Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works approval number	W6601/2021/1
Works approval holder	Northern Star (Thunderbox) Pty Ltd
ACN	107 154 727
Registered business address	Level 1, 388 Hay Street, PERTH, 6008
DWER file number	DER2021/000505
Duration	3 May 2022 to 3 May 2027
Date of amendment	13/11/2024
Premises details	North Eastern Goldfields Operations Mining tenements: M36/512, M36/582, M36/585

Prescribed premises category description (Schedule 1, *Environmental Protection Regulations 1987*)	**Assessed production / design capacity**
Category 5: Processing or beneficiation of metallic or non-metallic ore	7,000,000 tonnes per annum

This works approval is granted to the works approval holder, subject to the attached conditions, on 13 November 2024, by:

Fiona Westcott

Digitally signed by Fiona Westcott
Date: 2024.11.13 14:03:28 +08'00'

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

Works approval history

Date	Reference number	Summary of changes
3/05/2022	W6601/1/2021	Construction of Cells C and D of Thunderbox TSF
13/11/2024	W6601/1/2021	Extension of time limited operations

Interpretation

In this works approval:

(a) the words 'including', 'includes' and 'include' in conditions mean "including but not limited to", and similar, as appropriate;

(b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;

(c) where tables are used in a condition, each row in a table constitutes a separate condition;

(d) any reference to an Australian or other standard, guideline, or code of practice in this works approval:

  (i) if dated, refers to that particular version; and

  (ii) if not dated, refers to the latest version and therefore may be subject to change over time;

(e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act; and

(f) unless specified otherwise, all definitions are in accordance with the EP Act.

NOTE: This works approval requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this works approval.

Works approval conditions

The works approval holder must ensure that the following conditions are complied with:

Construction phase

Infrastructure and equipment

1. The works approval holder must:

(a) construct the critical containment infrastructure;

(b) in accordance with the corresponding design and construction requirements; and

(c) at the corresponding infrastructure location;

as set out in Table 1.

Table 1: Critical containment infrastructure design and construction requirements

	Infrastructure	Design and construction requirements	Infrastructure location
1.	Tailing Storage Facilities - Cells C and D	Seepage control and underdrainage system consisting of: • A low permeability clay/soil liner of at least 6 x 10-7 m/s permeability. • Cut-off trench; • Embankment upstream toe drain; • Basin underdrainage collection system; • Underdrainage collection tower; • Low permeability basin liner; and • External toe drain • A diversion drain sized 6m wide by 1 m deep, with a side slope of 2H:1V • A berm positioned between the external toe drain and the diversion drain 1m high by 6m wide.	Underdrainage layout – as depicted in Schedule 1, Figure 2 Cut off trench and upstream toe drain details - as depicted in Schedule 1, Figure 3 and Figure 4. External toe drain, berm and diversion drain – as depicted in Schedule 1, Figure 4 and Figure 5
2.	Pipelines carrying tailings and decant return water	• Constructed from HDPE PE100 and installed in accordance with AS4130 and AS413, and the Plastics Industry Pipe Association of Australia Limited (PIPA) Guideline POP003. • Stored in V-drains sufficient to contain spillages between routine inspections. • Fitted with telemetry (the Citect processing plant control system) which monitors pressure.	

2. The works approval holder must design, construct, and install groundwater monitoring wells in accordance with the requirements specified in Table 2.

Table 2: Infrastructure requirements – groundwater monitoring wells

Infrastructure	Design, construction, and installation requirements	Monitoring well location(s)	Timeframe
Groundwater monitoring wells TSF-CD-01, TSF-CD-02 TSF-CD-03 TSF-CD-04	<u>Well design and construction:</u> Designed and constructed in accordance with *ASTM D5092/D5092M-16: Standard practice for design and installation of groundwater monitoring bores*. Well screens must target the part, or parts, of the aquifer most likely to be affected by contamination[1]. Where temporary/seasonal perched features are present, wells must be nested, and the perched features individually screened.	As depicted in Schedule 1, Figure 1.	Must be constructed, developed (purged), and determined to be operational by no later than 14 calendar days prior to discharge of tailings to TSF Cell C and Cell D.
	<u>Logging of borehole:</u> Soil samples must be collected and logged during the installation of the monitoring wells. A record of the geology encountered during drilling must be described and classified in accordance with the Australian Standard Geotechnical Site Investigations AS1726. Any observations of staining / odours or other indications of contamination must be included in the bore log.		
	<u>Well construction log:</u> Well construction details must be documented within a well construction log to demonstrate compliance with *ASTM D5092/D5092M-16*. The construction logs shall include elevations of the top of casing position to be used as the reference point for water-level measurements, and the elevations of the ground surface protective installations.		
	<u>Well development:</u> All installed monitoring wells must be developed after drilling to remove fine sand, silt, clay and any drilling mud residues from around the well screen to ensure the hydraulic functioning of the well. A detailed record should be kept of well development activities and included in the well construction log.		
	<u>Installation survey:</u> the vertical (top of casing) and horizontal position of each monitoring well must be surveyed and subsequently mapped by a suitably qualified surveyor.		
	<u>Well network map:</u> a well location map (using aerial image overlay) must be prepared and include the location of all monitoring wells in the monitoring network and their respective identification numbers.		

Note 1: refer to Section 8 of Schedule B2 of the *Assessment of Site Contamination NEPM* for guidance on well screen depth and length.

3. The works approval holder must, within 60 calendar days of the monitoring wells being constructed, submit to the CEO a well construction report evidencing compliance with the requirements of condition 2.

4. The Licence Holder shall ensure that prior to, and during any disturbance to the 'affected area', as denoted by Figure 6 in Schedule 1, the area is continually wetted using water sprays, dribble bars or other suitable methods to ensure there is no visible windblown dust.

5. The licence holder must ensure that no visible dust generated from the construction activities crosses the boundary of the premises.

Compliance reporting

6. The works approval holder must within 30 calendar days of the Critical Containment Infrastructure identified by condition 1 being constructed:

(a) undertake an audit of their compliance with the requirements of condition 1; and

(b) prepare and submit to the CEO a Critical Containment Infrastructure Report on that compliance.

7. The Critical Containment Infrastructure Report required by condition 6 must include as a minimum the following:

(a) certification by a suitably qualified geotechnical engineer that each item of critical containment infrastructure or component thereof, as specified in condition 1, has been built and installed in accordance with the requirements specified in condition 1;

(b) as constructed plans and a detailed site plan showing the location and dimensions for each item of critical containment infrastructure or component thereof, as specified in condition 1;

(c) photographic evidence of the installation of the infrastructure;

(d) be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person;

(e) monitoring data indicating the baseline ambient environmental conditions at the premises prior to and immediately following construction of the items of infrastructure.

8. The monitoring of the baseline ambient environmental conditions required under condition 7(e) must

(a) be undertaken in accordance with Table 3;

(b) all sample analysis must be undertaken by laboratories with current accreditation from the National Association of Testing Authorities (NATA) for the relevant parameters.

Table 3: Determination of baseline ambient environmental conditions

Parameter	Monitoring location	Unit	Frequency	Averaging period	Method
					Sampling
pH[1]	Groundwater monitoring wells	-	No later than 7 calendar	Spot sample	In accordance with AS/NZS 5667.11
SWL		mbgl			

Parameter	Monitoring location	Unit	Frequency	Averaging period	Method
					Sampling
TDS	TSF-CD-01, TSF-CD-02 TSF-CD-03 TSF-CD-04	mg/L	days prior to discharge of tailings to TSF Cell C and Cell D.		
Weak acid dissociable cyanide (WAD CN)					
Total cyanide (CN)					
Arsenic (As)					
Antimony (Sb)					
Bicarbonate (HCO_3)					
Calcium (Ca)					
Carbonate (CO_3)					
Cadmium (Cd)					
Chloride (Cl)					
Chromium (Cr)					
Cobalt (Co)					
Copper (Cu)					
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					

Note 1: In-field non-NATA accredited analysis permitted.

Time limited operations phase

Commencement and duration

9. The works approval holder may only commence time limited operations for an item of critical containment infrastructure identified in condition 1:

(a) where the CEO has notified the works approval holder that the Critical Containment Infrastructure Report for that item of infrastructure as required by condition 6 meets the requirements of that condition; or

(b) where at least 10 business days have passed after the Critical Containment Infrastructure Report for that item of infrastructure as required by condition 6 has been submitted to the CEO.

Time limited operations requirements and emission limits

10. The works approval holder may conduct time limited operations for an item of infrastructure specified in condition 11 (as applicable):

(a) for a period not exceeding 270 calendar days from the day the works approval holder meets the requirements of condition 9 for that item of infrastructure; or

(b) until such time as a licence for that item of infrastructure is granted in accordance with Part V of the *Environmental Protection Act 1986*, if one is granted before the end of the period specified in condition 10(a).

11. During time limited operations, the works approval holder must ensure that the premises infrastructure and equipment listed in Table 4 and located at the corresponding infrastructure location is maintained and operated in accordance with the corresponding operational requirement set out in Table 4.

Table 4: Infrastructure and equipment requirements during time limited operations

	Site infrastructure and equipment	Operational requirement	Infrastructure location
1.	TSF Cell C and Cell D	• Low points are filled, and a beach is established in each cell to allow for efficient recovery of decant water within 16 weeks of commencing discharge to the TSF. • A minimum freeboard of 500mm from top of embankment. • Inspection of TSF at least twice per 12-hour shift.	As depicted in Figure 1, Schedule 1
2.	Pipelines carrying tailings and decant return water	Inspection of pipelines at least twice per 12-hour shift.	

12. The Licence Holder shall ensure that prior to, and during any disturbance to the following TSF components, these areas are continually wetted using water sprays, dribble bars or other suitable methods to ensure there is no visible windblown dust:

(a) The surface of the TSF

(b) The onsite roadways in the immediate vicinity of the TSF

(c) TSF embankments

(d) The 'TSF affected area', as denoted by Figure 6 in Schedule 1.

Monitoring during time limited operations

13. The works approval holder must:

(a) monitor the groundwater during time limited operations for concentrations of the identified parameters in accordance with Table 5.

(b) all sample analysis must be undertaken by laboratories with current accreditation from the National Association of Testing Authorities (NATA) for the relevant parameters.

Table 5: Monitoring of ambient concentrations during time limited operations

Parameter	Monitoring location	Unit	Frequency	Averaging period	Method
					Sampling
pH[1]		-			
SWL		mbgl			
TDS					
Weak acid dissociable cyanide (WAD CN)		mg/L	Quarterly	Spot sample	In accordance with AS/NZS 5667.11
Total cyanide (CN)					
Arsenic (As)					
Antimony (Sb)					
Bicarbonate (HCO_3)					
Calcium (Ca)					
Carbonate (CO_3)					
Cadmium (Cd)					
Chloride (Cl)					
Chromium (Cr)					
Cobalt (Co)					
Copper (Cu)	Groundwater monitoring wells TSF-CD-01, TSF-CD-02 TSF-CD-03 TSF-CD-04				
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)					
		mg/L	Six monthly or at least once prior to the end of the limited time operations period.	Spot sample	In accordance with AS/NZS 5667.11

Parameter	Monitoring location	Unit	Frequency	Averaging period	Method
					Sampling
Zinc					
Weak acid dissociable cyanide (WAD CN)	Decant	mg/L	Quarterly	Spot sample	In accordance with AS/NZS 5667.11
Arsenic (As)					

Note 1: In-field non-NATA accredited analysis permitted.

14. The works approval holder must record the results of all monitoring activity required by condition 13.

Compliance reporting

15. The works approval holder must submit to the CEO a report on the time limited operations within 60 calendar days of the completion date of time limited operations or 60 calendar days before the expiration date of the works approval, whichever is the sooner.

16. The works approval holder must ensure the report required by condition 15 includes the following:

(a) a summary of the time limited operations, including timeframes and amount of tailings discharged;

(b) a summary of groundwater monitoring results obtained during time limited operations under condition 13.

(c) a review of performance and compliance against the conditions of the works approval; and

(d) where the manufacturer's design specifications and the conditions of this works approval have not been met, what measures will the works approval holder take to meet them, and what timeframes will be required to implement those measures.

Records and reporting (general)

17. The works approval holder must record the following information in relation to complaints received by the works approval holder (whether received directly from a complainant or forwarded to them by the Department or another party) about any alleged emissions from the premises:

(a) the name and contact details of the complainant, (if provided);

(b) the time and date of the complaint;

(c) the complete details of the complaint and any other concerns or other issues raised; and

(d) the complete details and dates of any action taken by the works approval holder to investigate or respond to any complaint.

18. The works approval holder must maintain accurate and auditable books including the following records, information, reports, and data required by this works approval:

(a) the works conducted in accordance with condition 1;

(b) any maintenance of infrastructure that is performed in the course of complying with condition 11;

(c) monitoring programmes undertaken in accordance with conditions 8 and 13; and

(d) complaints received under condition 17.

19. The books specified under condition 18 must:

(a) be legible;

(b) if amended, be amended in such a way that the original version(s) and any subsequent amendments remain legible and are capable of retrieval;

(c) be retained by the works approval holder for the duration of the works approval; and

(d) be available to be produced to an inspector or the CEO as required.

Definitions

In this works approval, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AS/NZS 5667.11	means the Australian Standard *AS/NZS 5667.11 Water quality - sampling - guidance on sampling groundwater*.
books	has the same meaning given to that term under the EP Act.
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup DC WA 6919 info@dwer.wa.gov.au
critical containment infrastructure	means the items of infrastructure listed in condition 1.
Critical Containment Infrastructure Report	means a report to satisfy the CEO that works of critical containment infrastructure have been constructed in accordance with the works approval.
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.
discharge	has the same meaning given to that term under the EP Act.
emission	has the same meaning given to that term under the EP Act.
Environmental Compliance Report	means a report to satisfy the CEO that the conditioned infrastructure and/or equipment has been constructed and/or installed in accordance with the works approval.
EP Act	*Environmental Protection Act 1986* (WA).
mg/l	Milligrams per litre
mbgl	Metres below ground level
EP Regulations	*Environmental Protection Regulations 1987* (WA).
Quarterly	means the 4 inclusive periods from 1 April to 30 June, 1 July to 30 September, 1 October to 31 December and in the following year, 1 January to 31 March.”

Term	Definition
premises	the premises to which this licence applies, as specified at the front of this licence and as shown on the premises map in Schedule 1 to this works approval.
prescribed premises	has the same meaning given to that term under the EP Act.
Six monthly	means the two inclusive periods 1 October to 31 March and 1 April to 30 September
suitably qualified geotechnical engineer	means a person who: a) holds a Bachelor of Engineering recognised by the Australian Institute of Engineers; and b) has a minimum of five years of experience working in geotechnical engineering including experience in the design of tailings storage facilities.
SWL	Standing water level
time limited operations	refers to the operation of the infrastructure and equipment identified under this works approval that is authorised for that purpose, subject to the relevant conditions.
TSF	Tailings storage facility
works approval	refers to this document, which evidences the grant of the works approval by the CEO under section 54 of the EP Act, subject to the conditions.
works approval holder	refers to the occupier of the premises being the person to whom this works approval has been granted, as specified at the front of this works approval.

END OF CONDITIONS

Schedule 1: Maps

Premises map

The boundary of the prescribed premises is shown in the map below (Figure 1).

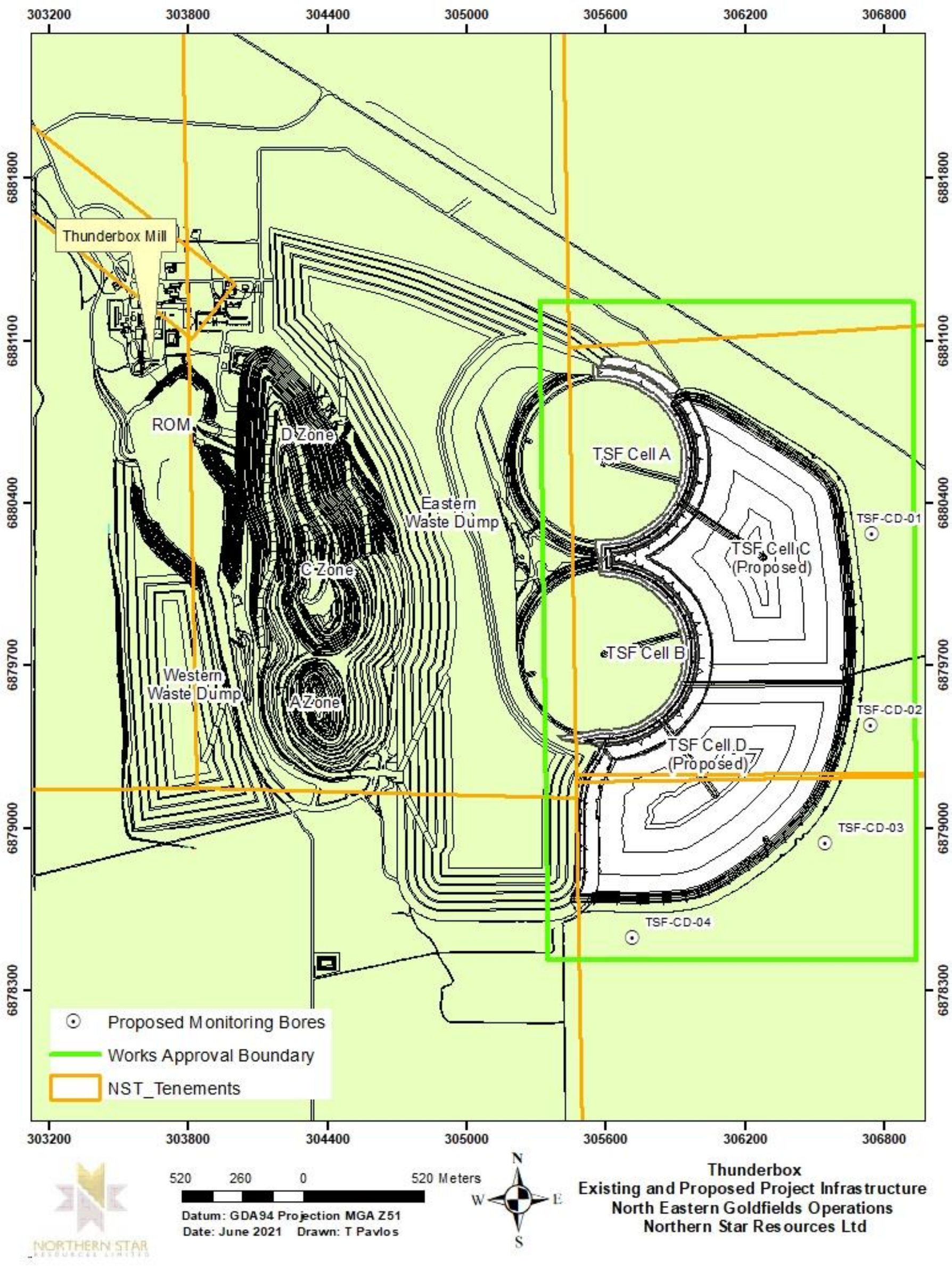

Figure 1: Map of the boundary of the prescribed premises

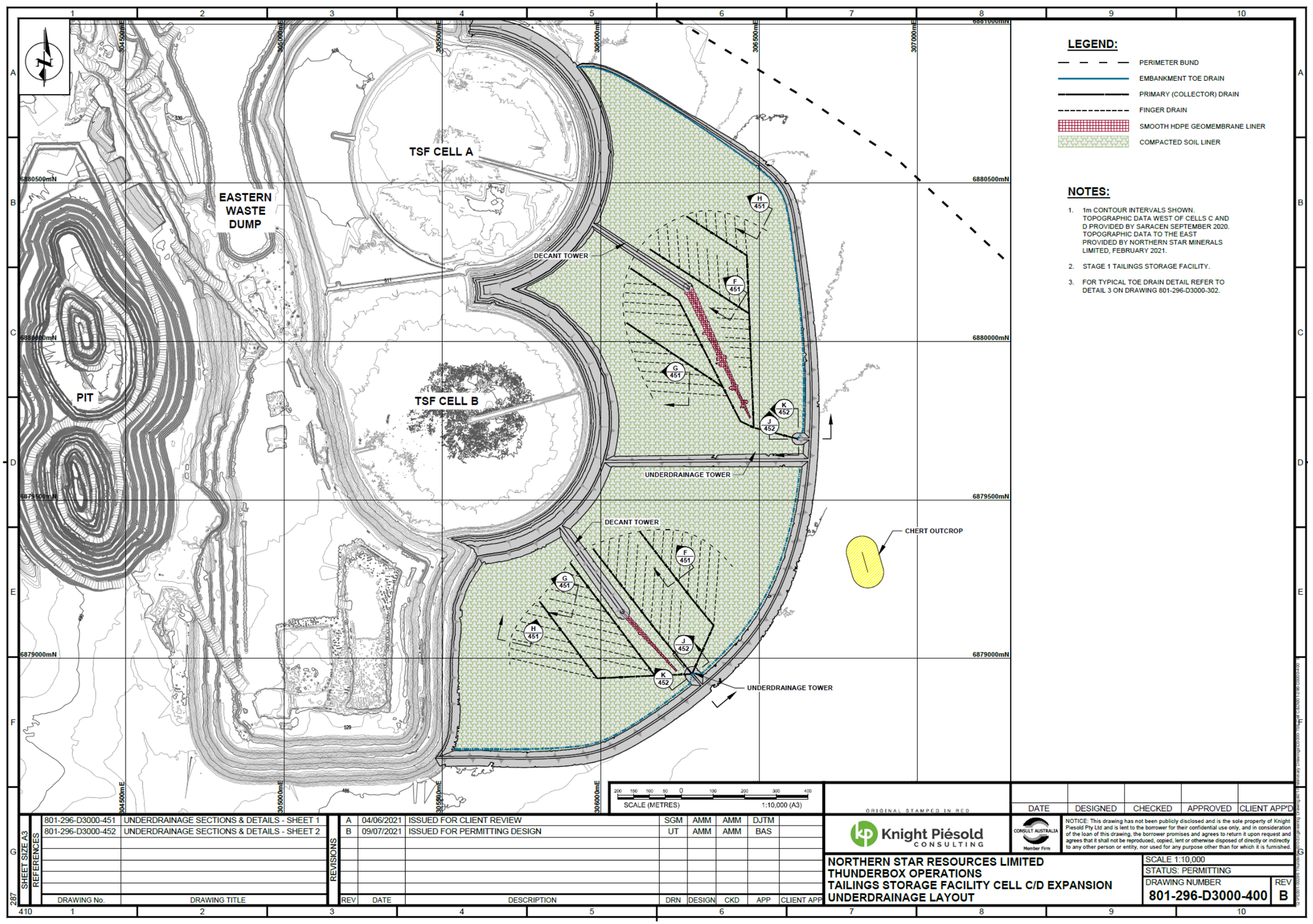

Figure 2: Underdrainage layout

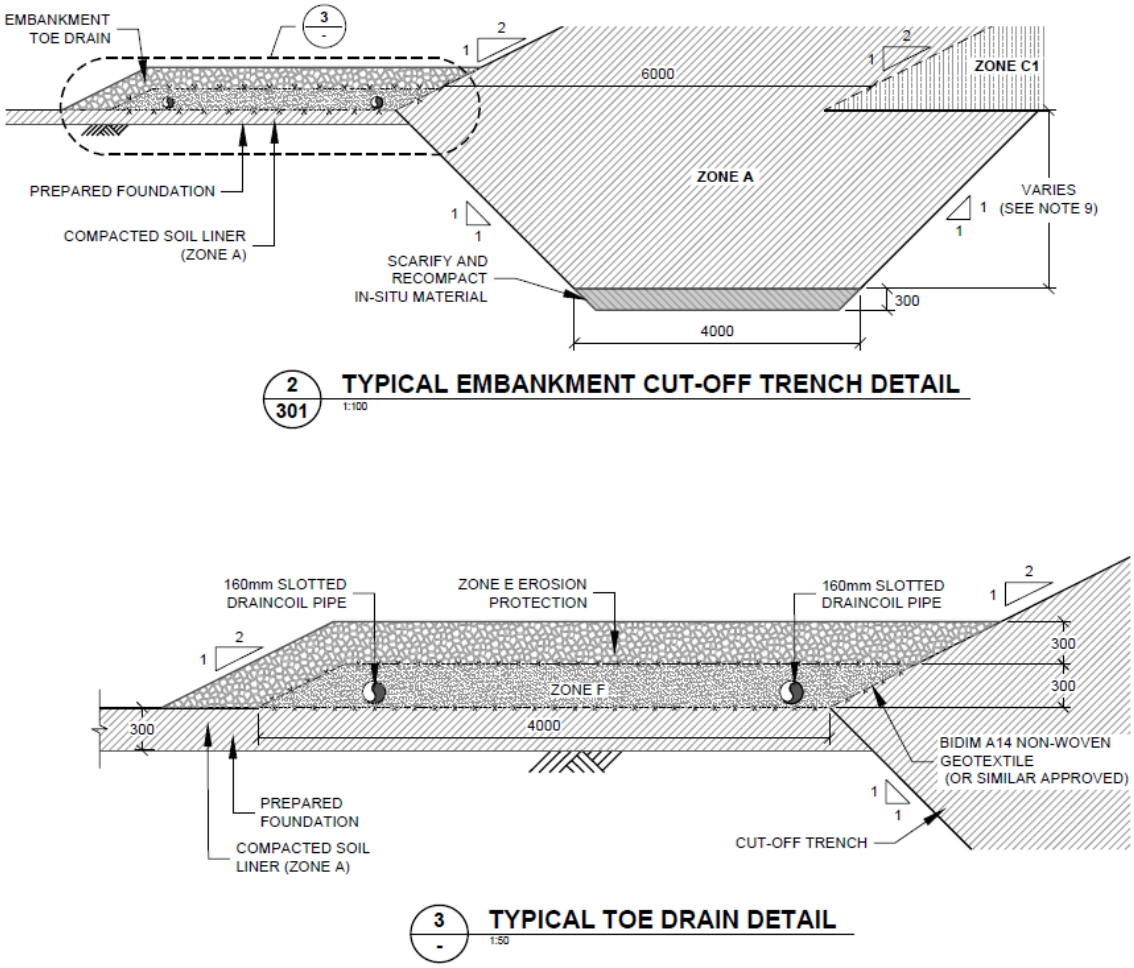

Figure 3: Cut off trench and toe drain details

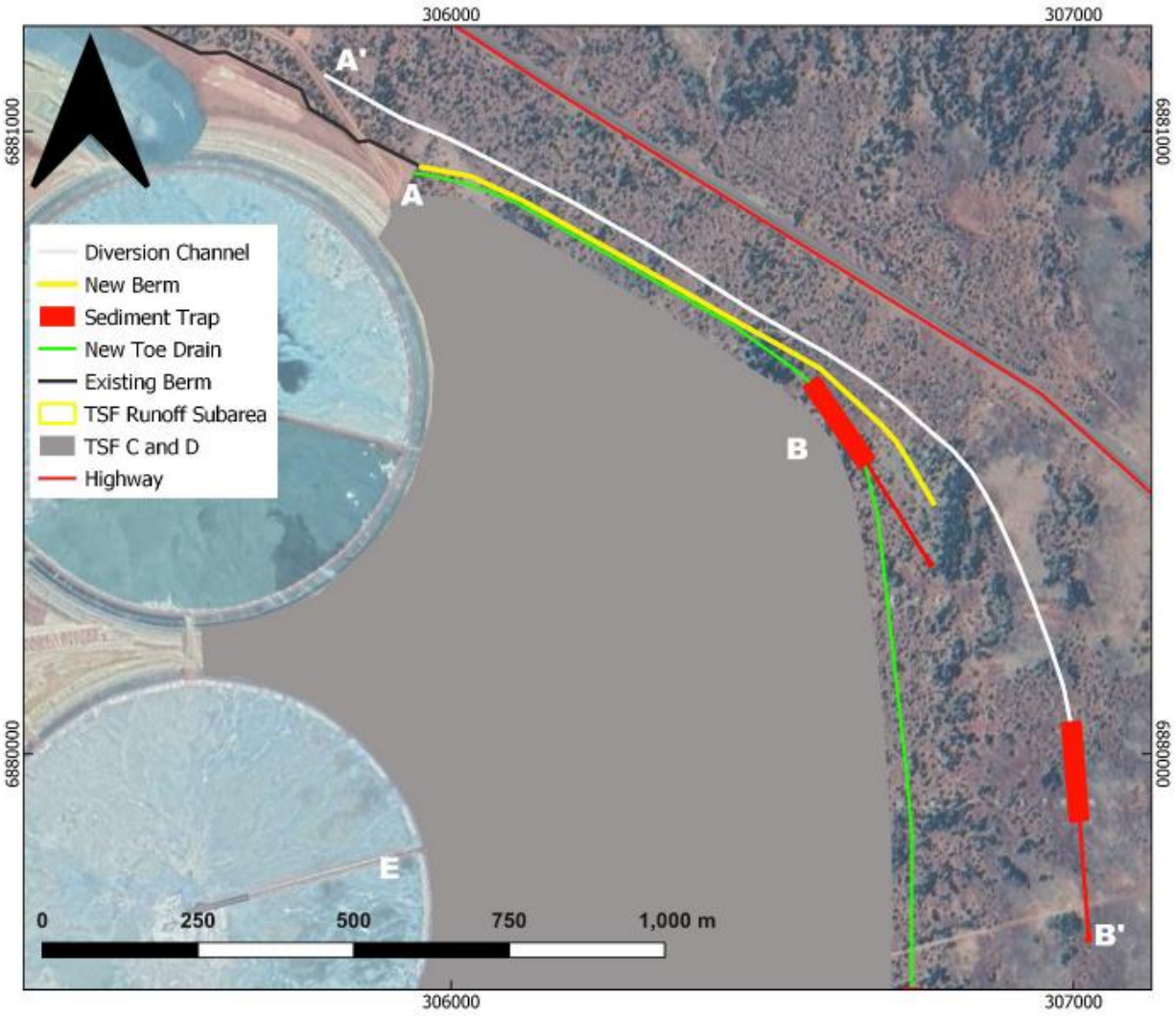

Figure 4: Positions of external toe drain, berm and diversion channel

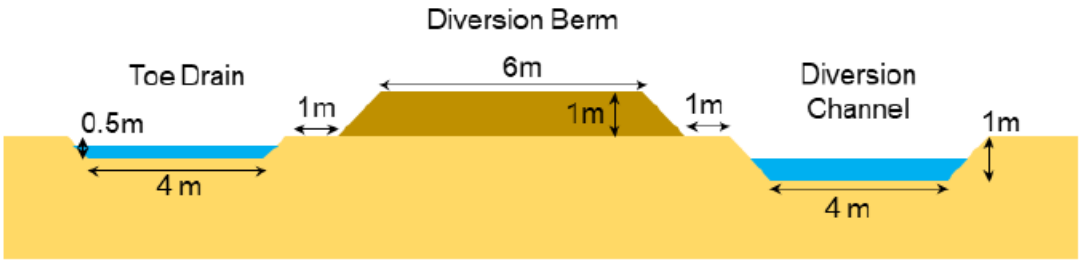

Figure 5: Schematic of toe drain, berm and diversion channel

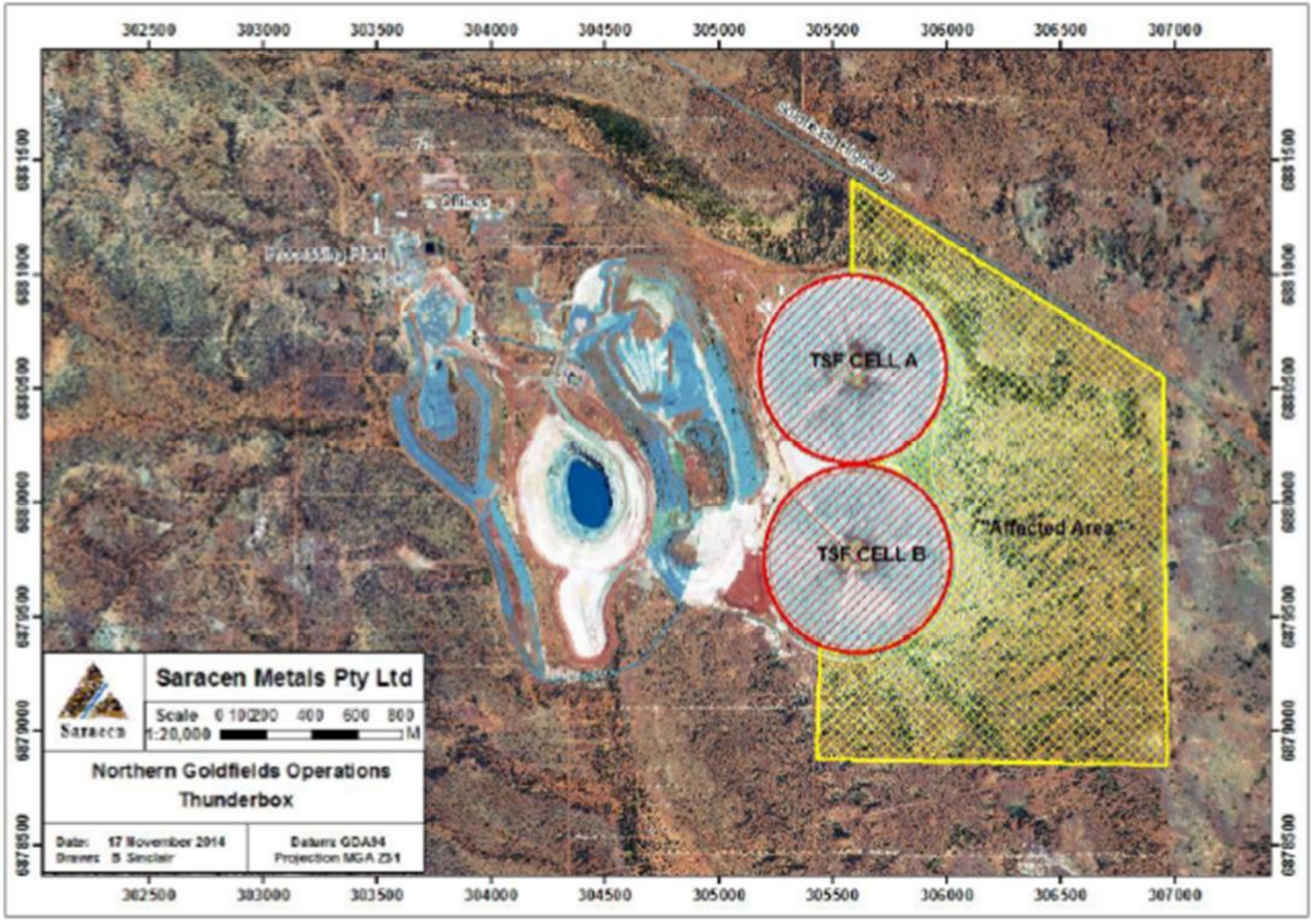

Figure 6: TSF Cell A and Cell B and Affected Area