Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works Approval Number	W6209/2019/1
Works approval holder	Hastings Technology Metals Limited
ACN	122 911 399
Registered business address	167 St Georges Terrace Perth WA 6000
DWER file Number	DER2019/000040
Duration	17/06/2020 to 16/06/2025
Date of issue	17/06/2020
Date of amendment	10/06/2022
Prescribed details	Yangibana Rare Earths Project Legal description - Mining Tenements G09/14, M09/158, M09/157, G09/18, G09/17, G09/20 and M09/161 WEST LYONS RIVER WA 6705

Prescribed premises category description (Schedule 1, *Environmental Protection Regulations 1987*)	**Assessed design capacity**
Category 5: Process or beneficiation of metallic or non-metallic ore	1,100,000 tonnes per annual period
Category 6: Mine dewatering	60,000 tonnes per annual period
Category 64: Class II or III putrescible landfill site	3,487 tonnes per annual period
Category 85: Sewage facility	34 cubic metres per day

This amended works approval is granted to the Works Approval Holder, subject to the attached conditions, on 10 June 2022, by:

A/SENIOR 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
17/06/2020	W6209/2019/1	Works approval granted
10/06/2022	W6209/2019/1	Works approval amended to: • Change location of Category 5 and 85 infrastructure; • Remove construction of Hydrometallurgical Plant and associated infrastructure (i.e. acid bake kiln); • Remove time limited operation of TSFs; and • Remove Category 52 and 73 from works approval.

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 means the version of the standard, guideline or code of practice in force at the time of granting of this Works Approval and includes any amendments to the standard, guideline or code of practice which may occur from time to time during the course of the works approval;

(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.

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 and/or install the 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: Design and construction / installation requirements

Infrastructure	Design and construction / installation requirement	Infrastructure location
Ore processing facility: • ROM pad • Beneficiation circuit • Chemical storage area	(a) Equipment and chemicals located over bunded concrete slabs for the containment of spillage. (b) Tanks containing process slurries and/or liquors are located within concrete bunds sized to capture 110% of the volume of the largest tank. (c) Stormwater runoff directed to sedimentation pond designed for runoff from a 5-day, 85th percentile rainfall (rainfall event of 23.5mm) event without discharge. (d) Sedimentation pond fitted with pumping system to recover spills. (e) ROM pad fitted with sprinkler systems for dust suppression. (f) Perimeter of the processing facility bunded with granite to divert uncontaminated stormwater away from the facility. (g) Process chemicals stored in tanks, IBCs or silos, with appropriate bunding. (h) Pipeline transferring chemicals from storage areas to process plant will have spill management bunds and sumps, if outside of process plant's bunded area.	Bunded compounds as indicated by pink shaded areas in Ore Processing Plant Stormwater Drainage Plan in Schedule 1. Sedimentation pond as shown in Ore Processing Plant Stormwater Drainage Plan in Schedule 1.
Ore processing facility sewage treatment plant and irrigation area	(a) Five stage Bardenpho activated sludge sewage treatment plant with the following treated effluent water quality design criteria: (i) pH between 6.8-8.5; (ii) Biochemical oxygen demand less than 20 mg/L; (iii) Total suspended solids less than 30 mg/L; (iv) Total nitrogen less than 30 mg/L; (v) Total phosphorus less than 8 mg/L; (vi) *E.coli* less than 1,000 cfu/100 ml. (b) High level alarm float switches on the balance tank and irrigation tank; instrumentation interlocked to process control system.	WWTP location as shown in the Processing Plant Site Layout in Schedule 1. Infrastructure components as shown in Map of ore processing facility sewage treatment plant in Schedule 1.

Infrastructure	Design and construction / installation requirement	Infrastructure location
	(c) 1 hectare irrigation sprayfield with sprinkler system. (d) Continuous flow meter to measure volumes discharged to the irrigation sprayfield. (e) Wet weather event contingency storage of at least 5,000 L within each pump station and a further capacity of 15 kL within the balance and irrigation tanks (equivalent to approx. one day's capacity in total).	
Putrescible and inert landfill bunkers	(a) Putrescible waste landfill bunker and inert waste landfill bunker at each of the Frasers Pit waste rock dump and Bald Hill Pit waste rock dump. (b) Bunkers to be nominally 50 m long, 10 m wide and 2 m deep. (c) Bunkers are to incorporate an approximate 2 percent slope to the rear to retain stormwater collected within bunkers. (d) Bunkers are to include perimeter stormwater diversion drainage.	Refer to indicative locations in 'Premises Map' in Schedule 1. Bunker design as per 'Map of landfill bunker design' in Schedule 1.
Discharge of dewater from Fraser Pit and Bald Hill Pit	(a) Frasers Pit and Bald Hill Turkey Nests lined with HDPE. (b) Controlled overflow discharge pipe from each of the Frasers Pit and Bald Hill Turkey Nests to convey water to the nearest drainage line. (c) A spreader pipe from the discharge point to manage flow and reduce inundation downstream of the discharge point. (d) Rock pitching at the discharge point to disperse kinetic energy and protect bed and banks adjacent to the discharge point.	Authorised discharge locations as per 'Map of dewater discharge points' in Schedule 1.
Tailings and return water pipelines	(a) Pipelines are to be constructed of HDPE. (b) With the exception of pipeline sections that traverse a waterway, pipelines are to be installed in bunded corridors that direct spillage to low point spillage containment ponds or into a TSF. (c) Pipeline corridor spillage containment points are to be designed for 12 hours of maximum flow from the largest pipe. (d) Sections of pipelines that traverse a waterway are to be double sleeved and installed on an elevated pipe bridge. (e) Pipelines are to be fitted with a continuously monitored pressure alarm system that activate an alarm system and automated tail pumping system shutdown in the event of pressure drop detection.	Pipeline routes as shown in 'TSF pipeline route and stormwater diversion plan' in Schedule 1.
Groundwater monitoring bores	(a) Six groundwater monitoring bores installed at approximate locations shown on the *Map of TSF groundwater and piezometer monitoring locations* in Schedule 1 that intercept groundwater in the confined aquifer and include a shallow nested bore to identify upward seepage from the confined aquifer. (b) Groundwater monitoring bores are to be installed no later than twelve months prior to commencing tailings deposition in either TSFs (whichever commences first).	Schedule 1: Maps – Map of TSF groundwater and piezometer monitoring locations

Critical containment infrastructure

2. The Works Approval Holder must:

(a) construct the critical containment infrastructure;

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

(c) at the corresponding infrastructure location,

as set out in Table 2 and

Table **3**.

Table 2: Beneficiation TSF Critical containment infrastructure design and construction requirements

Criteria	Design and construction requirements	Infrastructure location
General	(a) 86 hectare area with design for maximum volume of 6.5 Mm^3 (approximately 9.745 Mt solids). (b) Paddock style facility with perimeter discharge via spigots.	TSFs location as shown in the Premises Map and Map of TSF groundwater and piezometer monitoring locations in Schedule 1. Pipeline route as shown in the TSF pipeline route and stormwater in Schedule 1
Stormwater and freeboard controls	(c) Stormwater storage capacity equivalent to a 1:5 wet season plus 1:100 AEP, 72 hour flood. (d) A spillway for a 1:100,000 AEP, critical flood plus 1:10 AEP wave run-up or PMF. (e) Level gauge boards and/or automated level sensors for monitoring water levels. (f) Decant pumping system and decant (return water) pipeline to the ore processing facility.	
Seepage controls	(a) Minimum 300 mm of clayey in-situ soils at the base of the pond impoundment area that are proof compacted during construction to achieve a hydraulic conductivity of at least 1 x 10^{-8} m/s. (b) Contingency measures incorporated into the as constructed TSF are to include: (i) treatments of any identified preferential seepage paths between the TSF and downstream receptors using barrier systems such as cement grouting or cut-off walls; (ii) seepage interception systems such as trenches or recovery bores; and (iii) geosynthetic lining of collection drains within the final TSF landform to further reduce long term seepage rates.	

Table 3: Hydromet TSF Critical containment infrastructure design and construction requirements

Criteria	Design and construction requirements	Infrastructure location
General	(a) 36 hectare area with design for maximum volume 1.9 Mm^3 (approximately 0.72 Mt solids). (b) Paddock style facility with decant pond, decant tower and single point discharge.	TSF locations shown in Premises Map and TSF pipeline route and stormwater
Stormwater and	(c) Stormwater storage capacity equivalent to a 1:5 wet season plus	

Criteria	Design and construction requirements	Infrastructure location
freeboard controls	1:100 AEP, 72 hour flood. (d) Additional freeboard equivalent to a 1:10 AEP wind run-up plus 0.3 m. (e) A spillway for a 1:100,000 AEP, critical flood plus 1:10 AEP wave run-up or PMF. (f) Installation of level gauge boards and/or automated level sensors for monitoring water levels.	diversion map in Schedule 1.
Seepage controls	(a) Geocomposite lining system to achieve a hydraulic conductivity of 10^{-9} m/s or less comprising; (i) Minimum 300 mm thick compacted clay liner below a HDPE liner; (ii) Minimum 1.5 mm thickness HDPE liner; (iii) Installation to follow QA/QC procedures; (iv) Electrical leak location survey to be completed post installation; and (v) Any holes or defects identified in the leak location survey to be repaired. (b) Underdrainage collection in the valley of the TSF installed above HDPE liner.	

Compliance reporting – infrastructure and equipment

3. The Works Approval Holder must within 60 calendar days of each item of infrastructure and/or equipment 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 an Environmental Compliance Report on that compliance.

4. The Environmental Compliance Report required by condition 3, must include as a minimum the following:

(a) certification that the items of infrastructure or component(s) thereof, as specified in condition 1, have or have not been constructed and/or installed in accordance with the relevant requirements specified in condition 1;

(b) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 1; and

(c) be signed by a person authorised to represent the Works Approval Holder and contains the printed name and position of that person.

5. Where an item of infrastructure has been certified as not being located or constructed, or does not comply with the corresponding requirements, the works approval holder must correct the non-compliant or defective works, prior to re-certifying, or provide to the CEO a description of, and explanation for, any departures from the requirements specified in condition 1 that do not require relocation or rectification and do not constitute a material defect along with the Environmental Compliance Report.

Compliance reporting – critical containment infrastructure

6. The Works Approval Holder must within 60 calendar days of the critical containment infrastructure identified by condition 2 being constructed:

(a) undertake an audit of their compliance with the requirements of condition 2; 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 the Tailings Design Engineer of Record or their delegate that each item of critical containment infrastructure or component thereof, as specified in condition 2 has been built and installed in accordance with the requirements specified in condition 2;

(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 2; and

(c) be signed by a person authorised to represent the Works Approval Holder and contains the printed name and position of that person within the company.

8. Where an item of infrastructure has been certified as not being located or constructed, or does not comply with the corresponding requirements, the works approval holder must correct the non-compliant or defective works, prior to re-certifying, or provide to the CEO a description of, and explanation for, any departures from the requirements specified in condition 2 that do not require relocation or rectification and do not constitute a material defect along with the Critical Containment Infrastructure Report.

Commissioning phase

Commencement and duration

9. The Works Approval Holder is permitted to commission the WWTP for a period of three months from the date of completion of construction. The Works Approval Holder must notify the CEO of the start of commissioning, at least seven days prior to the commencement of commissioning.

10. During the commissioning period the Works Approval Holder must monitor the treated effluent stream post the WWTP for the parameters as listed in Table 7 in Schedule 3 and ensure the effluent meets the limits specified.

Compliance reporting

11. Within 14 days of the end of the commissioning period, the Works Approval Holder shall submit a report demonstrating compliance with condition 10.

Time limited operations phase

Commencement and duration

12. The Works Approval Holder may only commence time limited operations for an item of infrastructure identified in condition 1 (with the exception of the WWTP) where the Environmental Compliance Report as required by conditions 3 and 4 has been submitted by the Works Approval Holder for that item of infrastructure.

13. The WWTP may commence time limited operations following submission of the commissioning report as listed in condition 11.

14. The Works Approval Holder may conduct time limited operations for an item of

infrastructure specified in conditions 1:

(a) for a period not exceeding 180 calendar days from the day the Works Approval Holder meets the requirements of condition 12 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 14(a).

Time limited operations requirements and emission limits

15. During time limited operations, the Works Approval Holder must ensure that the emissions specified in Table 4 are discharged only from the corresponding discharge point and only at the corresponding discharge point location.

Table 4: Authorised discharged points

Emission	Discharge point	Discharge point height (m)	Discharge point location as shown in relevant map in Schedule 1
Fraser Pit dewater	Frasers Pit turkeys nest discharge pipe	N/A	Map of dewater discharge points
Bald Hill Pit dewater	Bald Hill turkeys nest discharge pipe		
Treated sewage wastewater	Irrigation sprayfield discharge pipe		Sprayfield as shown in Processing Plant Site Layout in Schedule 1.

Monitoring during time limited operations – emissions

16. The Works Approval Holder must monitor treated wastewater emissions during time limited operations in accordance with Table 7 in Schedule 3.

Monitoring during time limited operations – ambient

17. The Works Approval Holder must monitor groundwater and surface water quality during time limited operations for concentrations of the identified parameters in accordance with Table 8 and Table 12 in Schedule 3.

Compliance reporting

18. 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 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 ore processed

~~(b)~~ a summary of the monitoring results obtained during the time limited operations under conditions 16 and 17;

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

(d) where the manufacturers design specifications and the conditions of this Works Approval have not been met, the measures the Works Approval Holder will take to meet them, and the timeframes required to implement those measures.

Records and reporting (general)

20. 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

21. 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 and 2 of this works approval;

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

(c) monitoring programmes undertaken in accordance with conditions 16 and 17 and of this works approval; and

(d) complaints received under condition 20 of this works approval.

22. 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.

Definitions

In this Works Approval, the terms in Table 5 have the meanings defined.

Table 5: Definitions

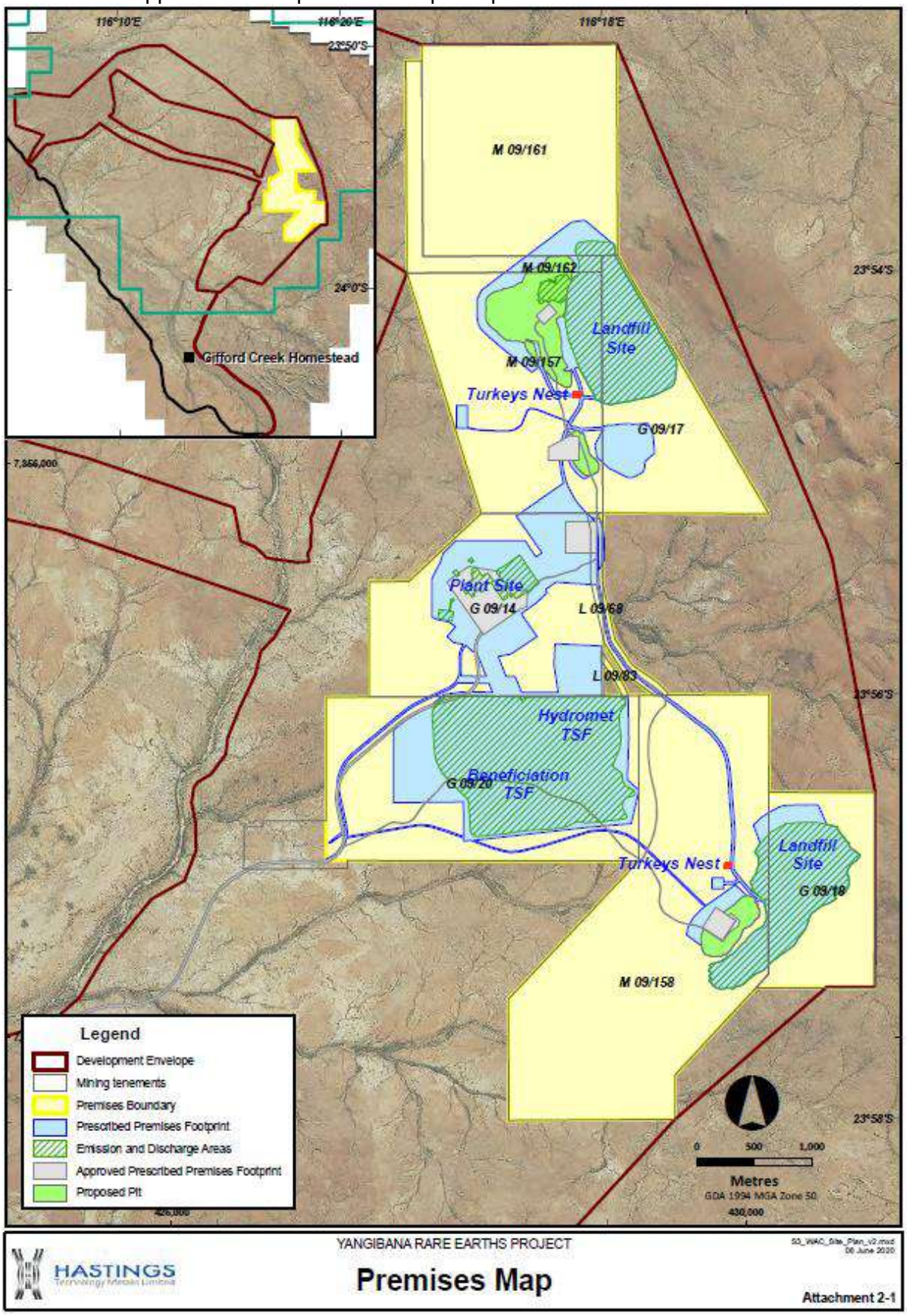
Term	Definition
AS 4323.1	means Australian Standard *AS 4323.1 Stationary source emissions: selection of sampling positions*.
AS/NZS 5667.1	means the Australian Standard AS/NZS 5667.1 *Water Quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.*
AS/NZS 5667.9	means the Australian Standard AS/NZS 5667.9 *Water Quality – Sampling – Guidance on the sampling of surface waters.*
AS/NZS 5667.10	means the Australian Standard AS/NZS 5667.10 *Water Quality – Sampling – Guidance on the sampling of waste waters.*
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
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.
critical containment infrastructure	means the infrastructure critical to operations as listed in Table 2 and Table 3.
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.
DER (2014)	Means the DER (2014) *Assessment and Management of Contaminated Sites,* Department of Environment Regulation, Perth, December 2014.
EN 14181:2014	means the European Standard *EN 14181:2014 Stationary source emissions – Quality assurance of automated measuring systems*, Comite Europeen de Normalisation (CEN), 2014
Environmental Compliance Report	means a report to satisfy the CEO that works have been constructed in accordance with the works approval.
EP Act	means the *Environmental Protection Act 1986* (WA).
EP Regulations	means the *Environmental Protection Regulations 1987* (WA).
HDPE	High density polyethylene
IBC	Intermediate bulk container
NATA	National Association of Testing Authorities, Australia
premises	refers to the premises to which this Works Approval applies, as specified at the front of this Works Approval and as shown on the map in Schedule 1 to this Works Approval.
prescribed premises	has the same meaning given to that term under the EP Act.
REEs	Rare earth elements
Tailings Design Engineer	means a person who: (a) holds a relevant tertiary academic qualification; and

Term	Definition
	(b) has a minimum of five years of experience working in the area / field of design engineering and certification of TSFs
time limited operations	refers to the limited operation of the primary activities described in Schedule 2 of this works approval, at locations shown in Schedule 1 of this works approval, subject to the conditions, whilst a licence application is being assessed.
TSF	Tailings Storage Facility
waste	has the same meaning given to that term under the EP Act.
works	refers to the works described in Schedule 2, at the locations shown in Schedule 1 of this Works Approval to be carried out at the premises, subject to the conditions.
works approval	refers to this document, which evidences the grant of the Works Approval by the CEO under s.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.

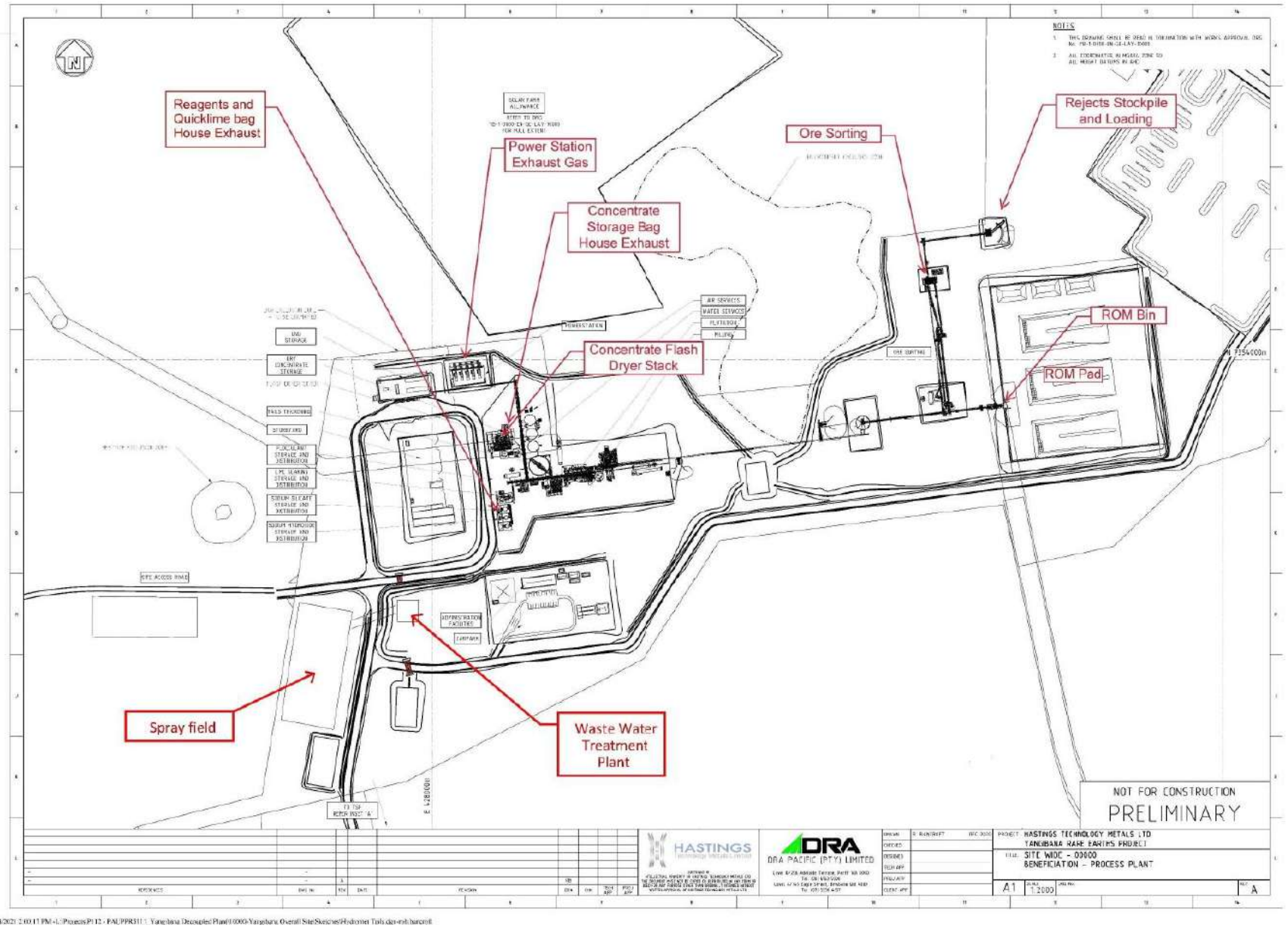
Schedule 1: Maps

Premises map

The Prescribed Premises boundary is shown in the map below in yellow. The brown line indicates the approved development envelope as per Ministerial Statement MS 1110.

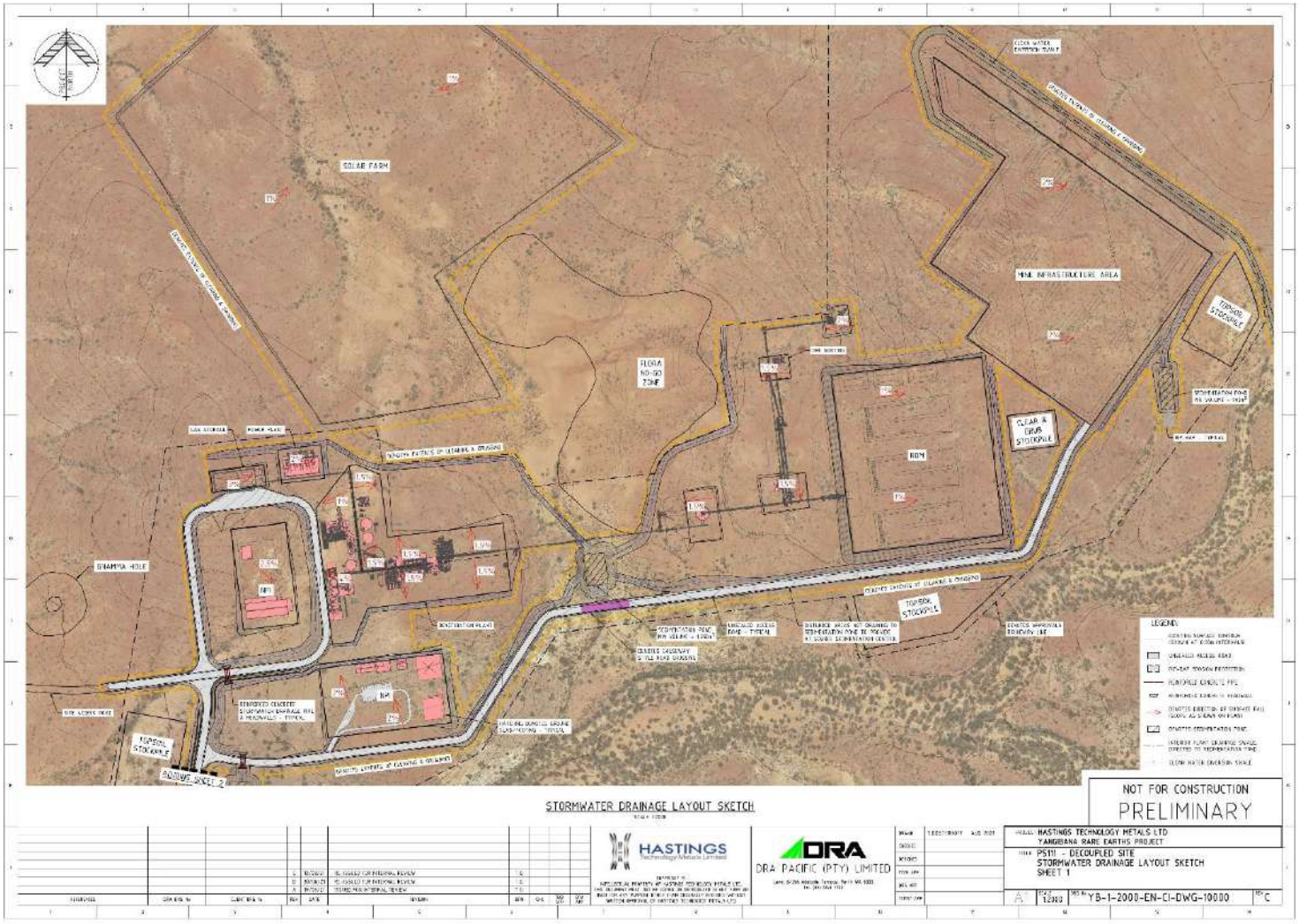


Processing Plant Site Layout

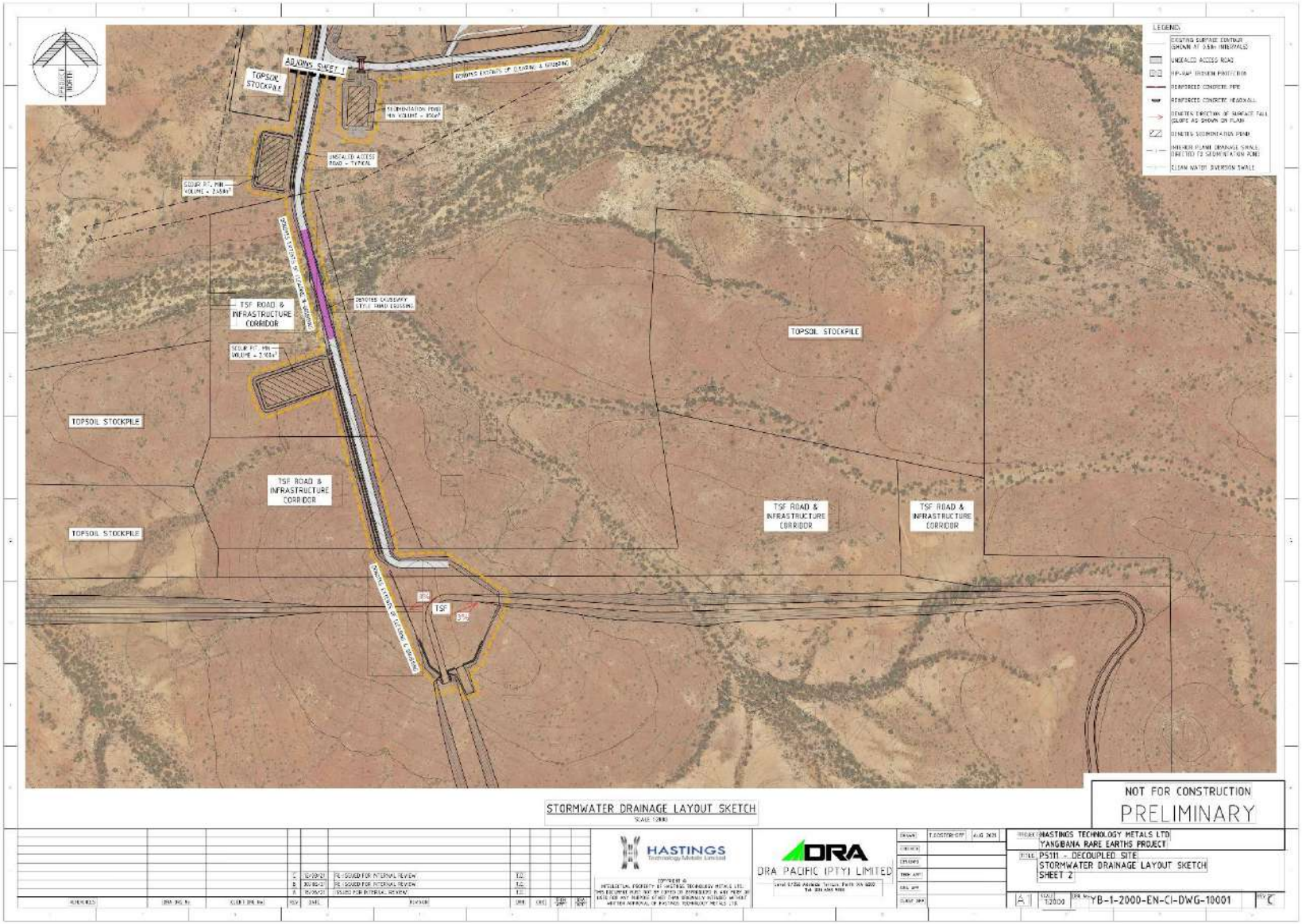


W6209/2019/1 (Date of amendment: 10/06/2022)

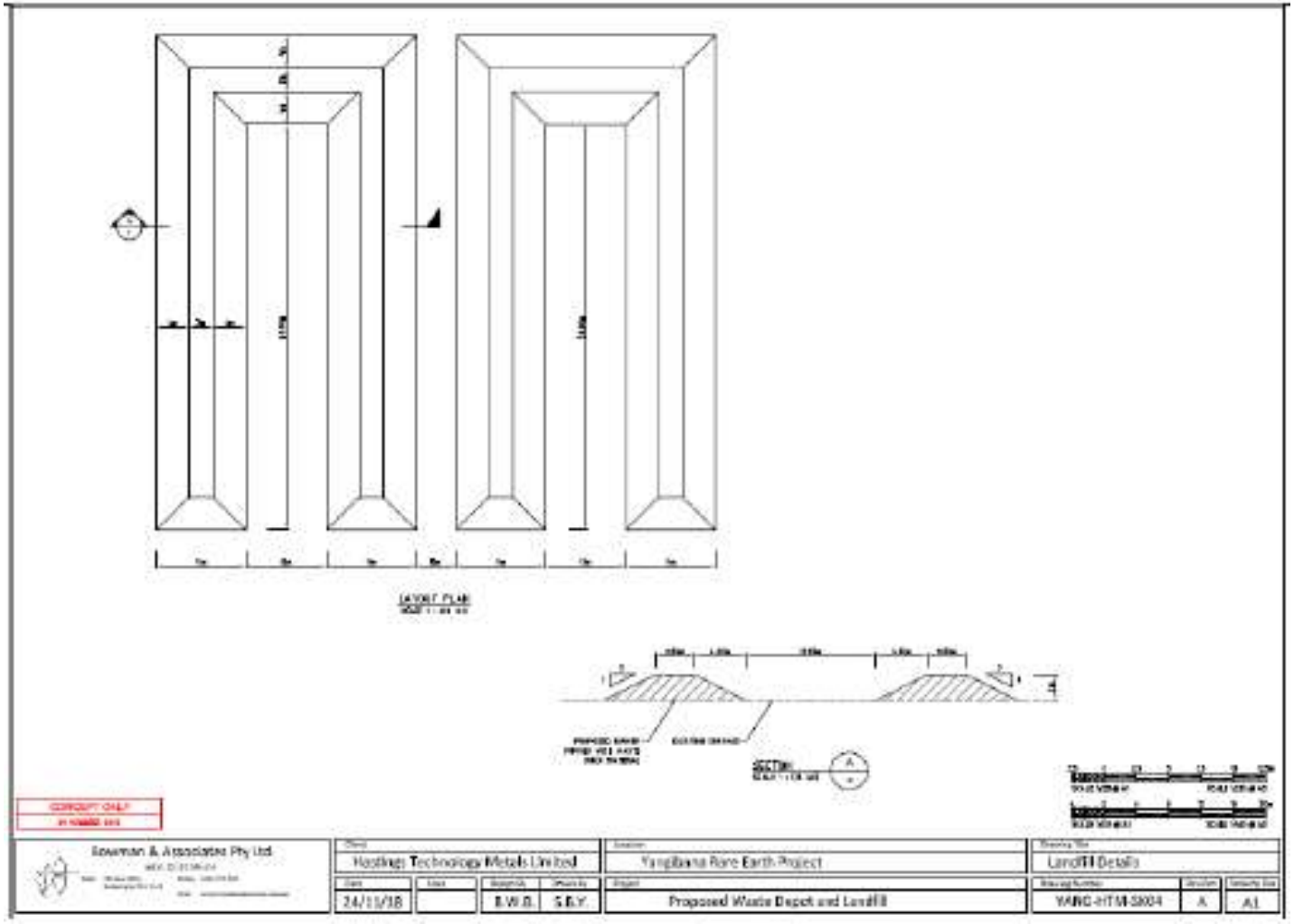
Ore Processing Plant Stormwater Drainage Infrastructure Map



W6209/2019/1 (Date of amendment: 10/06/2022)

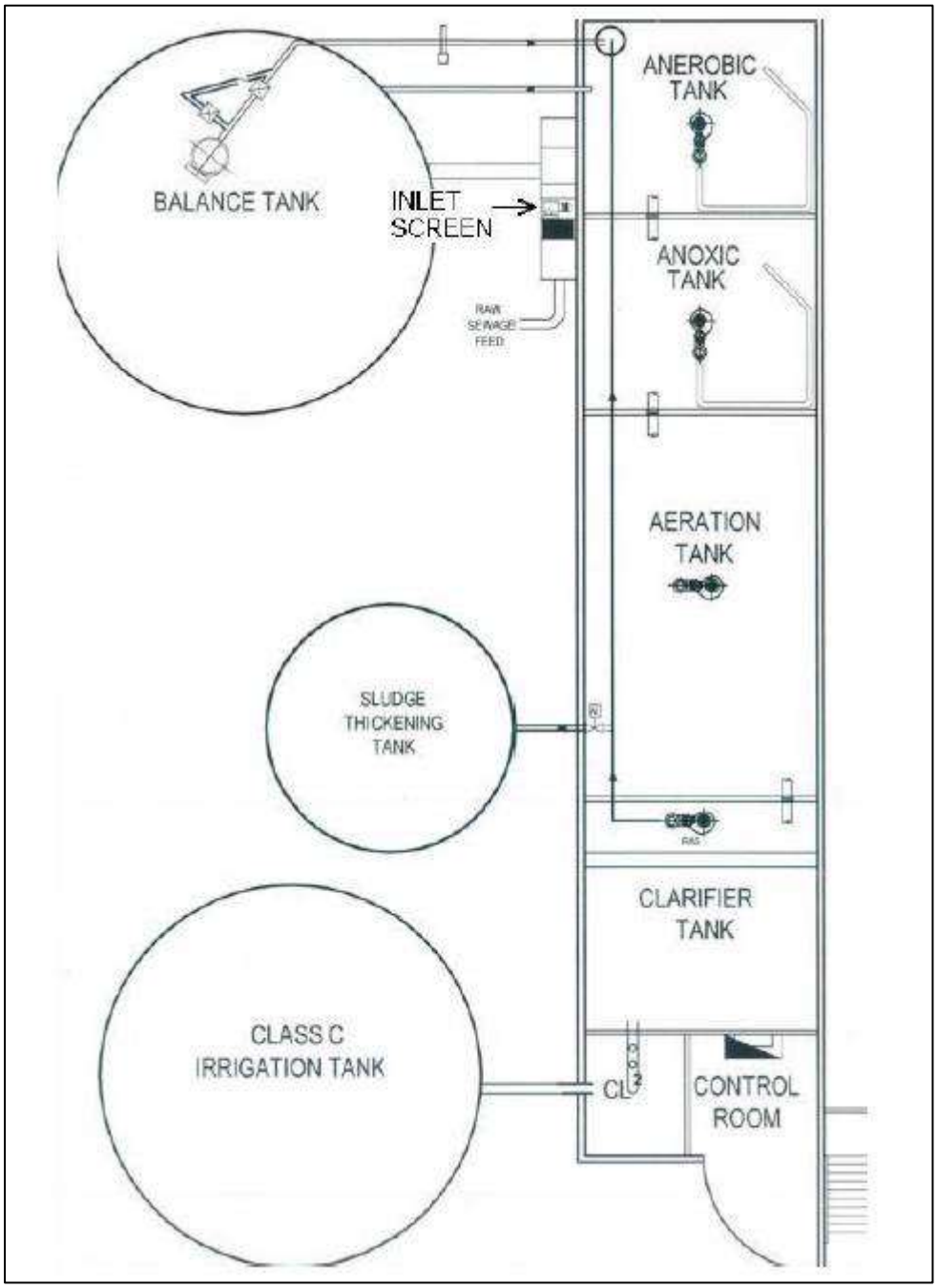

LEGEND
ADJOINS SHEET 1
TOPSOIL STOCKPILE
SEDIMENTATION POND
UNSEALED ACCESS ROAD - TYPICAL
TSF ROAD & INFRASTRUCTURE CORRIDOR
DENOTES CROSSWAY UTILITY HAND CROSSING
TOPSOIL STOCKPILE
TOPSOIL STOCKPILE
TSF ROAD & INFRASTRUCTURE CORRIDOR
TOPSOIL STOCKPILE
TSF ROAD & INFRASTRUCTURE CORRIDOR
TSF ROAD & INFRASTRUCTURE CORRIDOR
TSF
STORMWATER DRAINAGE LAYOUT SKETCH
NOT FOR CONSTRUCTION
PRELIMINARY
HASTINGS
DRA PACIFIC (PTY) LIMITED
HASTINGS TECHNOLOGY METALS LTD
YANGIBANA RARE EARTHS PROJECT
PS111 - DECOUPLED SITE
STORMWATER DRAINAGE LAYOUT SKETCH
SHEET 2
YB-1-2000-EN-CI-DWG-10001

Map of landfill bunker design

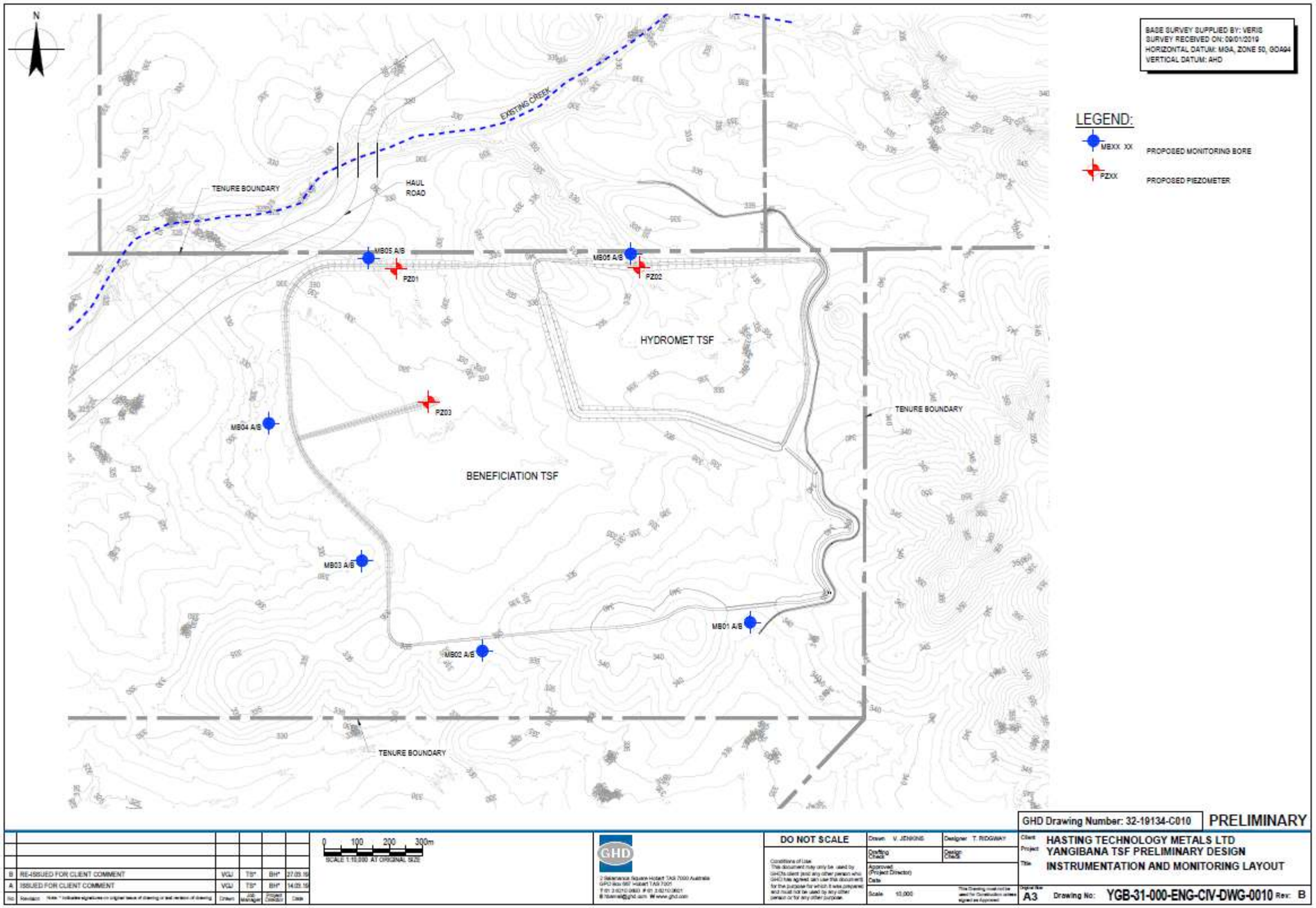


W6209/2019/1 (Date of amendment: 10/06/2022)

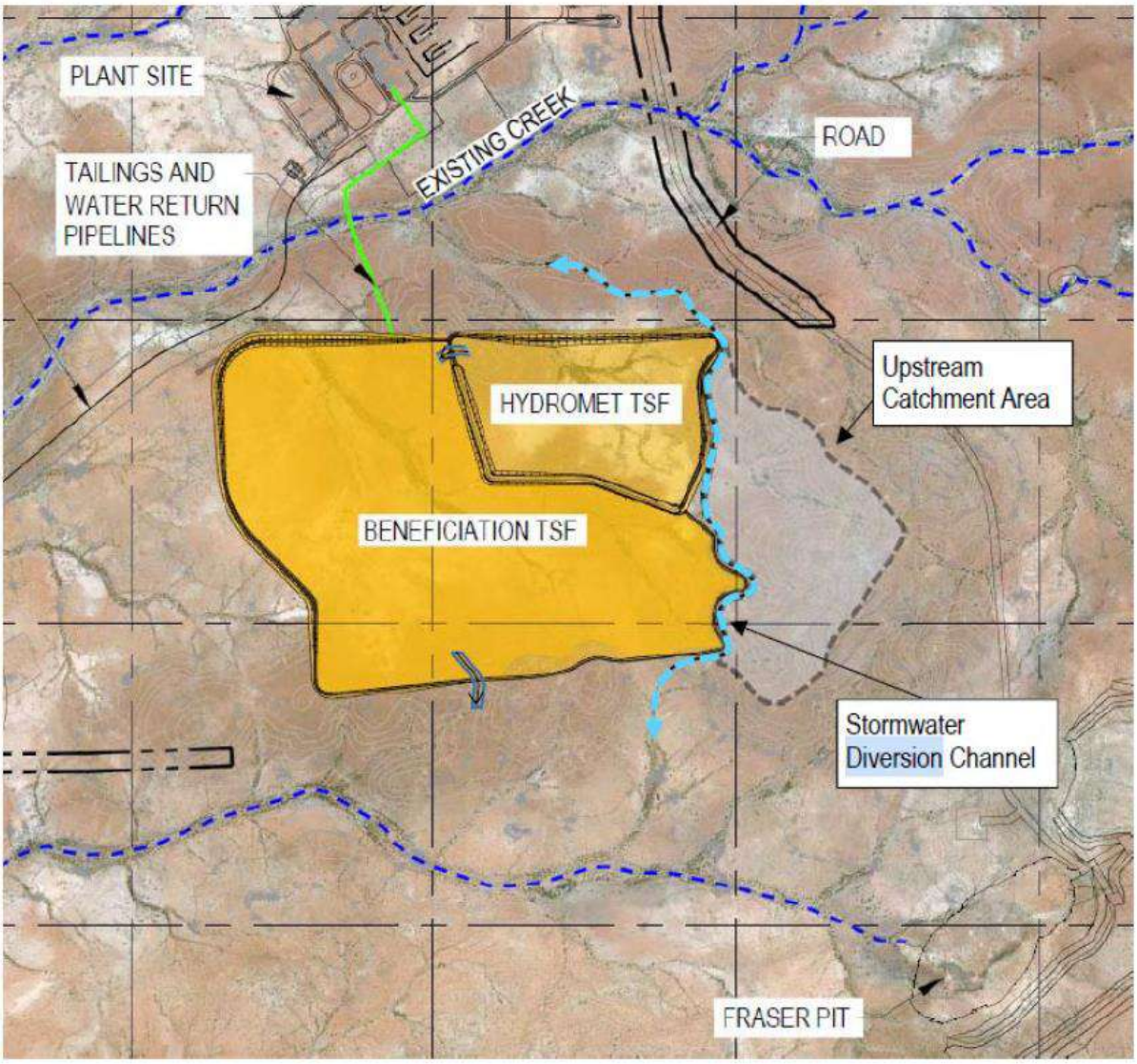
Map of ore processing facility sewage treatment plant



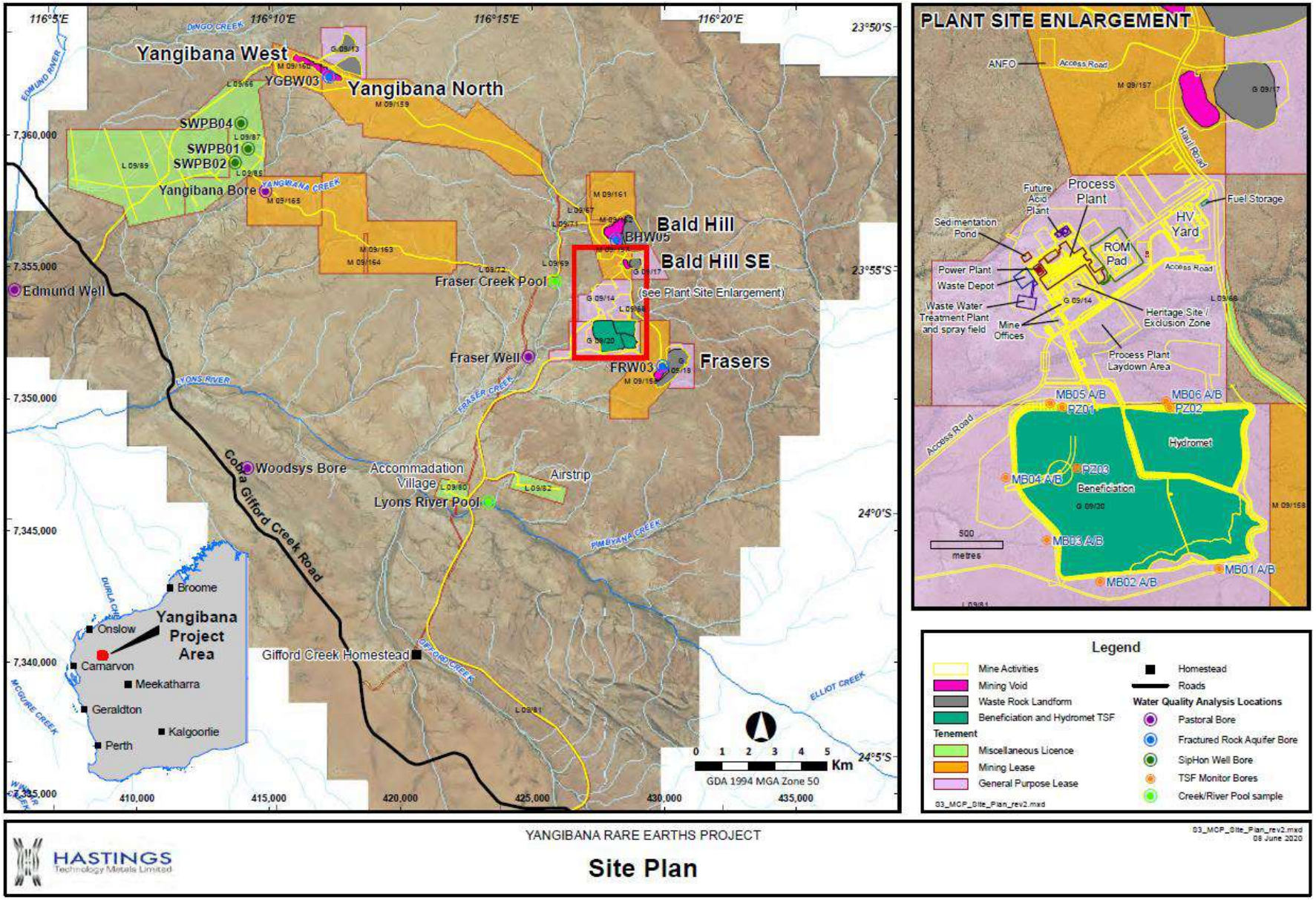
Map of TSF groundwater and piezometer monitoring locations



TSF pipeline route and stormwater diversion map



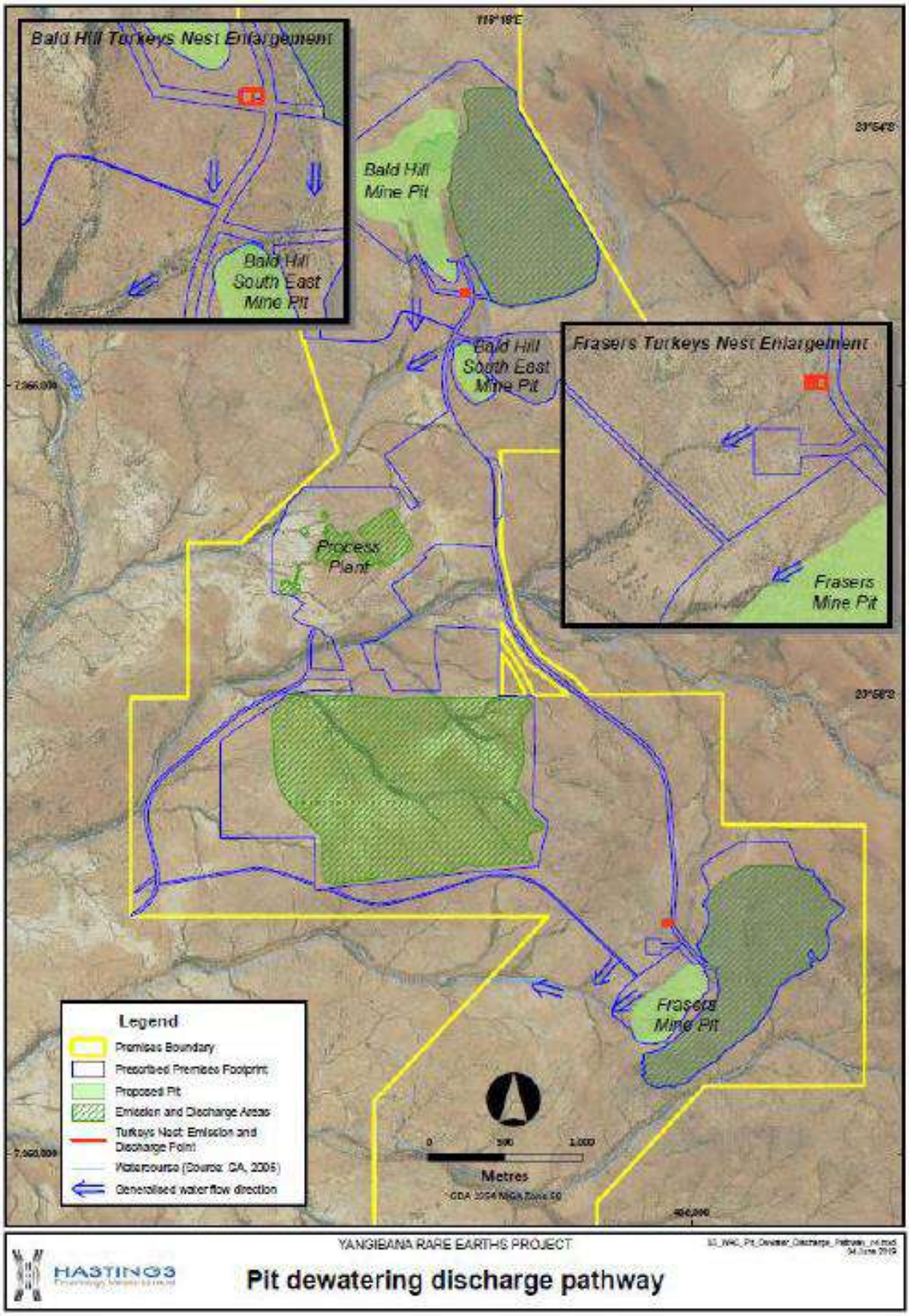
Map of surface water and groundwater monitoring sites



W6209/2019/1 (Date of amendment: 10/06/2022)

Map of dewater discharge points

The location of discharge points for the Bald Hill Pit dewater Turkey's Nest and Frasers Pit dewater Turkey's Nest are shown in the map below.



Schedule 2: Works

Table 6: Yangibana Project Category 6, 6, 64 and 85 infrastructure

	Infrastructure	Site Plan Reference in Schedule 1
Prescribed Activity Category 5		
Processing and concentrating up to 1.1 Mtpa of REE to produce a concrete that can be further processed at an offsite hydrometallurgical plant. Beneficiation process includes crushing, sorting, screening and grinding and concentration through the ore processing plant. Tailings generated from the plant are stored in the Beneficiation TSF. Tailings from the offsite hydrometallurgical plant will be disposed in the Hydromet TSF.		
Beneficiation Plant		
1	Key components including: • ROM pad • Ore crushers, sorters, screeners and grinders • Flotation cells, conditioning tanks, thickeners and filters • Gas-fired concentrate drier	Premises general layout map; Ore processing plant general layout map
Beneficiation TSF (not authorised to operate under this works approval)		
3	• Paddock style facility with perimeter discharge via spigots with 11 m maximum embankment height. • Tailings delivery and return water pipelines.	Premises general layout map; TSF general layout map
Hydromet TSF (not authorised to operate under this works approval)		
4	• Paddock style facility with decant pond, decant tower and single point discharge 36 ha Hydromet TSF • HDPE lined facility • Tailings and return water pipelines.	Premises general layout map; TSF general layout map
Prescribed Activity Category 6		
Discharge of excess Frasers Pit and Bald Hill Pit dewater from respective turkey nests to a localised drainage line during a modelled worst-case operating scenario (process plant shutdown coinciding with a 1:100 year ARI rainfall event).		
1	Bald Hill Pit Turkeys Nest and discharge point	Premises general layout map
2	Frasers Pit Turkeys Nest and discharge point	
Prescribed Activity Category 64		
Class II putrescible landfill bunker with 3,487 tpa putrescible and inert waste burial capacity and expected burial rate of approx. 3,170 tpa		
1	Approx. 1,000 m^2 waste depot	Ore processing plant general layout map
2	Frasers waste rock dump – putrescible waste bunker and inert waste bunker	Premises general layout map
3	Bald Hill waste rock dump - putrescible waste bunker and inert waste bunker	
Prescribed Activity Category 85		
A 34 m^3/day maximum capacity sewage treatment plant for the ore processing plant and mine support buildings. Treated wastewater discharged to a 1 ha sprayfield.		
1	Five stage Bardenpho activated sludge treatment plant	Premises general layout map
2	One hectare irrigation sprayfield	

Schedule 3: Monitoring

Table 7: Treated effluent monitoring table

Location	Parameter	Units	Limit	Averaging Period	Frequency	Method
WWTP treated effluent discharge pipeline (post treatment and pre-discharge)	Biochemical Oxygen Demand (BOD)	mg/L	≤30 mg/L	Spot sample	Once during commissioning and then quarterly during time limited operation	Sample collection and preservation as per AS/NZS 5667.1; analysis as per AS/NZS 5667.10
	Total Suspended Solids	mg/L	≤40 mg/L			
	Total Nitrogen	mg/L	≤50 mg/L			
	Total Phosphorus	mg/L	≤12 mg/L			
	pH	-	6.5 – 8.5			
	Thermo-tolerant Coliforms *(E.Coli)*	cfu/100ml	<1000 cfu/100ml			

Table 8: Groundwater monitoring requirements

Location	Parameter	Frequency	Averaging period	Units	Method
TSFs: MB01 A/B, MB02 A/B, MB03 A/B, MB04 A/B, MB05 A/B and MB06 A/B (*as shown in Map of surface water and groundwater monitoring sites in Schedule 1*)	Physical Standing water level (mbgl), pH (pH units), electrical conductivity (µS/cm) and total dissolved solids (mg/L)	Monthly upon installation of all bores, such that at least 12 monitoring events have been undertaken by the time tailings deposition commenced in either TSFs (whichever is sooner)	Spot sample	Refer to parameter listed	Sampling in accord with AS/NZS 5667.1; and analysis in accord with AS/NZS 5667.11
	Dissolved Major Cations and Anions Bicarbonate, Carbonate, Calcium, magnesium, potassium, phosphorus sodium and sulfate			mg/L	
	Dissolved metal(loid)s Aluminium, Antimony, Arsenic, Boron, Barium, Beryllium, Cadmium, Cobalt, Chromium (hexavalent and trivalent), Copper, Lanthanum, Manganese, Molybdenum, Nickel, Lead, Selenium, Thorium, Uranium (including hexavalent), Vanadium, Zinc, Iron			mg/L mg/L	
	Total recoverable mercury, Fluoride			mg/L	
	Rare Earth Elements Yttrium Lanthanum Cerium Praseodymium Neodymium Samarium Gadolinium Dysprosium	At least once prior to the tailings deposition in either TSFs (whichever is sooner)		mg/L	
Frasers Well *(as shown in Map of surface water and groundwater monitoring sites in Schedule 1)*	Physical Standing water level (mbgl), pH (pH units), electrical conductivity (µS/cm) and total dissolved solids (mg/L)	Monthly		Refer to parameter listed	
	Dissolved Major Cations and Anions Bicarbonate, Carbonate, Calcium, magnesium, potassium, phosphorus sodium and sulfate			mg/L	

	<u>Dissolved metal(loid)s</u> Aluminium, Antimony, Arsenic, Boron, Barium, Beryllium, Cadmium, Cobalt, Chromium, Copper, Lanthanum, Manganese, Molybdenum, Nickel, Lead, Selenium, Thorium, Uranium, Vanadium, Zinc, Iron			mg/L	
	Total recoverable mercury, fluoride			mg/L	
	<u>Rare Earth Elements</u> Yttrium Lanthanum Cerium Praseodymium Neodymium Samarium Gadolinium Dysprosium	At least once prior to the tailings deposition in either TSFs (whichever is sooner)		mg/L	

Table 9: Surface water monitoring requirements

Location	Parameter	Frequency	Averaging period	Units	Method
Lyons River Pools	Physical pH (pH units), electrical conductivity (µS/cm) and total dissolved solids (mg/L)	Biannually (summer and winter) after rainfall	Spot sample	Refer to parameter listed	AS/NZS 5667.9
	Dissolved Major Cations and Anions Bicarbonate, Carbonate, Calcium, magnesium, potassium, phosphorus sodium and sulfate			mg/L	
	Dissolved metal(loid)s Aluminium, Antimony, Arsenic, Boron, Barium, Beryllium, Cadmium, Cobalt, Chromium, Copper, Lanthanum, Manganese, Molybdenum, Nickel, Lead, Selenium, Thorium, Uranium, Vanadium, Zinc, Iron			mg/L	
	Total recoverable mercury, fluoride			mg/L	
	Rare Earth Elements Yttrium Lanthanum Cerium Praseodymium Neodymium Samarium Gadolinium Dysprosium			mg/L	