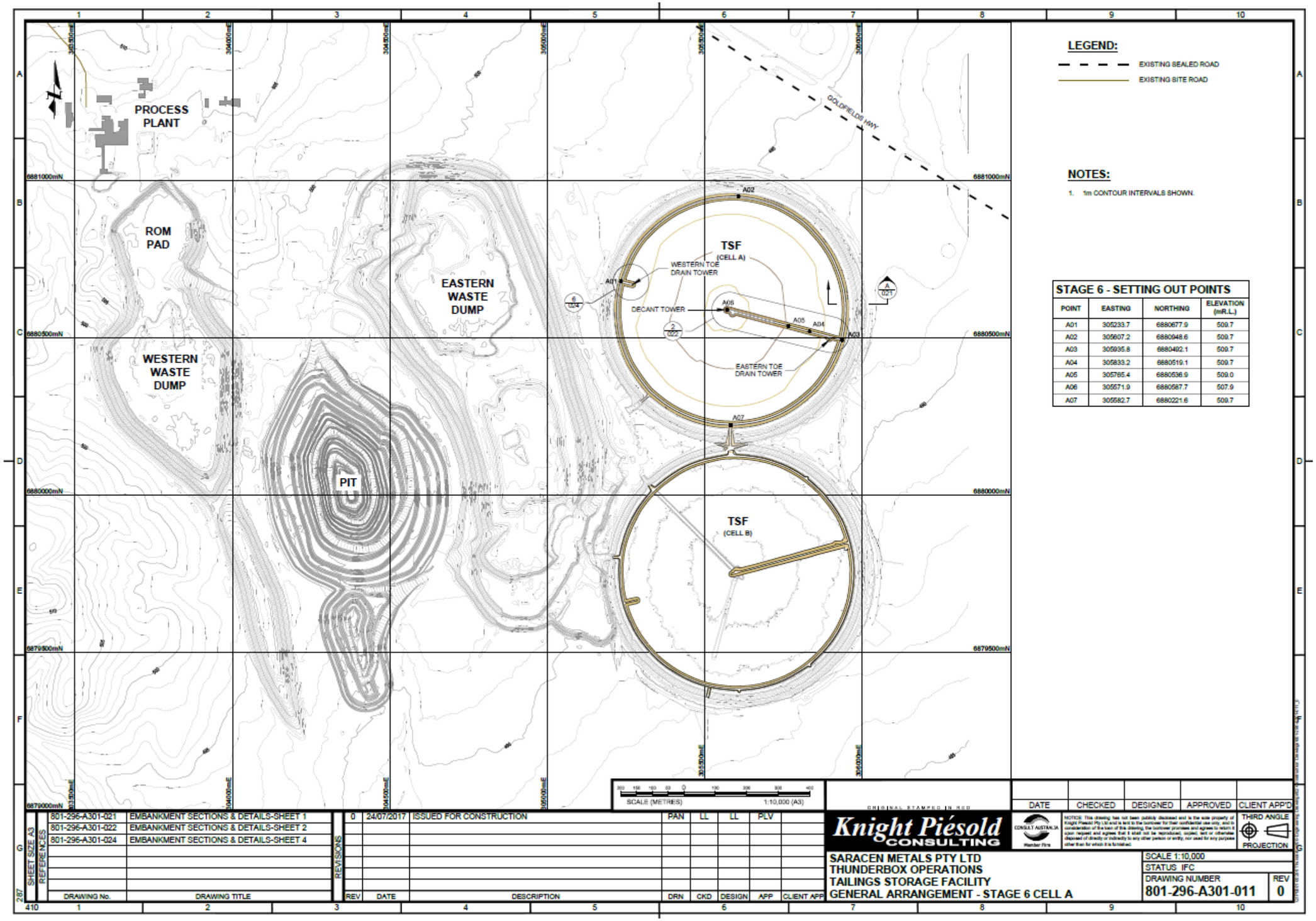



**Figure 1: General arrangement drawing for Stage 6 embankment raise works for TSF Cell A (works highlighted in yellow) (Knight Piesold 2017a)**

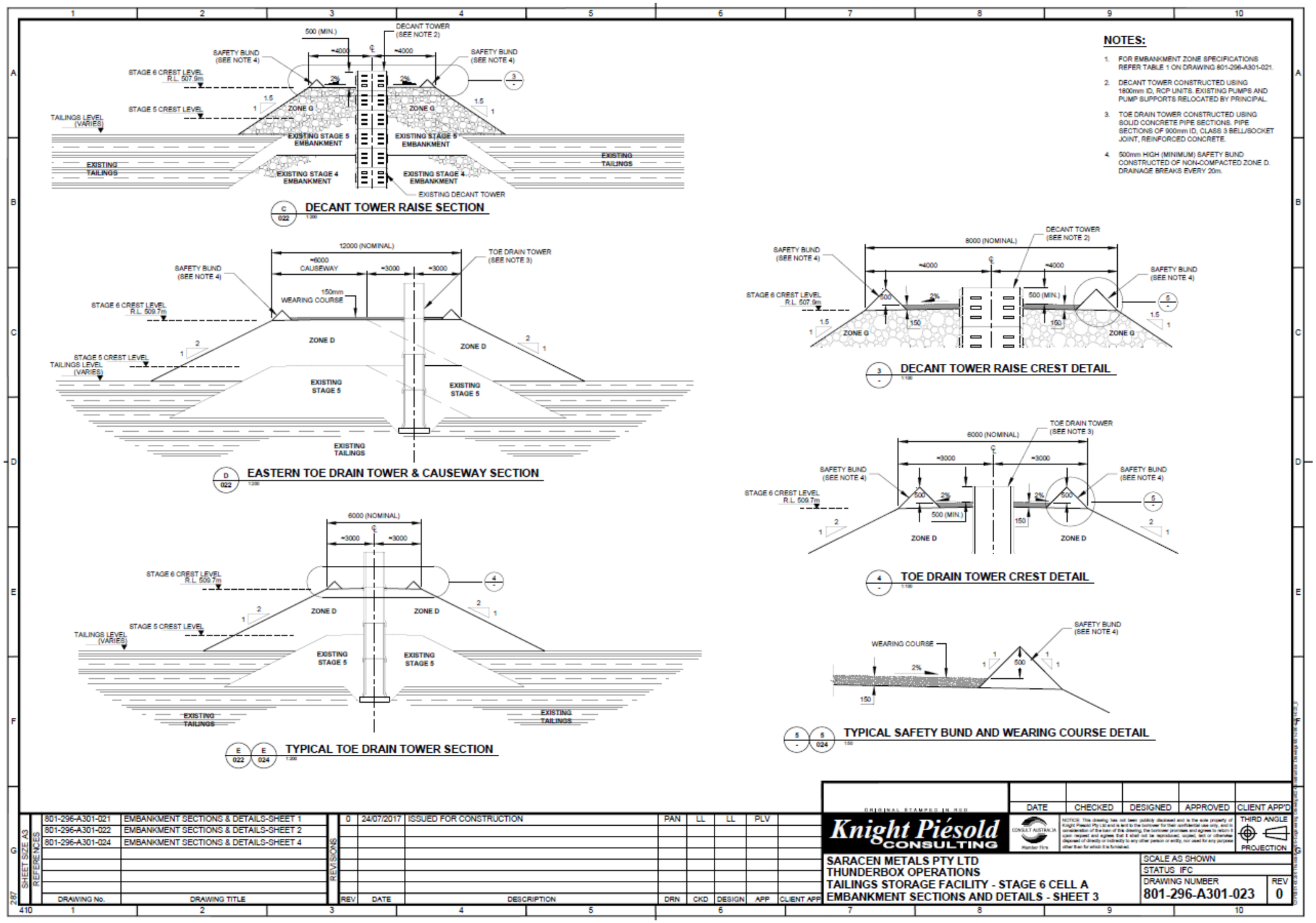



**Figure 2: Stage 6 embankment raise for TSF Cell A embankment sections (Knight Piesold 2017a)**

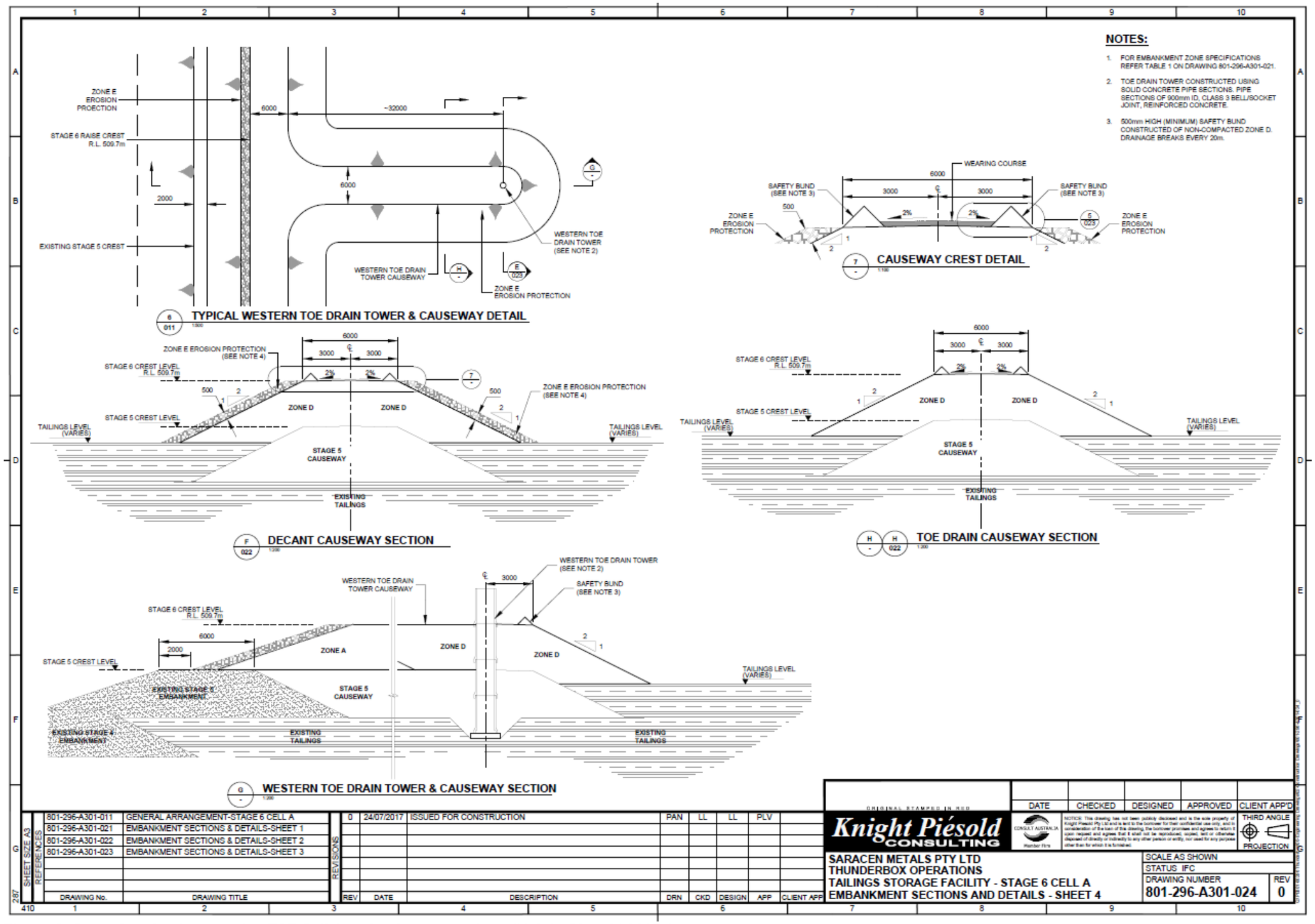



**Figure 3: Stage 6 embankment raise TSF Cell A embankment sections (Knight Piesold 2017a)**

## Amendment history

Table 3 provides the amendment history for L7815/2001/11.

**Table 3: Licence amendments**

| Instrument | Issued | Amendment |
|---|---|---|
| L7815/2001/11 | 29 January 2015 | Licence amendment |
| L7815/2001/11 | 29 October 2015 | Licence amendment to move out of care and maintenance, increasing throughput for category 5 to 2.6 Mtpa. |
| L7815/2001/11 | 4 April 2016 | Licence amendment to add categories 64 and 85. |
| L7815/2001/11 | 11 November 2016 | Licence amendment to add Bannockburn tenements and tenements for the connecting haul road and pipeline to Thunderbox as part of the North Eastern Goldfield Operations' Premises.<br>Removal of monitoring bore MB3. Correction to the power plant generators description. |
| L7815/2001/11 | 31 October 2017 | Licence amendment to authorise construction of stage 6 embankment lift to TSF Cell A. |

## Location and receptors

Table 4 below lists the relevant sensitive land uses in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

**Table 4: Receptors and distance from activity boundary**

| Residential and sensitive premises | Distance from Prescribed Premises |
|---|---|
| Goldfields Hwy | At premises boundary |

Table 5 below lists the relevant environmental receptors in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

**Table 5: Environmental receptors and distance from activity boundary**

| Environmental receptors | Distance from Prescribed Premises |
|---|---|
| Groundwater (fresh, TDS 370 – 740 mg/L; pH neutral to slightly alkaline (7.1 – 8.0) | Underlying the TSF at depths of between 19 mgbl to 28 mbgl. |

## Risk Assessment Methodology

The risk assessment following utilises the risk rating matrix as shown in Table 6, recently updated in accord with DWER's *Guidance Statement: Risk Assessments (November 2016)* (DER 2016a). The risk criteria used in the matrix below is further defined in Table 7.

**Table 6: 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 |

**.Table 7: Risk criteria definitions (taken from DWER's *Guidance Statement: Risk Assessments*)**

| Consequence | | |
|---|---|---|
| **The following criteria will be used to determine the consequences of a risk event occurring:** | | |
| | **Environment** | **Public Health* and Amenity (such as air and water quality, noise, and odour)** |
| **Severe** | • **on-site impacts**: catastrophic<br>• **off-site impacts local scale**: high level or above<br>• **off-site impacts wider scale:** mid level or above<br>• Mid to long term or permanent impact to an area of high conservation value or special significance^<br>• Specific Consequence Criteria (for environment) are significantly exceeded | • Loss of life<br>• **Adverse health effects:** high level or ongoing medical treatment<br>• Specific Consequence Criteria (for public health) are significantly exceeded<br>• **Local scale impacts:** permanent loss of amenity |
| **Major** | • **on-site impacts**: high level<br>• **off-site impacts local scale**: mid level<br>• **off-site impacts wider scale**: low level<br>• Short term impact to an area of high conservation value or special significance^<br>• Specific Consequence Criteria (for environment) are exceeded | • **Adverse health effects:** mid level or frequent medical treatment<br>• Specific Consequence Criteria (for public health) are exceeded<br>• **Local scale impacts**: high level impact to amenity |
| **Moderate** | • **on-site impacts**: mid level<br>• **off-site impacts local scale**: low level<br>• **off-site impacts wider scale**: minimal<br>• Specific Consequence Criteria (for environment) are at risk of not being met | • **Adverse health effects:** low level or occasional medical treatment<br>• Specific Consequence Criteria (for public health) are at risk of not being met<br>• **Local scale impacts:** mid level impact to amenity |
| **Minor** | • **on-site impacts**: low level<br>• **off-site impacts local scale**: minimal<br>• **off-site impacts wider scale**: not detectable<br>• Specific Consequence Criteria (for environment) likely to be met | • Specific Consequence Criteria (for public health) are likely to be met<br>• **Local scale impacts:** low level impact to amenity |
| **Slight** | • **on-site impact**: minimal<br>• Specific Consequence Criteria (for environment) met | • **Local scale**: minimal impacts to amenity<br>• Specific Consequence Criteria (for public health) criteria met |

| Likelihood | |
|---|---|
| **The following criteria will be used to determine the likelihood of the risk event occurring.** | |
| | |
| **Almost Certain** | The risk event is expected to occur in most circumstances |
| **Likely** | The risk event will probably occur in most circumstances |
| **Possible** | The risk event could occur at some time |
| **Unlikely** | The risk event will probably not occur in most circumstances. |
| **Rare** | The risk event may only occur in exceptional circumstances |

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

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

**"on-site"** means within the prescribed premises boundary

## Risk assessment

Tables 8 and 9 below describe the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments* (DER 2016a). Both tables identify whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

**Table 8: Risk assessment for proposed amendments during construction**

| Risk Event | | | | | | Consequence rating | Likelihood rating | Risk | Reasoning |
|---|---|---|---|---|---|---|---|---|---|
| **Source/Activities** | | **Potential emissions** | **Potential receptors** | **Potential pathway** | **Potential adverse impacts** | | | | |
| **Category 5** Processing or beneficiation of metallic or non-metallic ore | Construction of TSF lift | **Dust**: associated with construction activities | Passing traffic on Goldfields Hwy | Air | Health and amenity impacts | **Minor** (tailings solids have elevated arsenic concentration) | **Unlikely** | **Medium** | TSF scope of works requires the contractor to manage dust and regularly wet down roads and work areas (Knight Piesold 2017b). |
| | | **Noise:** associated with construction activities | | Air | Amenity impacts | N/A | N/A | N/A | TSF scope of works requires the earthmoving equipment to be fitted with smart alarm reversing systems maintained in good working order. Muffler systems on all equipment to be maintained in good working order (Knight Piesold 2017b). Delegated Officer deems this amenity impact to be negligible. |

**Table 9: Risk assessment for proposed amendments during operation**

| Risk Event | | | | | | Consequence rating | Likelihood rating | Risk | Reasoning |
|---|---|---|---|---|---|---|---|---|---|
| **Source/Activities** | | **Potential emissions** | **Potential receptors** | **Potential pathway** | **Potential adverse impacts** | | | | |
| **Category 5** Processing or beneficiation of metallic or non-metallic ore | Tailings deposition to Cell A | Tailings seepage | Groundwater with beneficial use (fresh water quality) | Through underlying soil to groundwater | Increasing pH, metals /metalloids in groundwater that was suitable for livestock/ potable use | **Minor** | **Possible** | **Medium** | Refer to 'Reasoning –risk event: Seepage impacts on groundwater quality', section below this table. |
| | | | Native vegetation | Groundwater mounding at base of the TSF | Rising standing water levels result in inundation of rootzones of adjacent vegetation | **Minor** (land area to the west and south is disturbed with waste rock landform and Cell B of TSF. To the north Goldfields Hwy cuts through native vegetation) | **Rare** (groundwater levels over the previous 15 years have demonstrated | **Low** | The TSF design has a basin underdrainage system with upstream toe drains to capture seepage.<br>Piezometers placed within the embankments during Stage 5 (previous embankment raise) have not detected any phreatic surface (wetting front/seepage) through the embankment to date.<br>A minimum sized of supernatant pond of 5000m$^3$ will be maintained and there is a central decant design to keep supernatant away from the embankments (Knight Piesold 2017a). |
| | | Tailings supernatant | Birds and other wildlife ingesting tailings liquor/ supernatant | Direct consumption | Poor wildlife health or death where WAD–CN (weak acid dissociable cyanide) concentrations are above 50 mg/L. | **Moderate** (salinity of supernatant is fresh so palatable to birds and other wildlife) | **Unlikely** (WAD-CN concentrations of supernatant typically between 10-20 mg/L with tailings slurry discharged at 3 – 33mg/L; Saracen 2014) | **Medium** | Research has indicated that gold processing tailings with residual WAD-CN in solution above 50 mg/L, with a salinity of less than 50 000 mg/L present a risk to wildlife health (Adams *et al* 2008). As the tailings salinity is fresh, Table 3.3.1 of the Licence will be modified to require WAD–CN in tailings supernatant in the TSF to remain below a limit of |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 50 mg/L. |
| | | Tailings (including supernatant) | Native vegetation | Supernatant release/ tailings overflow during extreme rainfall event | Inundation of vegetation causing poor health; vegetation death possible if covered by tailings sediment. | **Moderate** (tailings water quality is alkaline (8.1- 9.4) and fresh (Saracen 2014). Native vegetation to the north and east may be impacted; however the Goldfields Hwy lies to the north east and bisects this vegetation. | **Rare** (supernatant pond size will be kept to a minimum of 5000m$^3$; and the Stage 6 design has capacity to retain rainfall runoff up to a PMP (probable maximum precipitation) 72 hour event (pond depth of 920 mm) (Knight Piesold 2017a)) | **Medium** | The consequence of a tailings discharge is mitigated due to the disturbed land surrounding the facility (Eastern waste rock dump to the west and TSF Cell B to the south) and that the salinity of the tailings is fresh. The Licence will be amended to require the embankment raise works to be completed to ensure that the capacity of Cell A is sufficient to provide storage capacity for a PMP event of 72 hours duration, in accord with the design. |

## Reasoning – risk event: seepage impacts on groundwater quality

Groundwater monitoring over the past 15 years from the bores surrounding the TSF has shown very few records of water quality concentrations for metals/metalloids and major ions above the livestock drinking water guidelines (Appendix E of Saracen 2014; Saracen 2016). Totals dissolved solids concentrations have remained relatively steady (from between 400 – 800 mg/L in 2002 to 370 – 740 mg/l in 2016). pH has remained relatively steady (between 7.1 – 8.0 in 2016; Saracen 2016).

It is noted however that some parameters analysed at other gold processing operations are not part of the monitoring suite. Historical groundwater monitoring results from 2009 – 2011 suggest cadmium, copper, chromium and nickel should be added to the groundwater parameters required to be analysed (Saracen 2014). Further the works approval application supporting document for W5794/2015/1 noted that the processed ore comprises two types: oxide and primary; of which the oxide ore tailings were slightly enriched in antimony, whilst the tailings from primary ore were enriched in chromium, nickel, selenium , molybdenum and antimony. Both tailings samples were enriched in arsenic (arsenopyrites and arsenical ferrihydrates in the primary ore and non sulphide forms in the oxide tailings). It is also noted that these results are based on testwork conducted on a single oxide tailings sample and a single primary ore tailing sample (Saracen 2014).

Additionally, reviews of metalliferous drainage from gold processing sites have identified that the following parameters may be constituents of concern: antimony, cobalt, manganese, selenium, thallium and zinc (MEND 2004; Smith 2007). Accordingly the groundwater parameters in Table 3.3.1 of the Licence will be updated to include these and molybdenum. The frequency of analysis will be set at six monthly for the expanded list of analytes, with quarterly monitoring of standing water levels, arsenic, pH, TDS and WAD-CN retained. Pending the results of the analysis of the initial sampling runs for ambient groundwater quality the required parameters for analysis may be revised in the future.

Existing Licence Condition 1.3.4 requires that a seepage collection and recovery system is provided and used to capture TSF seepage and that it is either returned to the TSF or re-used in the process. Cell A has two seepage toe drains on the western and eastern sides of the Cell, in addition to a basin underdrainage system to capture seepage and return it to the Processing Plant. Condition 1.3.6 requires an annual water balance to be conducted over the TSF in which seepage recovery volumes and volumes of tailings discharged are required to be accounted for.

## Decision

Given the application of Licence Holder controls (embankment raise design, scope of work specification and quality assurance and monitoring controls), and the consequent medium – low level of risk, the amendment application is granted.

Licence Holder controls for the construction of the works are conditioned on the Licence to ensure that the work is constructed in accord with the scope of work assessed and that the Licence Holder's environmental controls are met. Conditions 1.3.3, 1.3.4, 1.3.5, 1.3.6 prescribed controls for minimum freeboard depths on the TSF, operating a seepage collection and recovery system, inspections of embankment freeboard and completing an annual water balance. Currently Licence Condition 3.3.2 capture controls for the rare event that groundwater levels rise above 6 mbgl. Table 3.3.1 of Condition 3.3.1 has been updated to revise the parameters subject to groundwater quality monitoring and the frequency of the monitoring schedule, in addition to prescribing a limit of 50 mg/L for the weak acid dissociable cyanide concentration in the TSF supernatant ponds.

A new Figure (Figure 8) has been added to the Licence to show the additional landfill location. Existing Conditions 1.3.7 - 1.3.10 apply.

## Licence Holder's comments

The Licence Holder was provided with the draft Amendment Notice on 27 October 2017. Comments received from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 2.

## Amendment

1. Definitions of the Licence are amended by the deletion of the text shown in strikethrough and the insertion of the red text shown in underline below:

'CEO' means CEO of the Department of Water and Environmental Regulation (DWER);

'CEO' for the purpose of correspondence means;
~~Chief Executive Officer~~
~~Department Div.3 Pt. V EP Act~~
Director General
Department Administering the *Environmental Protection Act 1986*
Locked Bag 33
CLOISTERS SQUARE WA 6850
Email: ~~info@der.wa.gov.au~~ info-der@dwer.wa.gov.au;

'six monthly' means the two inclusive periods 1 October to 31 March and 1 April to 30 September;

2. Condition 1.3.11 is added to the Licence as shown below:

1.3.11 The Licensee must construct the infrastructure in Column 1 of Table 1.3.5 in accord with the requirements specified in Column 2 and to plans and locations referenced in Column 3.

**Table 1.3.5: Infrastructure and equipment requirements**

| **Column 1** | **Column 2** | **Column 3** |
|---|---|---|
| **Infrastructure/ Equipment** | **Requirements (design and construction)** | **Site plan reference** |
| Stage 6 embankment raise to TSF Cell A | • Construct an upstream embankment raise to the perimeter embankment of TSF Cell A from a starting embankment crest height of RL 507.0 m to completion at RL 509.7 m, in accord with Knight Piesold (2017a) General Arrangement drawing 801-296-A301-011 (Figure 1 of this Amendment Notice);<br>• Raise the eastern and western toe drain towers as per Knight Piesold (2017b) drawings 801-296-A301-023 and 024 (Figures 2 and 3 of this Amendment Notice);<br>• Complete decant return system raise works comprising an access causeway, decant tower with 1,800mm diameter slotted concrete pipe surrounded by clean waste rock, submersible pump and pipework and hoist and pulley to raise and lower the pump; and<br>• Install four piezometers within the completed Stage 6 embankments | TSF Cell A location shown in Figure 4 of Schedule 1. |

3. Condition 1.3.12 is added to the Licence as shown below:

1.3.12 The Licensee must not depart from the requirements specified in Table 1.3.5 except:
(a) Where such departures are minor in nature and do not materially change or

affect the infrastructure; and

(b) Where such departure improves the functionality of the infrastructure and does not increase the risks to public health, public amenity or the environment.

If condition 1.3.12(b) applies, then the Licensee must provide the CEO with a list of departures and demonstrate that these have not increased the risk to public health, public amenity or the environment.

4. Condition 1.3.13 is added to the Licence as shown below:

1.3.13 The Licensee shall submit a construction compliance document to the CEO, following construction of the infrastructure listed in Table 1.3.5 and prior to operation.

5. Condition 1.3.14 to be added to the Licence as shown below:

1.3.14 The Licensee must ensure the construction compliance document:

(a) Is certified by a qualified engineer stating that each item of infrastructure specified in Table 1.3.5 has been constructed in accordance with the conditions of the Licence; and

(b) Be signed by a person authorised to represent the Licensee and contain the printed name and position of that person within the company.

6. Condition 1.3.15 is added to the Licence as shown below:

1.3.15 The Licensee shall operate Cell A of the TSF in accordance with the conditions of this Licence, following submission of the construction compliance document required by condition 1.3.13.

7. The Licence is amended by the insertion of the following Condition :

3.1.3 The Licensee shall ensure that six monthly monitoring is undertaken at least 165 days apart.

8. Table 3.3.1 of Condition 3.3.1 of the Licence is amended by the deletion of text in shown in strikethrough and the insertion of the red text shown in underline below:

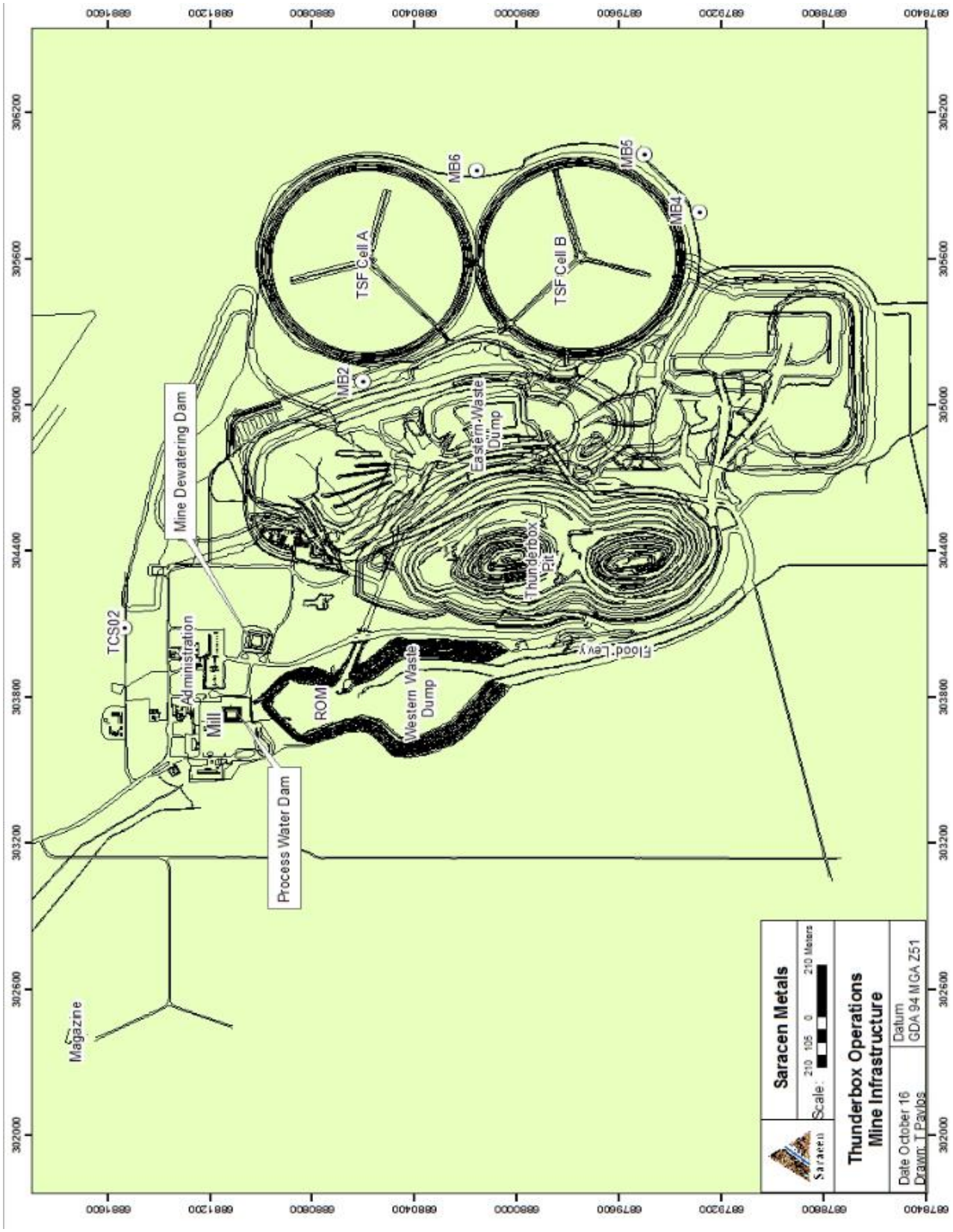
**Table 3.3.1: Monitoring of ambient groundwater quality and WAD cyanide concentrations**

| Monitoring point reference and location | Parameter | Limit | Units | Averaging period | Frequency |
|---|---|---|---|---|---|
| Monitoring bores ~~MB1,~~ MB2, MB4, MB5 and MB6 | pH[1] | 6.0 to 9.0 | - | Spot sample | Quarterly |
| | Standing water level (SWL) | >4 | mbgl | | |
| | Total dissolved solids (TDS) | <1500 | mg/L | | |
| | Weak acid dissociable cyanide (WAD CN) | <0.5 | | | |
| | Arsenic (As) | <0.5 | | | |
| | Antimony (Sb) | - | mg/L | Spot sample | Six monthly |
| | Bicarbonate ($HCO_3$ | - | | | |
| | Calcium (Ca) | - | | | |
| | Carbonate ($CO_3$) | - | | | |
| | Cadmium (Cd) | - | | | |
| | Chloride (Cl) | | | | |
| | Chromium (Cr) | - | | | |
| | Cobalt (Co) | - | | | |
| | Copper (Cu) | - | | | |
| | Total cyanide (CN) | - | | | |
| | Iron (Fe) | - | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Lead (Pb) | - | | | |
| | Magnesium (Mg) | - | | | |
| | Manganese (Mn) | - | | | |
| | Mercury (Hg) | - | | | |
| | Molybdenum (Mo) | - | | | |
| | Nickel (Ni) | - | | | |
| | Nitrate ($NO_3$) | - | | | |
| | Potassium (K) | - | | | |
| | Selenium (Se) | - | | | |
| | Sodium (Na) | - | | | |
| | Sulphate ($SO_4$) | - | | | |
| | Thallium (Tl) | - | | | |
| | Zinc (Zn) | - | | | |
| Decant (supernatant) pond of each operating Cell of the Tailings Storage Facility | Weak acid dissociable cyanide | 50 | mg/L | Spot sample | Quarterly |

Note 1: In-field non NATA accredited analysis permitted

9. Schedule 1 of the Licence is amended by the replacement of Figure 4 with the Figure below:


Saracen Metals
Thunderbox Operations
Mine Infrastructure
Date October 16
Drawn: T Pavlos
Datum
GDA 94 MGA Z51
Scale:
210 105 0 210 Meters
Mine Dewatering Dam
Process Water Dam
TCS02
Administration
Mill
ROM
Western Waste Dump
Eastern Waste Dump
Thunderbox Pit
Flood Levy
TSF Cell A
TSF Cell B
MB2
MB4
MB5
MB6
Magazine

10. Schedule 1 of the Licence is amended by the addition of Figure 8 below:

**Map of landfill locations**

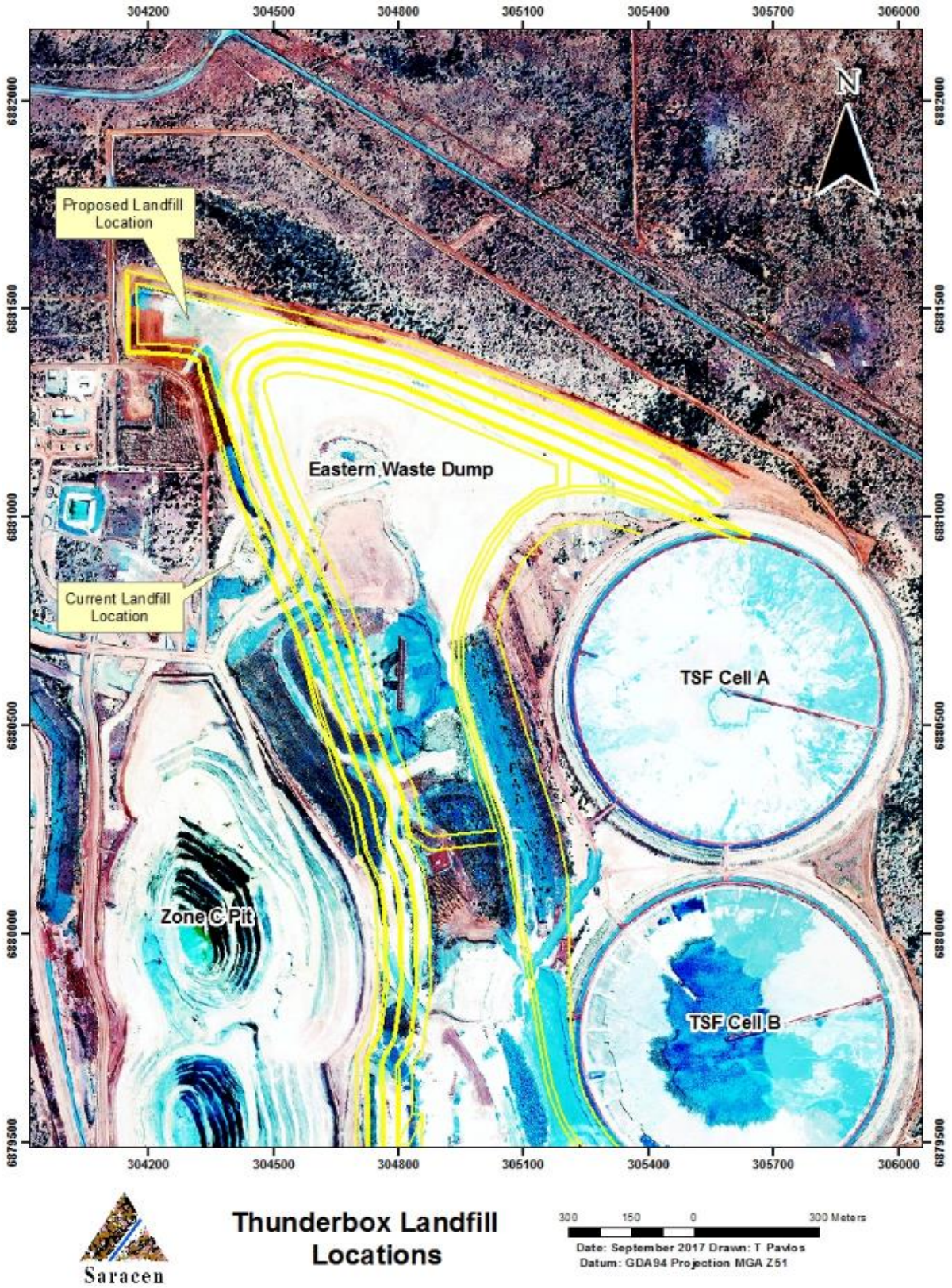



**Figure 8: Thunderbox Landfill Locations**

## Appendix 1: Key documents

| | Document title | In text ref | Availability |
|---|---|---|---|
| 1 | Licence L7815/2001/11 | L7815/2001/11 | accessed at www.dwer.wa.gov.au |
| 2 | Works Approval W5794/2015/1 | W5794/2015/1 | |
| 3 | Adams, M.D., Donato, D.B., Schulz, R.S. and Smith, G.B., (2008) *Influences of Hypersaline Tailings on Wildlife Cyanide Toxicosis*; MERIWA Project M398 (II) 'Cyanide Ecotoxicity at Hypersaline Gold Operations' Final Report Volume 2 – Definitive Investigation, 26 August 2008. | Adams *et al* 2008 | Accessed at: https://www.mriwa.wa.gov.au/publications/previous-project-reports/ |
| 4 | DER (2015) *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth, July 2015. | DER 2015a | accessed at: www.dwer.wa.gov.au |
| 5 | DER (2015) *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth, October 2015. | DER 2015b | |
| 6 | DER (2016) *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth November 2016. | DER 2016a | |
| 7 | DER (2016) *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth November 2016. | DER 2016b | |
| 8 | Knight Piesold (2017a) Memorandum from Dave Morgan to Saracen Metals Pty Ltd Re: Thunderbox Operations – TSF Cell A Stage 6 Design, 31 August 2017 | Knight Piesold 2017a | DWER records (A1516427) |
| 9 | Knight Piesold (2017b) TSF Stage 6 (Cell A) Tender Documentation, August 2017. | Knight Piesold 2017b | DWER records (A1516427) |
| 10 | MEND (2004) Review of Water Quality Issues in Neutral pH Drainage: Examples and Emerging Priorities for the Mining Industry in Canada. MEND Report 10.1 | MEND 2004 | Accessed at: http://mend-nedem.org/wp-content/uploads/2013/01/10.1.pdf |
| 11 | Saracen Metals Pty Ltd (2014) *North Eastern Goldfields Operations Works Approval* (supporting document), November 2014. | Saracen 2014 | DWER records (A836815) |
| 12 | Saracen Metals Pty Ltd (2016*) Annual* | Saracen 2016 | DWER records (A1335109) |

| | | | |
|---|---|---|---|
| | *Environmental Report 2016*, November 2016. | | |
| 13 | Smith, K.S. (2007) Strategies to predict metal mobility in surficial mining environments, in DeGraff, J.V, (Ed.), Understanding and Responding to Hazardous Substances at Mine Sites in Western United States. *Geological Society of America Reviews in Engineering Geology*, **v.XVII**, 25- 45. | Smith 2007 | accessed at: http://pebblescience.org/Pebble-Mine/acid-drainage-pdfs/GSAREG017-Smith_508/pdf |

## Appendix 2: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amendment Notice on 27 October 2017 for review and comment. The Licence Holder responded on 27 October 2017. The following comments were received on the draft Amendment Notice.

| Condition | Summary of Licence Holder comment | DWER response |
|---|---|---|
| 3.3.1 | Reminder that MB1 has been destroyed by Eastern Waste Rock Dump development so should be removed from Table 3.3.1. | Accepted |
| - Schedule 1 | Map provided of new landfill location to include in the Licence. | Accepted |