Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works approval number	W6675/2022/1
Works approval holder	Northern Star (HBJ) Pty Ltd
ACN	127026519
Registered business address	Level 1 388 Hay Street Subiaco WA 6008
DWER file number	DER2022/000088
Duration	10/05/2023 to 9/05/2028
Date of issue	10/05/2023
Premises details	Lot 15 on Plan 58833, Lot 50 on Plan 226299 and Lot 51 on Plan 226303, Lot 103 on Plan 40395 Lot 105 on Plan 40396, and mining tenements M26/118, M26/143, M26/204 and M15/456 Kalgoorlie WA 6430 As defined by the premises map attached to the issued works approval

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	1,650,000 tonnes per year

This works approval is granted to the works approval holder, subject to the attached conditions, on 10 May 2023, by:

Alana Kidd
Digitally signed by Alana Kidd
Date: 2023.05.10 07:52:26 +08'00'

ALANA KIDD
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
10/05/2023	W6575/2021/1	Works approval granted

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

Critical containment infrastructure and equipment

1. The works approval holder must:

(a) construct and/or install all the critical containment infrastructure and/or equipment;

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

(c) at the corresponding infrastructure location,

as set out in Table 1.

Table 1: Critical containment infrastructure design and construction / installation requirements

Infrastructure	Design and construction / installation requirements	Infrastructure location and/or drawing number
Samphire paddock style Tailings Storage Facility - embankments	• Construction authorised to starter embankment height of RL349.0m (southern end) and RL341.5m (northern end) only; • Starter embankment to be constructed as per specifications of fill materials detailed in Section 2.8 and 5.2. of Scope of Works – Starter Embankment Construction - Report reference number: 754-PERGE290892 – 22 December 2021. • The construction of embankment shall be supervised by a suitably qualified geotechnical engineer. • A low permeability clay core will be constructed using compacted clayey mine waste along the interface between the TSF and the adjacent waste dump areas. • Surface soil within the embankment footprint area to be compacted to target a minimum permeability requirement of 1 x 10^{-7} m/s as part of the embankment construction, to limit seepage through the foundation. • 21 Vibrating Wire Piezometers (VWP) installed at the base of embankment. • A perimeter bund and drain system (toe drain and collection sump) to be placed around the perimeter of the Samphire paddock style TSF. The proposed	As depicted in Schedule 1, Figure 3 to 7 Drawing Numbers (Revision B): 754-PERGE290892 – 003; 754-PERGE290892 – 006; –754-PERGE290892 – 011 – 754-PERGE290892 - 012

	perimeter toe drain to have a base width of 5 m with a nominal depth of 1 m. • A cut-off trench with a 4 m wide base will be excavated beneath the perimeter embankment, backfilled with compacted clayey mine waste. The trench will be excavated to a nominal depth of 2 m (below ground surface) with cut side batters of 1:1 (V:H). • Layout and general arrangement as specified in Figures 2, 3, and 4 of Schedule 1	
Samphire paddock style TSF – Decant Infrastructure	Decant Access Causeway • Construct the decant access causeway to the lines, grades and levels as shown on the Drawings 754-PERGE290892 – 003 and 754-PERGE290892 – 007. • The access causeway will be constructed using traffic compacted selected mine waste from the waste dump (Zone B1 material). The material shall be bore-graded rockfill, free of organic matter and other deleterious material, with a maximum particle size of 300 mm and a fines content of at least 15%. • Fill placement and compaction to be conducted in several lift layers (nominally 1.5 m high). • Each layer shall be traffic compacted using mine haulage equipment over the full width of the layer to achieve a homogenous fill. • A nominal 100 mm layer of gravel sheeting to be placed over the running surface (nominal 6 m wide). Decant Structure • The decant water recovery system will comprise a submersible pump within pre-cast, slotted concrete rings, surrounded by rockfill of nominal 10 m radius, as shown on the Drawings 754-PERGE290892 – 003 and 754-PERGE290892 – 007.	As depicted in Schedule 1, Figure 3 to 7 Drawing Number (Revision B): 754-PERGE290892 – 003 and 754-PERGE290892 – 007 –
Samphire paddock style TSF – Eastern Waste Rock Dump	• Active gully erosion on eastern waste rock dump to be repaired.	Slopes of eastern waste rock dump located as depicted in Schedule 1, Figure 3

Construction of Monitoring and Seepage Recovery Infrastructure

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

Table 2: Infrastructure requirements – groundwater monitoring bores

Infrastructure	Design, construction, and installation requirements	Timeframe
Groundwater monitoring bore(s)	Bore location and number: A minimum of 8 additional bores to be constructed surrounding Samphire paddock TSF. Appropriate location and number of bores to be assessed and identified by suitably qualified hydrogeologist, based on the presence of targeted aquifer structural features, supported by geological and geophysical assessments, including ground-based investigations.	Must be constructed, developed (purged), and determined to be operational prior to the commencement of time limited operations.
	Bore design and construction: Designed and constructed in accordance with *ASTM D5092/D5092M-16: Standard practice for design and installation of groundwater monitoring bores* where applicable. Bore screens must target the part, or parts, of the aquifer most likely to be affected by contamination. Where temporary/seasonal perched features are present, bores must be nested, and the perched features individually screened.	
	Logging of borehole: Soil samples must be collected and logged during the installation of the monitoring bores. A record of the geology encountered during drilling must be described and classified in accordance with the *Minimum Construction Requirements for Water Bores in Australia,* ensuring that sufficient information is recorded to provide a thorough understanding of the geological profile. Any observations of staining / odours or other indications of contamination must be included in the bore log.	
	Bore construction log: Bore construction details must be documented within a bore construction log to demonstrate compliance with *ASTM D5092/D5092M-16* where applicable for bore design and construction. 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.	
	Bore development: All installed monitoring bores must be developed after drilling to remove fine sand, silt, clay and any drilling mud residues from around the bore screen to ensure the hydraulic functioning of the bore. A detailed record should be kept of bore development activities and included in the bore construction log.	
	Installation survey: the vertical (top of casing) and horizontal position of each monitoring bore must be surveyed and subsequently mapped by a suitably qualified surveyor.	
	Bore network map: a bore location map (using aerial image overlay) must be prepared and include the location of all monitoring bores in the monitoring network and their respective	

Infrastructure	Design, construction, and installation requirements	Timeframe
	identification numbers.	

3. The works approval holder must decommission any monitoring bores within the Samphire paddock style TSF footprint in accordance with the *Minimum Construction Requirements for Water Bores in Australia*.

4. The works approval holder must design, construct, and install seepage recovery infrastructure in accordance with the requirements specified in Table 3.

Table 3: Seepage Recovery Infrastructure - Design and construction requirements / installation requirements

Infrastructure	Design and construction requirement / installation requirement	Infrastructure location	Timeframe
Seepage recovery bores and drains/trenches	Appropriate location and number of bores and/or trenches to be assessed and identified by suitably qualified hydrogeologist, supported by review of current monitoring data, identification of receptors, interpretation of groundwater flow modelling, geological and geophysical assessments.	Must be situated at locations targeted to recover seepage.	Must be constructed and determined to be operational/available for use prior to the commencement of time limited operations.

Installation of meteorological monitoring unit

5. The works approval holder must install an on-site meteorological monitoring unit including a Class A Evaporation Pan to measure daily rainfall and evaporation near the Samphire paddock style TSF. The monitoring unit and evaporation pan must be installed and determined to be operational prior to the commencement of time limited operations.

Compliance reporting (critical containment infrastructure)

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

(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(s) thereof, as specified in condition 1, has been built and installed in accordance with the requirements specified in condition 1;

(b) certification by a suitably qualified geotechnical engineer, that the infrastructure or component(s) thereof, as specified in condition 1 have been constructed to satisfy the design intent;

(c) 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;

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

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

Compliance reporting (monitoring and seepage recovery infrastructure)

8. The works approval holder must within 30 calendar days of infrastructure or equipment required by conditions 2, 3, 4 and 5 being constructed, decommissioned and/or installed:

(a) undertake an audit of their compliance with the requirements of conditions 2, 3, 4 and 5; and

(b) prepare and submit to the CEO an Environmental Compliance Report on that compliance.

9. The Environmental Compliance Report required by condition 8, must include as a minimum the following:

(a) certification by a suitably qualified hydrogeologist, that the infrastructure or component(s) thereof, as specified in condition 2, 3 or 4, have been constructed or decommissioned in accordance with the relevant requirements specified in condition 2, 3 and 4;

(b) map clearly showing the location and label of installed monitoring bores and seepage recovery infrastructure as specified in condition 2 and 4;

(c) bore logs, justification of location and number of monitoring bores, and seepage recovery infrastructure as specified in condition 2 and 4;

(d) detailed seepage recovery and monitoring plan;

(e) photographic evidence of the installation of the meteorologic station unit specified in condition 5;

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

Time limited operations phase

Commencement and duration

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

11. The works approval holder may conduct time limited operations for an item of critical containment infrastructure specified in condition 1:

(a) for a period not exceeding 180 calendar days from the day the works approval holder meets the requirements of condition 10 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 11(a).

Time limited operations requirements and emission limits

12. 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

Item No.	Site infrastructure and equipment	Operational requirement	Infrastructure location
1.	Samphire paddock style Tailings Storage Facility	• Throughput of no more than 1,200,000 tonnes per annum (tailings) • To be maintained as per the design and construction / installation requirements in condition 1 • Tailings in the form of slurry will be discharged into the facility in thin discrete layers (i.e. less than 300 mm nominal thickness). • Maintain and operate spigots. Daily visual inspections to check for integrity or any malfunction. • Supernatant decant water recovery system comprises of pump returning water to the process plant. Decant return to the plant to be maximized, with a minimum pump capacity of 20L/s. • The edge of decant water pond shall be kept at least 150 m away from the embankment under normal operating conditions. • The facility will have sufficient capacity to store water during a storm event of 1:100-year AEP, 72-hour duration whilst maintaining the required minimum total freeboard of 1.65 m. • Daily visual inspection of the location and size of the decant pond • Daily visual inspection of the integrity of the embankment and perimeter containment embankment. • Weekly inspections of embankment piezometers to be conducted to ensure its integrity. • Perimeter bund and drain system placed around the perimeter of the Samphire paddock style TSF to be maintained in good working order. • Periodic monitoring and maintenance across the paddock style TSF embankments and surrounding waste rock dumps to prevent and mitigate	Figure 3 to 7 of Schedule 1

Item No.	Site infrastructure and equipment	Operational requirement	Infrastructure location
		any potential localised erosion which can result in sedimentation downstream.	

Emissions during time limited operations

13. The works approval holder must ensure that the emissions specified in Table 5 are discharged only from the corresponding discharge point and only at the corresponding discharge point location.

Table 5: Authorised discharge points during Time-limited operations

Emission	Discharge point	Discharge point location
Tailings	Samphire paddock style TSF	As shown in Figure 3 of Schedule 1

Monitoring during time limited operations

14. The works approval holder must monitor groundwater during time limited operations in accordance with Table 6 and must not exceed the corresponding limit in that table.

Table 6: Groundwater monitoring of ambient concentrations

Monitoring location	Parameter	Unit	Limit	Frequency	Averaging period	Method
To be determined as per condition 2	pH[1]	-	-	Quarterly	Spot sample	AS/NZS 5667.1 AS/NZS 5667.11
	Total dissolved solids[1]	mg/L	-			
	WAD-CN	mg/L	-			
	Total cyanide	mg/L				
	Conductivity	µS/cm	-			
	Standing water level	mbgl	4	Monthly		

Note 1: pH and TDS are permitted to be measured in the field in accordance with Australian Standard 5667.

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

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

17. The works approval holder must undertake a water balance for the Samphire paddock style TSF each monthly period, and (as a minimum) record the following information:

(a) site rainfall obtained from on-site meteorological unit as required by condition 5;

(b) evaporation rate obtained from on-site evaporation pan as required by condition 5;

(c) surface runoff;

(d) decant water stored and recovery volumes;

(e) seepage recovery volumes from TSF underdrainage and other seepage infrastructure;

(f) volume of tailings deposited;

(g) tailings solid content (w/w %);

(h) volume of water retained in tailings; and

(i) calculated seepage rate; compared against predicted seepage rates for the TSF.

Time Limited Operations - Compliance reporting

18. The works approval holder must submit to the CEO a report on the time limited operations within 30 calendar days of the completion date of time limited operations or 30 calendar days before the expiration date of the works approval, whichever is the sooner.

19. The works approval holder must ensure the report required by condition 18 includes the following:

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

(b) water balance over Samphire paddock style TSF as required by condition 17;

(c) interpretation of groundwater monitoring results obtained during time limited operations as required under condition 14;

(d) volume of seepage recovered via seepage recovery bores or underdrainage;

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

(f) 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.

Notification

20. The works approval holder must immediately after becoming aware of any breach of any limit specified in the works approval, notify the CEO in writing of that non-compliance and include in that notification the following information:

(a) which condition was not complied with and a copy of the corresponding data and previous trigger level data (if applicable);

(b) the time and date when the non-compliance occurred;

(c) if any environmental impact has occurred as a result of the non-compliance and if so what that impact is and where the impact occurred;

(d) the details and result of any investigation undertaken into the cause of the non-compliance;

(e) what action(s) has been taken and the date on which it was taken to prevent the non-compliance occurring again; and

(f) what action(s) will be taken and the date by which it will be taken to prevent the non-compliance, including monitoring undertaken to ensure compliance is met and there is and no environmental impact.

Records and reporting (general)

21. 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.

22. 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 conditions 1

(b) any maintenance of infrastructure that is performed in the course of complying with conditions of this works approval;

(c) monitoring programmes undertaken in accordance with conditions 14; and

(d) complaints received under condition 20.

23. The books specified under condition 21 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.

Decommissioning and Closure

24. In the event of decommissioning and closure of the Samphire paddock style TSF within the duration of this works approval, the Works Approval Holder shall ensure the Samphire paddock style TSF is closed and rehabilitated in accordance with the recommendations set out in Section 17 of the South Kalgoorlie Operations, *SKO Samphire Tailings Storage Facility Design Report* – Tetra Tech Coffey Ref: 754-PERGE290892, dated 22 December 2021.

Definitions

In this works approval, the terms in Table 7 have the meanings defined.

Table 7: Definitions

Term	Definition
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 2
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).
EP Regulations	*Environmental Protection Regulations 1987* (WA).
Minimum Construction Requirements for Water Bores in Australia	means the document *Minimum Construction Requirements for Water Bores in Australia* developed by the National Uniform Drillers Licensing Committee, as amended from time to time.
NATA	means the National Association of Testing Authorities, Australia.

Term	Definition
NATA accredited	means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis.
premises	the premises to which this licence applies, as specified at the front of this licence and as shown on the premises map (Figure 1) in Schedule 1 to this works approval.
prescribed premises	has the same meaning given to that term under the EP Act.
quarterly period	Means the four inclusive periods from 1 January to 31 March, 1 April to 30 June, 1 July to 30 September, and 1 October to 31 December.
suitably qualified geotechnical engineer	means a person who: a) holds a Bachelor of Engineering recognised by the Institute of Engineers; and b) has a minimum of five years of experience working in the area of geotechnical engineering or is otherwise approved by the CEO to act in this capacity.
suitably qualified hydrogeologist	means a person who holds a tertiary qualification specialising in environmental science or equivalent and has a minimum of five years of experience working in area of hydrogeology, including investigation and assessment of groundwater resources, or who is otherwise approved by the CEO to act in this capacity.
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.
WAD CN	means weak acid dissociable cyanide
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 and design drawings

Premises map

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

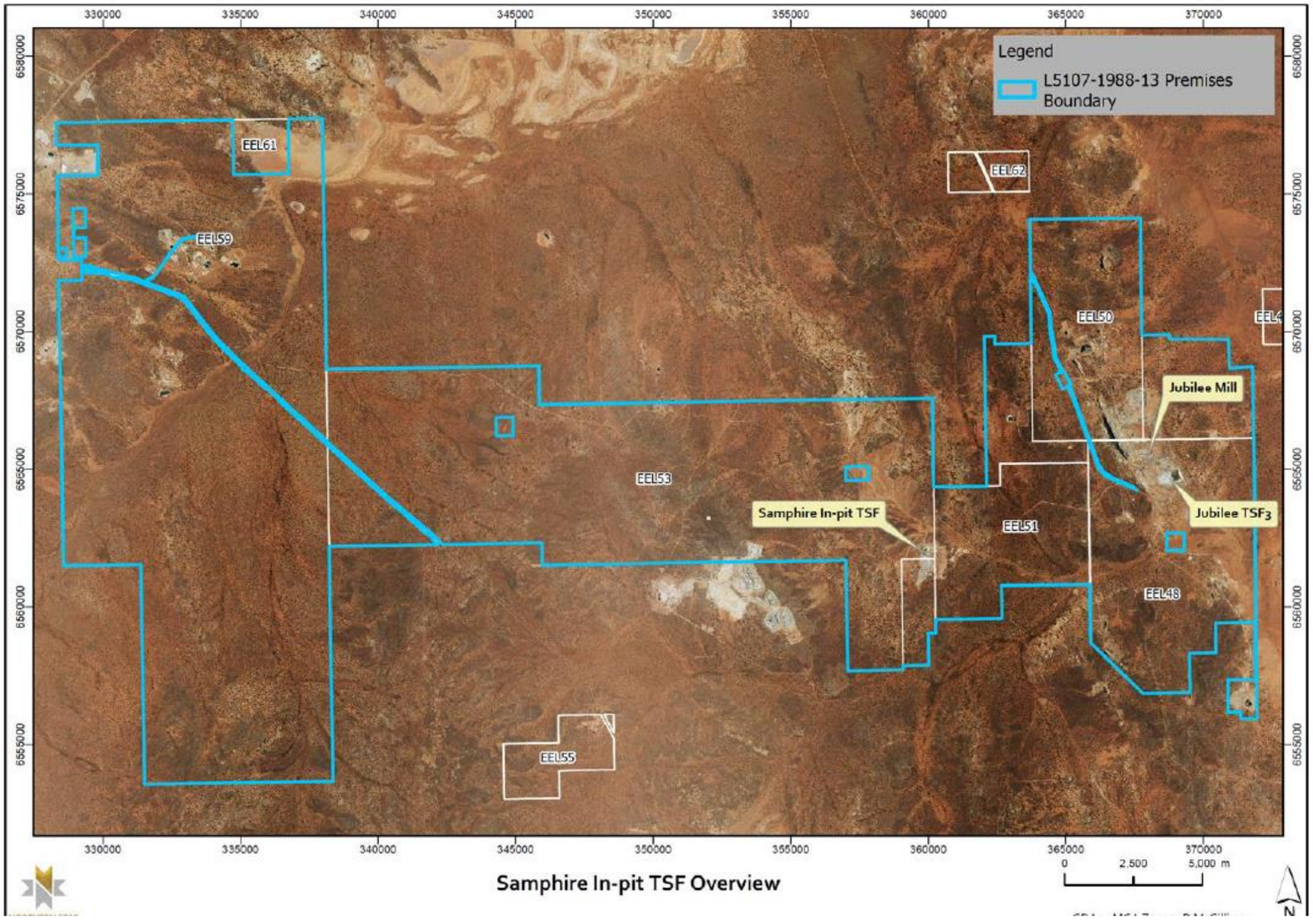


Figure 1: Map of the boundary of the prescribed premises

Figure 2: Samphire paddock style TSF - General Arrangement

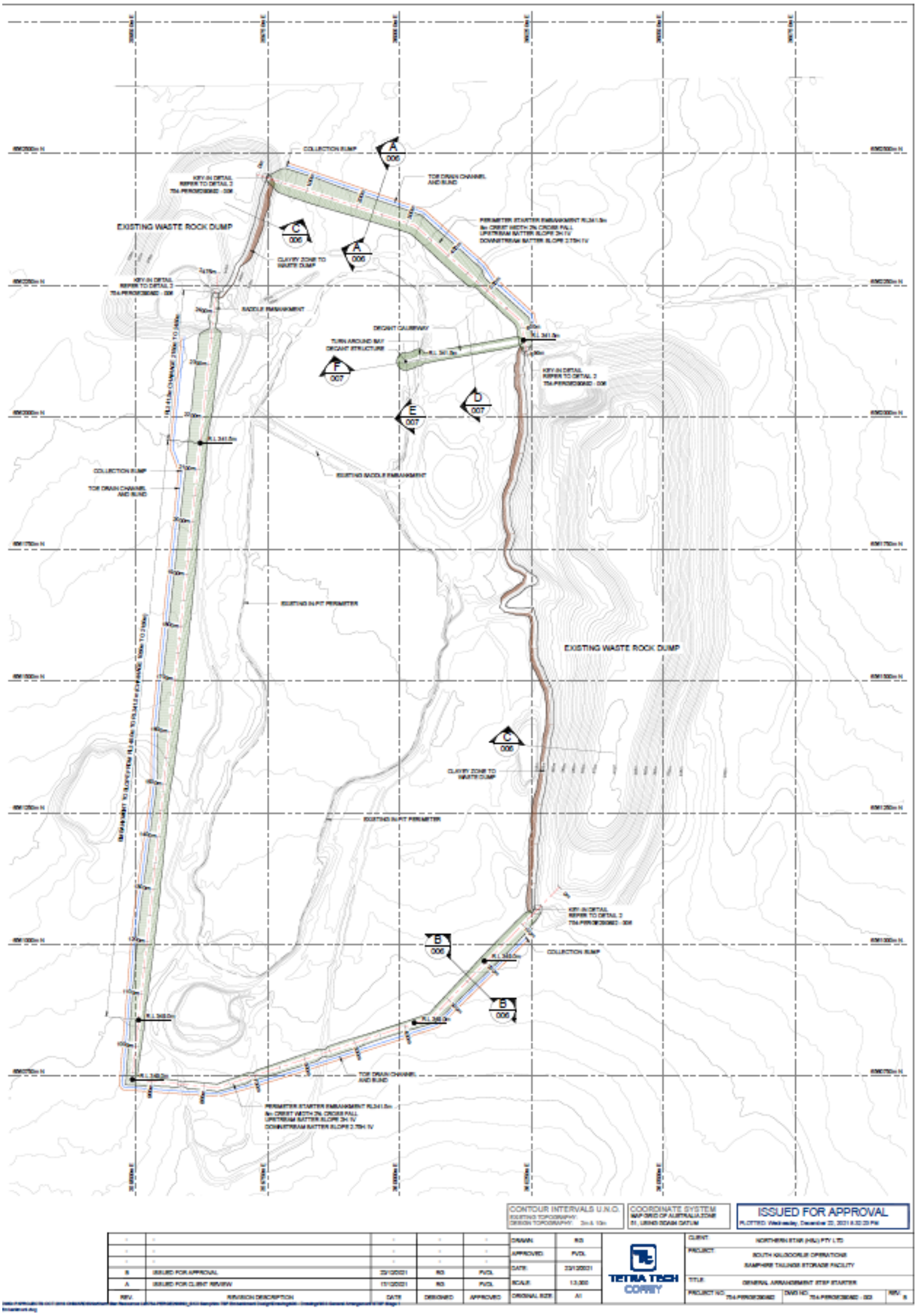


Figure 3 Samphire paddock style TSF (Starter Embankment) – Drawing number: 754-PERGE290892 - 003

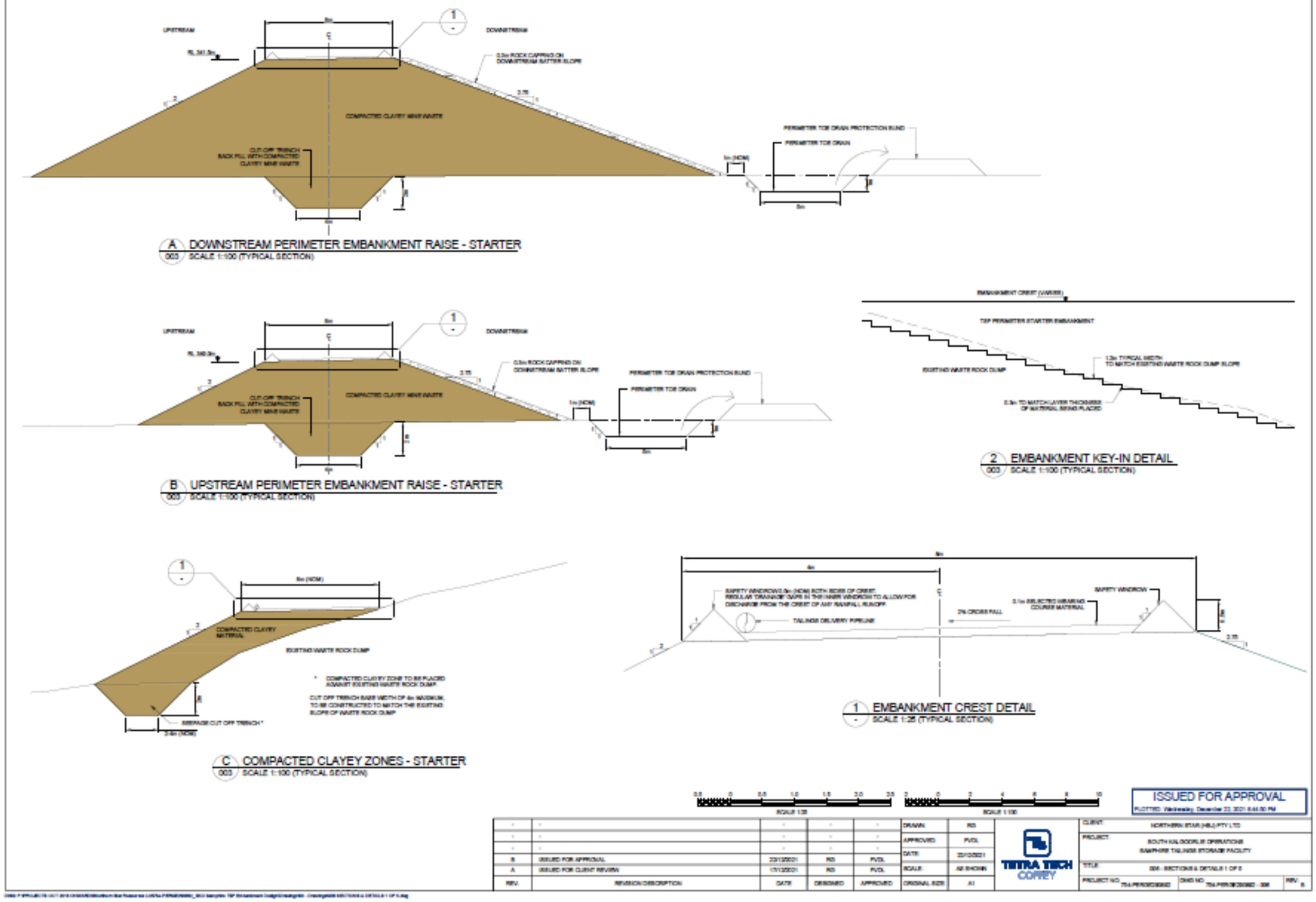
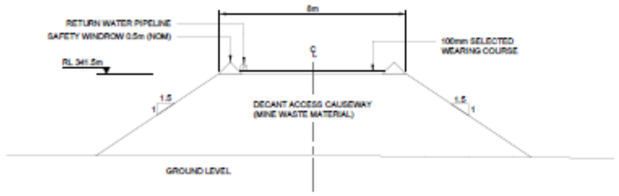
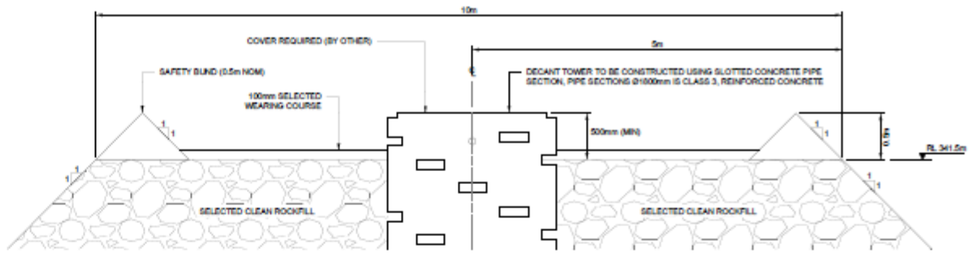


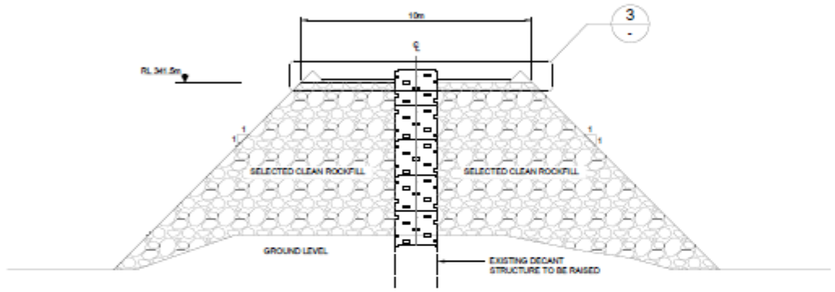
Figure 4 - Downstream and upstream embankment - starter – Drawing number: 754-PERGE290892 – 006



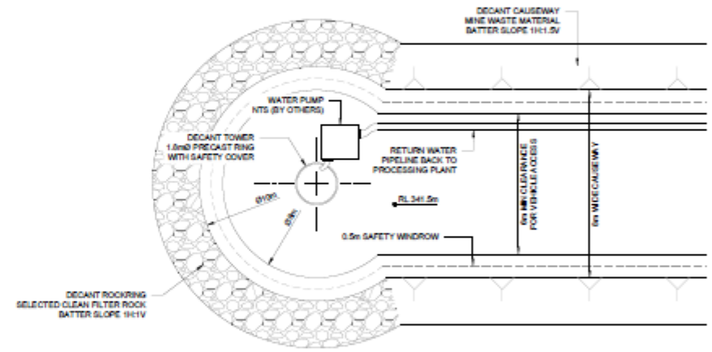
D 003 DECANT ACCESS CAUSEWAY - STARTER
SCALE 1:100 (TYPICAL DETAIL)



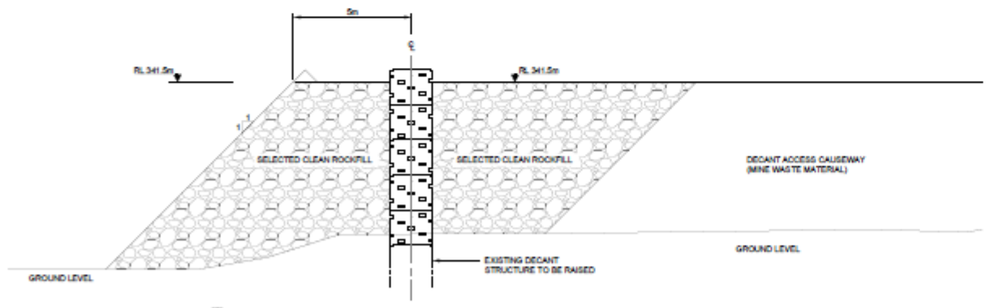
3 - DECANT STRUCTURE DETAIL
SCALE 1:100 (TYPICAL DETAIL)



E 003 DECANT STRUCTURE CROSS SECTION - STARTER
SCALE 1:100 (TYPICAL DETAIL)



DECANT STRUCTURE PLAN VIEW DETAIL
SCALE 1:100 (TYPICAL DETAIL)



F 003 DECANT STRUCTURE LONG SECTION - STARTER
SCALE 1:100 (TYPICAL DETAIL)

SCALE 1:100

ISSUED FOR APPROVAL
PLOTTED: Wednesday, December 22, 2021 8:47:09 PM

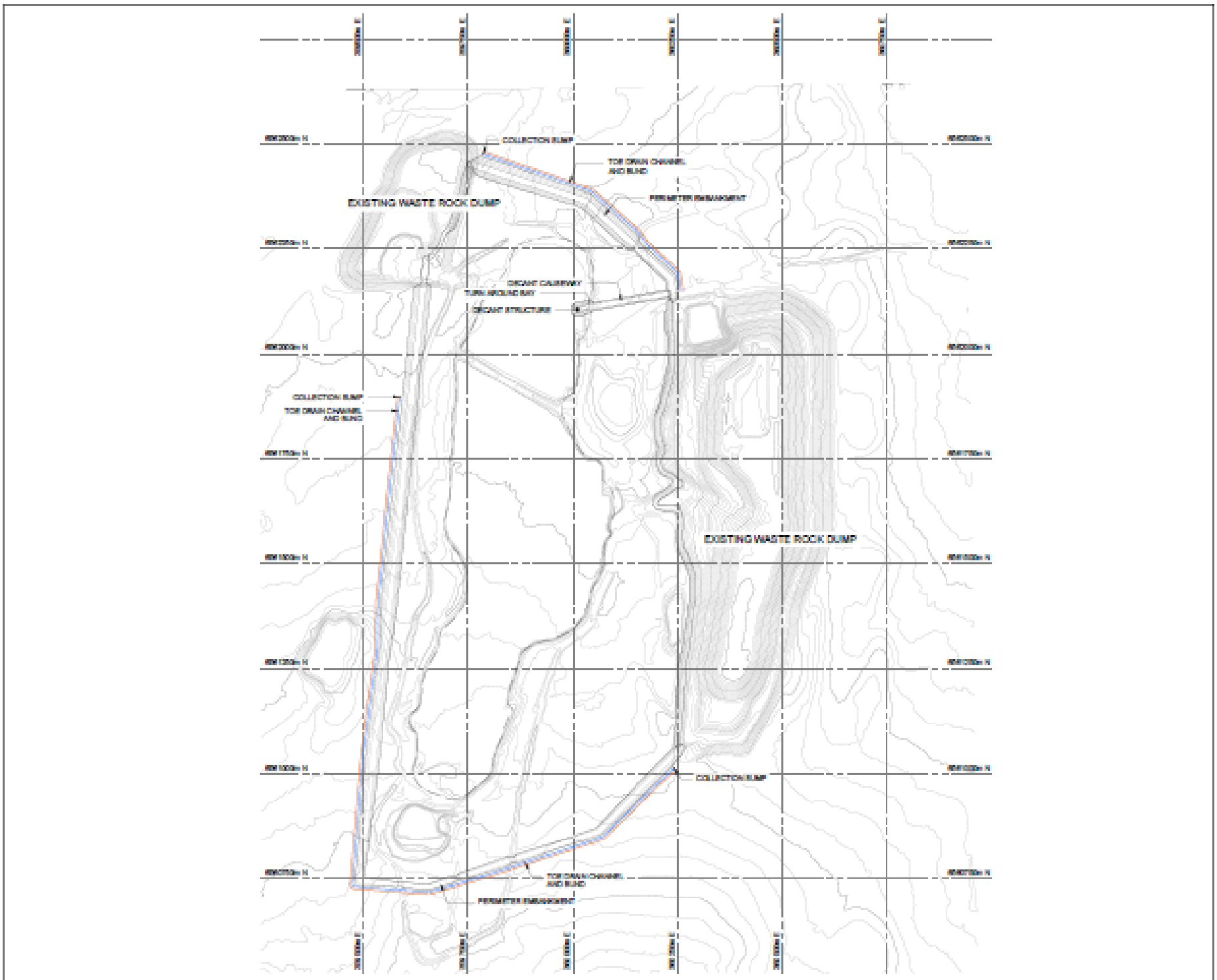
REV.	REVISION DESCRIPTION	DATE	DESIGNED	APPROVED
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
B	ISSUED FOR APPROVAL	22/12/2021	RG	FVDL
A	ISSUED FOR CLIENT REVIEW	17/12/2021	RG	FVDL

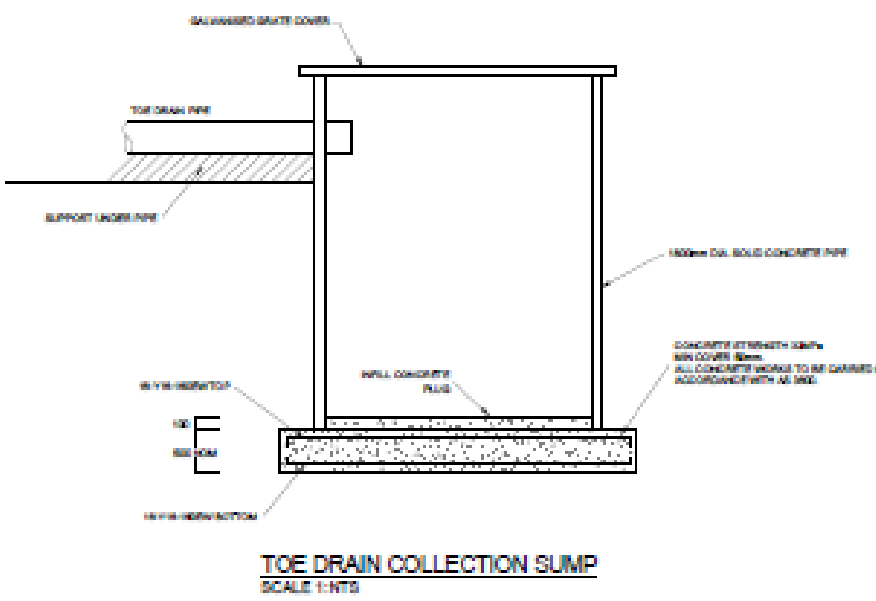
DRAWN: RG
APPROVED: FVDL
DATE: 22/12/2021
SCALE: 1:100
ORIGINAL SIZE: A1

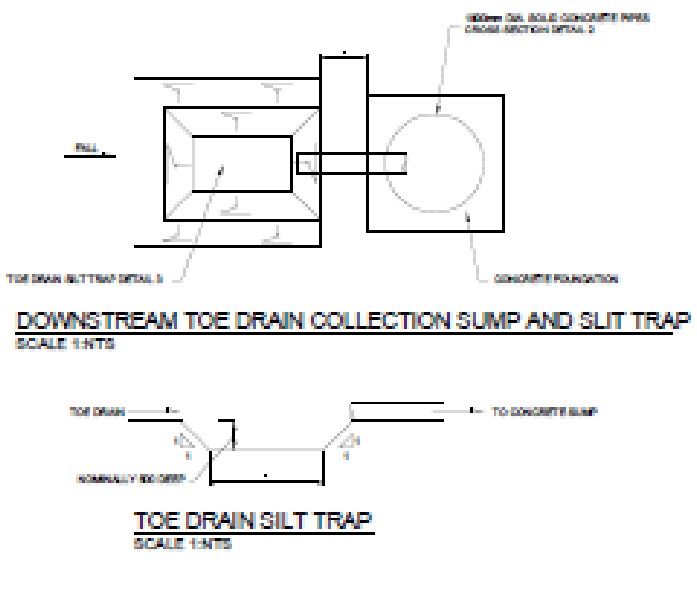
TETRA TECH COFFEY

CLIENT: NORTHERN STAR (HBJ) PTY LTD
PROJECT: SOUTH KALGOORLIE OPERATIONS SAMPHIRE TAILINGS STORAGE FACILITY
TITLE: SECTIONS & DETAILS 2 OF 5
PROJECT NO: 754-PERGE290892
DWG NO: 754-PERGE290892 - 007
REV: B

Figure 5 - Decant Structure – Drawing number: 754-PERGE290892 - 007







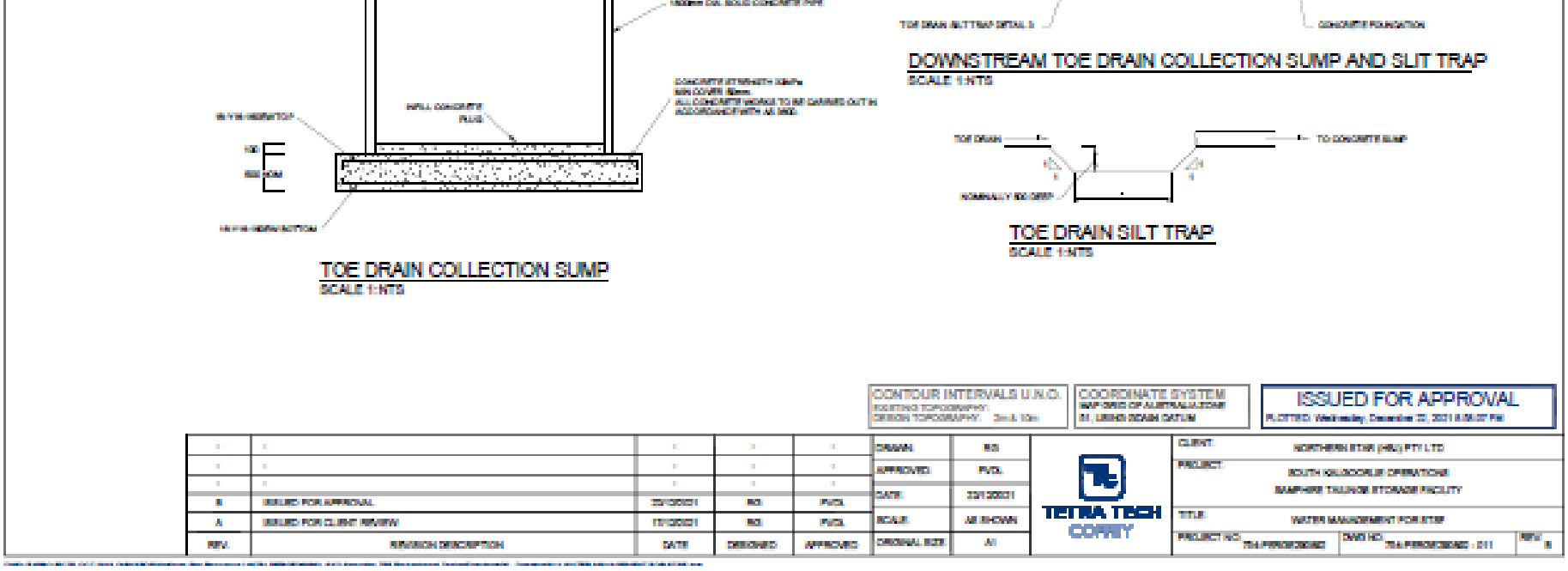


Figure 6 - Toe Drain and Collection sump – Drawing number: 754-PERGE290892 - 011

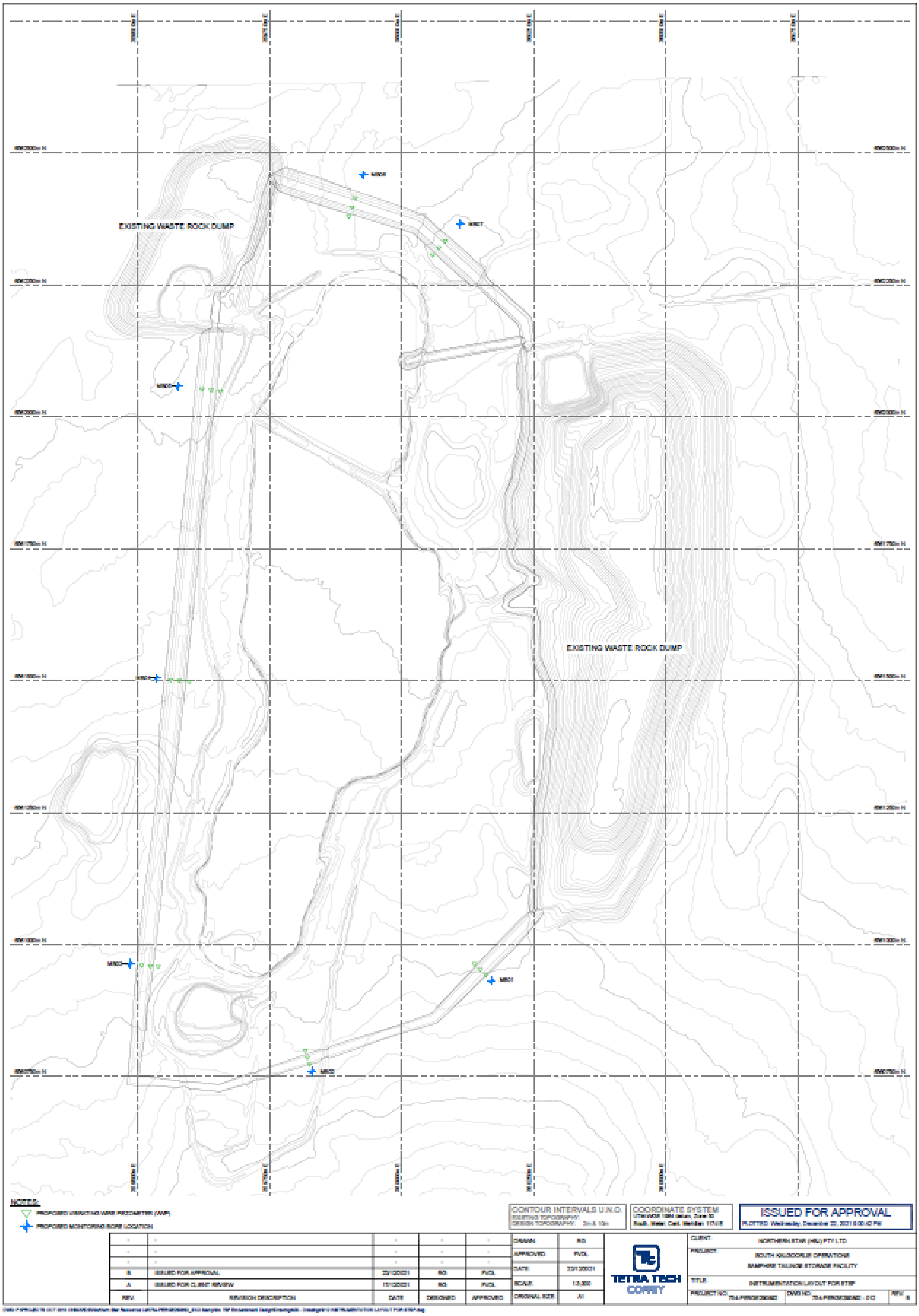


Figure 7 - Vibrating Wire Piezometer location – Drawing number: 754-PERGE290892 - 012