



Works approval number W6522/2021/1

Works approval holder Northern Star Resources Ltd

ACN 092 832 892

Registered business address Level 1, 388 Hay Street
SUBIACO WA 6008

DWER file number DER2021/000035

Duration 14/9/2021 to 13/09/2026

Date of issue 14/9/2021

Premises details Jundee Mining Operations
Legal description -
Mining tenements G53/20, M53/191, M52/412,
M53/413 and M53/414

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

This works approval is granted to the works approval holder, subject to the attached conditions, on 14 September 2021, by:

Christine Pustkuchen
A/MANAGER, RESOURCE INDUSTRIES
REGULATORY SERVICES

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

Works approval history

Date	Reference number	Summary of changes
14/09/2021	W6522/2021/1	Construction of tailings storage facility (TSF) 3

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;
 - (c) at the corresponding infrastructure location; and
 - (d) within the corresponding timeframe
 as set out in Table 1.

Table 1: Critical containment infrastructure design and construction requirements

	Infrastructure	Design and construction / installation requirements	Infrastructure location
1.	Tailings storage facility 3	<ul style="list-style-type: none"> • Total storage capacity of 48.5 Mt • Storage area of 230 hectares • Constructed to provided a minimum 0.5 m total freeboard (including an allowance for a 1% AEP 72 hour rain event) above the normal operating period. 	As shown in site layout map in Schedule 1
	Starter embankment	<ul style="list-style-type: none"> • Crest level of 566.0 m • Perimeter embankment slopes of 1:2 (V;H) upstream and an overall 1:2.75 (V;H) downstream slope. • Cut-off trench with 4 m side base excavated beneath the perimeter embankment and backfilled with compacted clayey mine waste or borrowed earthfill. Excavated to a nominal depth of 1 m below ground surface with side cut batters of 1:1 (V;H) • Decant causeway with central pumped decant system constructed in a single stage for starter embankment. Starter embankment causeway lifts to coincide with perimeter embankment raises. 	As shown in General Arrangement Starter Embankment map in Schedule 1
	Seepage control	<ul style="list-style-type: none"> • Constructed with an in-situ compacted clay liner (minimum 300 mm thick) with a hydraulic conductivity of 1×10^{-7} m/s • Testing of the compacted clay liner must completed at a rate of one test per 10 hectare 	N/A
	Water reclamation	<ul style="list-style-type: none"> • Central decant recovery system • Central underdrainage pipe network 	As shown in Water Recovery Layout

	Infrastructure	Design and construction / installation requirements	Infrastructure location
		around decant facility which connect to underdrainage pipe network	map in Schedule 1

2. The works approval holder is authorised to construct embankment raises for TSF3 to the construction height specified in Table 2.

Table 2: Stage construction heights for TSF3

Stages	Construction height (mRL)
1 – starter embankment	566.0
2	569.0
3	572.0

Infrastructure and equipment (non-CCL)

3. The works approval holder must:
- construct and/or install the infrastructure and/or equipment;
 - in accordance with the corresponding design and construction/installation requirements;
 - at the corresponding infrastructure location; and
 - within the corresponding timeframe
- as set out in Table 3

Table 3: Design and construction requirements

	Infrastructure	Design and construction requirements	Timeframe
1.	Tailings and Decant Return Pipeline	Pipelines shall: <ul style="list-style-type: none"> be constructed within secondary containment sufficient to contain any spill for a period equal to the time between routine inspections; and/or be fitted with a telemetry system; and/ or automatic cutouts in the event of a pipe failure. 	N/A
2.	Monitoring instrumentation	<ul style="list-style-type: none"> Vibrating wire piezometers to be installed at the base of the embankment Vibrating wire piezometers will be in a conduit installed in a trench (nominally 0.5 m deep) running under the embankment to terminal data loggers adjacent to the final downstream embankment toe line. 	Vibrating piezometers to be constructed and determined operational prior to operation of starter embankment

	Infrastructure	Design and construction requirements	Timeframe
3.	Stage 2 – Embankment raise	<ul style="list-style-type: none"> Upstream embankment raise of 3 m 	N/A
4.	Stage 3 – Embankment raise	<ul style="list-style-type: none"> Upstream embankment raise of 3 m 	N/A

Compliance reporting

4. The works approval holder must within 30 calendar days of an item of critical containment infrastructure required 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.
5. The Critical Containment Infrastructure Report required by condition 4 must include as a minimum the following:
 - (a) certification by a qualified geotechnical or civil 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; and
 - (e) a Quality Control / Quality Assurance Certificate from an independent third party which demonstrates that in-situ compacted soil liner meets the requirements specified in Table 1.
6. The works approval holder must within 30 calendar days of an item of infrastructure or equipment required by condition 3 being constructed and/or installed:
 - (a) undertake an audit of their compliance with the requirements of condition 3; and
 - (b) prepare and submit to the CEO an Environmental Compliance Report on that compliance.
7. The Environmental Compliance Report required by condition 6 must include as a minimum the following:
 - (a) certification by a suitably qualified geotechnical or civil engineer that each item of critical containment infrastructure or component thereof, as specified in condition 3, has been built and installed in accordance with the requirements specified in condition 3;
 - (b) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 3; and

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

Construction of groundwater monitoring wells

8. The works approval holder must design, construct and install groundwater monitoring wells in accordance with the requirements specified in Table 4

Table 4: Infrastructure requirements – groundwater monitoring bores

Infrastructure	Design and construction requirements	Monitoring well location(s)	Timeframe
Groundwater monitoring wells NMB16 – NMB23	<p><u>Well design and construction</u></p> <p>Designed and constructed in accordance with the Minimum Construction Requirements for Water Bores in Australia and Figure 4 in Schedule 1.</p> <p>Well screens must target the part, or parts of the aquifer most likely to be affected by contamination¹. Where temporary/seasonal perched features are present bores must be nested, and the perched features individually screened.</p>	As depicted in map under heading Monitoring Bore Layout in Schedule 1.	Must be constructed, developed (purged) and determined to be operational by no later than 30 calendar days prior to the commencement of time limited operations under Condition 10.
	<p><u>Logging of borehole</u></p> <p>Soil samples must be collected and logged during the installation of the monitoring bores.</p> <p>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.</p> <p>Any observations of staining/odours or other indications of contamination must be included in the bore log.</p>		
	<p><u>Well construction log</u></p> <p>Well construction details must be documented within a well construction log to demonstrate compliance with the Minimum Construction Requirements for the Water Bores in Australia. 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.</p>		
	<p>Installation survey: the vertical (top of casing) and horizontal position of each monitoring bore must be surveyed and</p>		

Infrastructure	Design and construction requirements	Monitoring well location(s)	Timeframe
	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 identification numbers.		

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

9. The works approval holder must within 30 calendar days of the monitoring bores being constructed, submit to the CEO a bore construction report evidencing compliance with the requirements of condition 8.

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 4 meets the requirements of that condition.
11. The works approval holder may only commence time limited operations for an item of infrastructure identified in condition 3 where the Environmental Compliance Report as required by condition 6 has been submitted by the works approval holder for that item of infrastructure.
12. The works approval holder may conduct time limited operations for an item of infrastructure specified in condition 13 (as applicable):
 - (a) for a period not exceeding 180 calendar days from the day the works approval holder meets the requirements of condition 10 or 11 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*.

Time limited operations – infrastructure and equipment

13. During time limited operations, the works approval holder must ensure that the premises infrastructure and equipment listed in Table 5 and located at the corresponding infrastructure location is maintained and operated in accordance with the corresponding operational requirement set out in Table 5.

Table 5: Infrastructure and equipment requirements during time limited operations

	Site infrastructure and equipment	Operational requirement	Infrastructure location
1.	Tailings Storage Facility cell 3	<ul style="list-style-type: none"> Operational freeboard of 500 mm Methods of operation must minimize the likelihood of erosion of the embankments by wave action 	As shown in Site layout map in Schedule 1

Monitoring during time limited operations

14. The works approval holder must conduct monitoring in accordance with the requirements specified in Table 6 and record the results of all monitoring activities conducted under that program.

Table 6: Compliance and performance monitoring

Site infrastructure and equipment	Parameter	Frequency
Tailings Storage Facility Cell 3	<ul style="list-style-type: none"> Outer perimeter area and embankments Condition of roads and ramps Tailings behaviour at deposition point Visual check on tailings and water levels embankment crest (freeboard) Offtake location Blockage or damage of discharge Monitoring instrumentation 	Daily
TSF decant system	<ul style="list-style-type: none"> Size of supernatant pond Location of supernatant pond Blockage of decant tower Visual check on decant tower operation 	Daily
TSF underdrainage, toe-drains and seepage trench	<ul style="list-style-type: none"> Blockage of towers/pipes Visual checks of water level in towers/pipes 	Daily
TSF basin	<ul style="list-style-type: none"> Water volume and level Tailings beach-head level 	Each weekly period
Tailings	<ul style="list-style-type: none"> Tailings solids (tonnes) Water in tailings (tonnes or m³) Average tailings flow (m³/s) 	Each weekly period
Water	<ul style="list-style-type: none"> Outflow from decant pumps Outflow from toe drain and 	Daily

Site infrastructure and equipment	Parameter	Frequency
	underdrainage <ul style="list-style-type: none"> Specific gravity of decant water 	
Standpipe and vibrating wire piezometers	<ul style="list-style-type: none"> Standing water level Pore-water pressure 	Each monthly period
Tailings slurry	<ul style="list-style-type: none"> Full assays and analysis of tailings material characteristics 	N/A

15. The works approval holder must conduct a groundwater monitoring program in accordance with the requirements specified in Table 7 and record the results of all monitoring activity conducted under that program.

Table 7: Groundwater monitoring of ambient concentrations

Monitoring well location	Parameter	Frequency	Method
Monitoring Bores NMB16 – NMB23	Standing water level ¹	Each monthly period	Spot sample in accordance with AS/NZS 5667.1
	pH ¹		
	Electrical conductivity ¹		
	Total dissolved solids		
	WAD cyanide	Each quarterly period	
	Total cyanide		
	Ca, Mg, Na, K, CO ₃ , Cl, SO ₄ , Al, As, Cd, Cr, Cu, Fe, mn, Ni, Zn, Pb and Co		

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

Time limited operations – Compliance reporting

16. 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 sooner.
17. The works approval holder must ensure the report required by condition 16 includes the following:
- a summary of the time limited operations, including timeframes and amount of gold bearing ore processed;
 - a summary of the environmental performance of all infrastructure as constructed or installed (as applicable), which includes records detailing the:
 - tailings deposited in TSF 3;
 - monitoring conducted in accordance with conditions 14 and 15; and
 - water balance for TSF 3 for the duration of time limited operations,

recording site rainfall; evaporation rate, decant water recovery volumes; volumes of tailings deposited and estimated seepage losses.

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

- 18.** 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.
- 19.** 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 1;
 - (c) monitoring programmes undertaken in accordance with conditions 14 and 15; and
 - (d) complaints received under condition 18.
- 20.** The books specified under condition 19 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 8 have the meanings defined.

Table 8: Definitions

Term	Definition
AEP	means the average exceedance probability.
AS/NZS 5667.1	means the Australian Standard AS/NZS 5667.1 <i>Water quality Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.</i>
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 <i>Environmental Protection Act 1986</i> 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 <i>Public Sector Management Act 1994</i> 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 commissioning	means the sequence of activities to be undertaken to test equipment integrity and operation, or to determine the environmental performance, of equipment and infrastructure to establish or test a steady state operation and confirm design specifications.
Environmental Commissioning Report	means a report on any commissioning activities that have taken place and a demonstration that they have concluded, with focus on emissions and discharges, waste containment, and other environmental factors.
Environmental	means a report to satisfy the CEO that the conditioned

Term	Definition
Compliance Report	infrastructure has been constructed and/or installed in accordance with the works approval.
EP Act	<i>Environmental Protection Act 1986 (WA).</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA).</i>
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.
suitably qualified geotechnical engineer	means a person who <ul style="list-style-type: none"> (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
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	means 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).

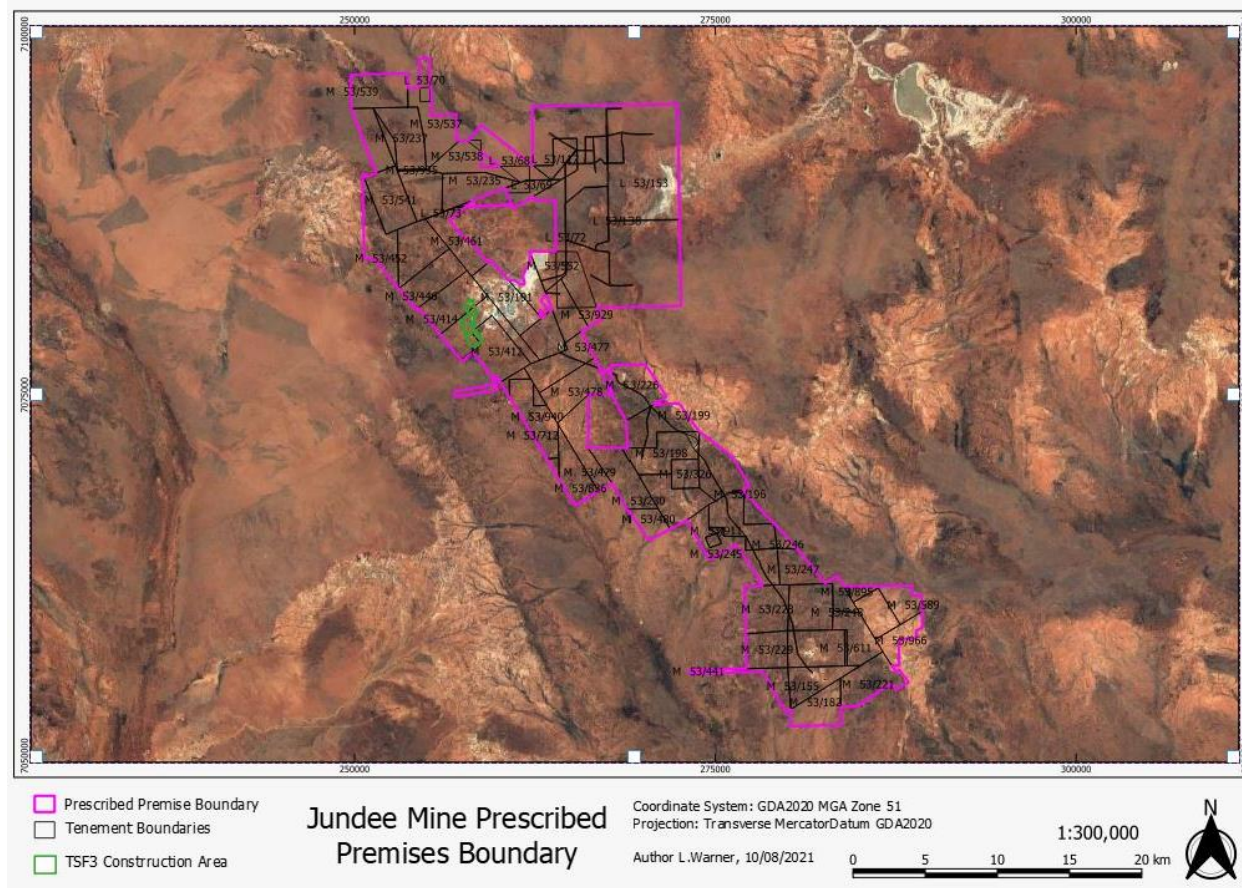


Figure 1: Map of the boundary of the prescribed premises

[W6522/2021/1](#)

IR-T05 Works approval template (v5.0) (February 2020)

Site Layout Map



Figure 2: General layout of TSF3

General Arrangement – Starter embankment

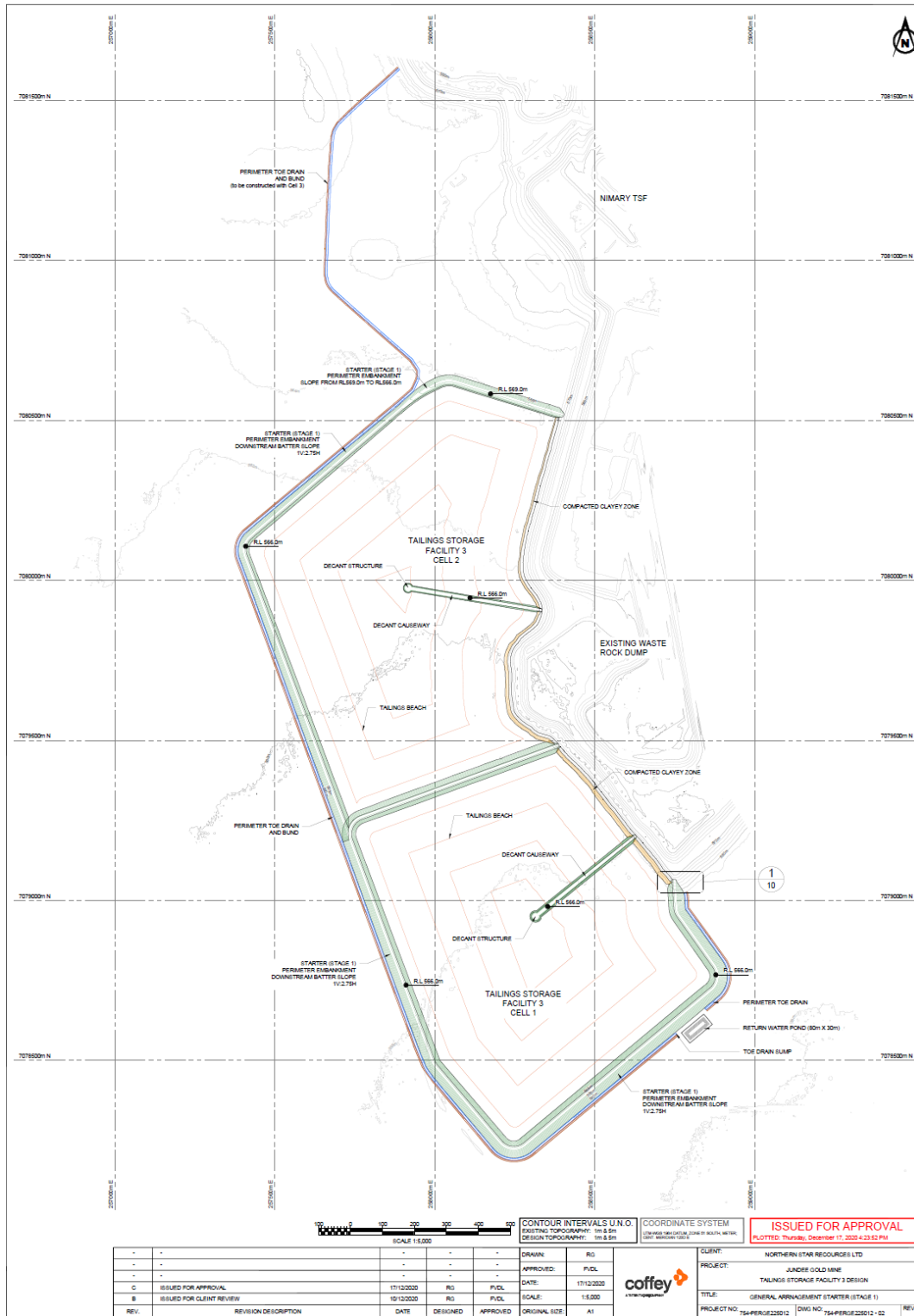


Figure 3: General arrangement of starter embankment of TSF3

Water Recovery Layout Map

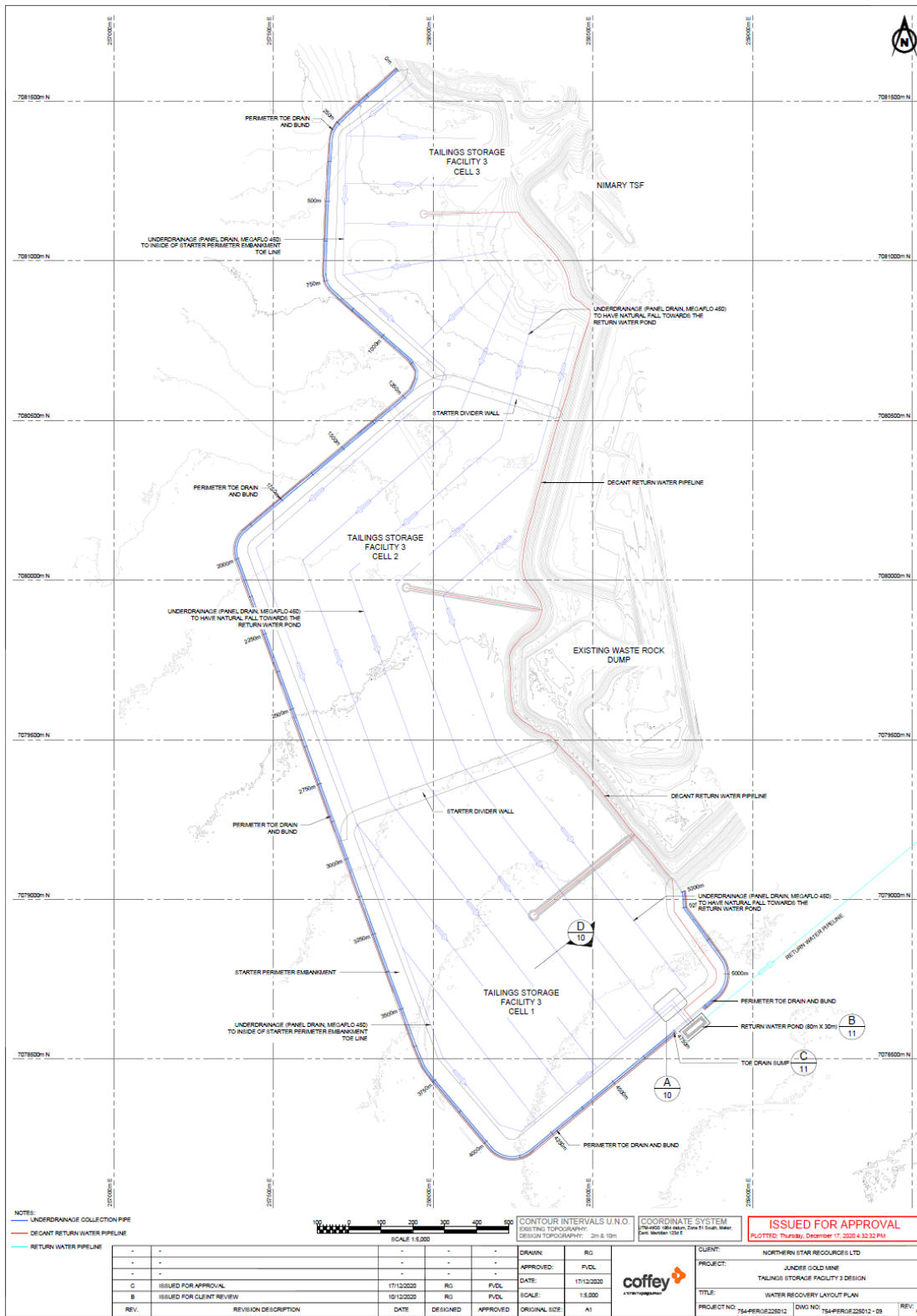


Figure 4: Water recovery layout for TSF3

Monitoring Bore Layout



Figure 5: TSF3 proposed monitoring bore locations