Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works approval number	W6518/2021/1
Works approval holder	Pilbara Iron Company Pty Ltd
ACN	107 210 248
Registered business address	L 22, Central Park 152-158 St Georges Terrace Perth, WA, 6000
DWER file number	DER2018/001042-4~22
Duration	6/08/2021 to 5/08/2024
Date of issue	5/08/2021
Premises details	Yandicoogina Iron Ore Mine Mineral Lease M274SA As defined by the coordinates in Schedule 2

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	60 million tonnes per year

This works approval is granted to the works approval holder, subject to the attached conditions, on 5 August 2021, by:

Alana Kidd

Digitally signed by Alana Kidd
Date: 2021.08.05 12:52:30 +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
5/08/2021	W6464/2021/1	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

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; and

(d) within the corresponding timeframe,

as set out in Table 1.

Table 1: Design and construction / installation requirements

	Infrastructure	Design and construction / installation requirements	Infrastructure location	Timeframe

1.	In pit tailings storage facility WFC3A Extension	- Total capacity for 46.3 Million dry tonnes of waste fines.
		- Pit maximum capacity of 72.56 Mm^3 to RL 499 m
		- Tailings discharge points
		- Exclusion bunding around pit
		- Survey prism
		- Three piezometers along the south end of embankment wall:
		  ○ VWP11
		  ○ VWP13
		  ○ VWP15
		- Stormwater infrastructure
			Figure 2 and Figure 4	N/A - existing infrastructure

2.	Waste fines pumping and pipelines	- Use of WFC3A delivery pipeline and relocation of existing deposition pipelines - Contingency pipeline within existing pipeline corridor - Waste fines delivery pipelines (including flow meters / telemetry installed along the pipeline to detect any issues) - Within a bunded corridor reporting to containment sumps with total capacity of 320 m^3 (for the purposes of containing any spills caused by pipeline leaks)	Figure 2 and Figure 3	N/A – existing infrastructure

Compliance reporting

2. The works approval holder must within 60 calendar days of the issue of this works approval of an item of infrastructure or equipment required by condition 1:

(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.

Construction of groundwater monitoring wells

3. 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
Two new groundwater monitoring bores near the yellow crosses in Figure 5 Two groundwater monitoring bore in the Hyporheic zone creek sediments[2] Near the red crosses in Figure 5	<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.	Schedule 1: Maps, Premises map, Figure 5	Must be constructed, developed (purged), sampled and determined to be operational prior to deposition of tailings into WFC3A Extension.
	<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 logs.		
	<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 measurement, and the revelations of the ground surface protective installations.		
	<u>Well development:</u> All installed monitoring wells must be developed		

Infrastructure	Design, construction, and installation requirements	Monitoring well location(s)	Timeframe
	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.		
	Installation survey: The vertical (top of casing) and horizontal position of each monitoring well must be surveyed and subsequently mapped by a suitably qualified surveyor.		
	Well network map: 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.

Note 2: Information on constructing bores of this type can be found in UK Environment Agency (2009) and British Geological Survey (2010)

4. A baseline ambient groundwater condition must be undertaken according to Table 5 for the four new bores: The results must compare against 95% level of species protection - ANZEG 2018 criteria.

5. 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 conditions 3 and 4.

Monitoring during environmental commissioning

6. The works approval holder must submit to the CEO an Environmental Commissioning Report within 60 calendar days of the granting of this Works Approval, for delivery pipelines and contingency pipelines.

7. The works approval holder must ensure the Environmental Commissioning Report required by condition 6 of this works approval includes the following:

(a) A summary of the environmental commissioning activities undertaken, including timeframes and tailings deposited or decant recovered;

(b) A summary of the environmental performance of each item of infrastructure or equipment as constructed or installed (as applicable), which at minimum includes records detailing the:

(i) Commissioning of the infrastructure; and

(ii) Testing of the infrastructure;

(c) A review of the works approval holder's performance and compliance against the conditions of this works approval; and

(d) Where they have not been met, measures proposed to meet the manufacturer's design specifications and the conditions of this works approval, together with timeframes for implementing the proposed measures.

Time limited operations phase

Commencement and duration

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

(a) Where the item of infrastructure is not authorized to undertake environmental commissioning, the Environmental Compliance Report as required by condition 2 has been submitted by the works approval holder for that item of infrastructure; and

(b) Where the item of infrastructure is authorized to undertake environmental commissioning, the Environmental Commissioning Report for that item of infrastructure as required by condition 8 has been submitted by the works approval holder.

9. Upon the granting of a licence or registration under Part V of the *Environmental Protection Act 1986*, authorizing the operation of the infrastructure identified in condition 12, the works approval holder may no longer conduct time limited operations in respect of the infrastructure under the terms of this works approval.

Time limited operations requirements and emission limits

10. 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 requirements set out in Table 4.

Table 4: Infrastructure and equipment requirements during time limited operations

	Site infrastructure and equipment	Operational requirements	Infrastructure location
1	Pipeline and services corridor (Processing Plant to WFC3A Extension)	Daily inspections of pipelines.	Schedule 1: Maps, Premises map, Figure 2
2	In pit tailings storage facility WFC3A Extension	General: • Freeboard of 500mm maintained • Tailings discharge of 3.7 Mt (dry tailings) per year • Tailings containing ≥ on average 45% w/w solids and • Beach angle 0.5% to 0.9% Daily inspections logs of the following: • Routine inspections for all components of the in pit tailings storage facility including: ➢ Pumps, valves ➢ General integrity of embankment and ➢ Fauna entrapment.	Schedule 1: Maps, Premises map, Figure 2

	Site infrastructure and equipment	Operational requirements	Infrastructure location
		Monthly records of the following: • Groundwater monitoring • Piezometers readings • Average tailings solid content • Tailings level (mRL) • Volume of tailings discharged	

Monitoring during time limited operations

11. The works approval holder must monitor groundwater during time limited operations for concentrations of the identified parameters in accordance with Table 5.

12. The works approval holder must record the results of all monitoring activity required by condition 13 and report against 95% level of species protection - ANZEG 2018 criteria.

Table 5: Ambient Groundwater Monitoring

Monitoring location	Parameter	Unit	Frequency	Averaging Period	Method	
					Sampling	Analysis
MB10YRN001 MB10YRN002 MB10YRN008 MB10YRN009S MB10YRN009D MB10YRN010 MB10YRN013 MB10YMA006 MB09YJSB006 MB09YJSB009 MB09YJSB004 MB09YJSB008 MB09YJSB002 MB16YBIL0017 MB16YBIL0018 MB16YBIL0009 MB16YBIL0010 MB15YBIL044 MB15YBIL045 4 New boreholes (Figure 6)	Surface water level	mbgl	Monthly	Spot sample	AS/NZS 5667.1 AS/NZS 5667.11	N/A
	Electrical Conductivity	µS/cm				In field
	pH	pH units	Quarterly			
	Dissolved Oxygen	mg/L				
	TDS (gravimetric) Alkalinity $CaCO_3$ Nitrate and N Nitrite as N Ammonia	mg/L	Quarterly	Spot sample	AS/NZS 5667.1 AS/NZS 5667.11	By a NATA accredited laboratory
	Major Ions: Calcium (Ca) Chloride (Cl) Fluoride (F) Potassium (K) Magnesium (Mg) Sodium (Na) Phosphorus (P) Sulphate (SO_4^{-2})					
	Metals / metalloids: Aluminium (Al) Arsenic (As) Barium (Ba) Boron (B) Cadmium (Cd) Cobalt (Co) Chromium (Cr) Copper (Cu) Iron (Fe) Mercury (Hg) Manganese (Mn) Molybdenum (Mo) Nickel (Ni)					

Monitoring location	Parameter	Unit	Frequency	Averaging Period	Method	
					Sampling	Analysis
	Lead (Pb) Antimony (Sb) Selenium (Se) Silicon (Si) Tin (Sn) Thallium (Tl) Uranium (U) Zinc (Zn)					
	Acrylamide					
Piezometers VWP11, VWP13 and VWP15	phreatic surface	mbgl and mRL	Monthly	Spot sample	AS/NZS 5667.1 AS/NZS 5667.11	N/A

Specified actions

13. Following the granting of this works approval, the works approval holder must collect at least 10 individual representative tailings samples, including pore water, to determine the likely behaviour of elements under a range of leaching conditions, which may include, but not be limited to:

(a) Testing using the LEAF Test Method 1313 (United States Environmental Protection Agency, 2017) pH-dependent leaching test only for pH range of 5 to 9;

(b) Geotechnical characterisation of tailings including: particle size distribution, volume of solids, settling test (drained and undrained), air drying test and hydraulic conductivity of the same tailings tested in (a); and

(c) Testing for the contaminants listed in Table 5.

14. The works approval holder must within 30 days of the issue of this works approval, submit via e-mail to the CEO the WFC3A Extension operating manual.

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 17 includes the following:

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

(b) The tailings test results obtained during time limited operations under condition 15;

(c) The ambient groundwater monitoring results obtained during time limited operations under Table 5;

(d) A summary of the environmental performance of WFC3A Extension as constructed or installed (as applicable), which includes records detailing the:

(i) Volume of tailings deposited;

(ii) Tailings density;

(iii) Tailings solid content; and

(iv) WFC3A Extension water balance; and

(e) Where the WFC3A Extension design specifications and the conditions of this works approval have not been met, what measures will the works approval holder take to meet the specifications, and the timeframes 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 1;

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

(d) complaints received under condition 20.

19. 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.

Specified actions

20. The works approval holder must conduct further stability analysis of the pit wall adjacent to the Marilana creek. A report detailing the stability analysis must be submitted to the CEO within three months of the date of approval of the works approval. The analysis should consider possible worst case scenarios and focus on the:

(a) Stability of the uppermost batter; and
(b) Potential for progressive multi-batter failure above the assumed maximum water level in the pit.

The stability analysis should take into account:

(i) The combined effect of the assumed highest groundwater and pit water levels, the effect of rainfall on the pit wall materials and the high water level in the Marilana creek during extreme wet weather conditions.

(ii) All possible failure modes applicable to the material types and geological features in the pit wall.

(iii) Engineering properties representative of the materials in the pit wall.

Definitions

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

Table 1: Definitions

Term	Definition
AS/NZS 5667.1	means the Australian Standard AS/NZS 5667.1 *Water Quality – Sampling – Guidance of the Design of sampling programs, sampling techniques and the preservation and handling of samples.*
AS/NZS 5667.11	means the Australian Standard AS/NZS 5667.11 *Water Quality – Sampling – Guidance on sampling of groundwaters.*
ANZEG 2018	Australian and New Zealand guidelines for fresh and marine water quality https://www.waterquality.gov.au/guidelines/anz-fresh-marine
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.
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 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).

Term	Definition
EP Regulations	*Environmental Protection Regulations 1987* (WA).
Freeboard	means the distance between the maximum water surface elevations and the top of retaining banks or structures at their lowest point.
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.
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.
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).

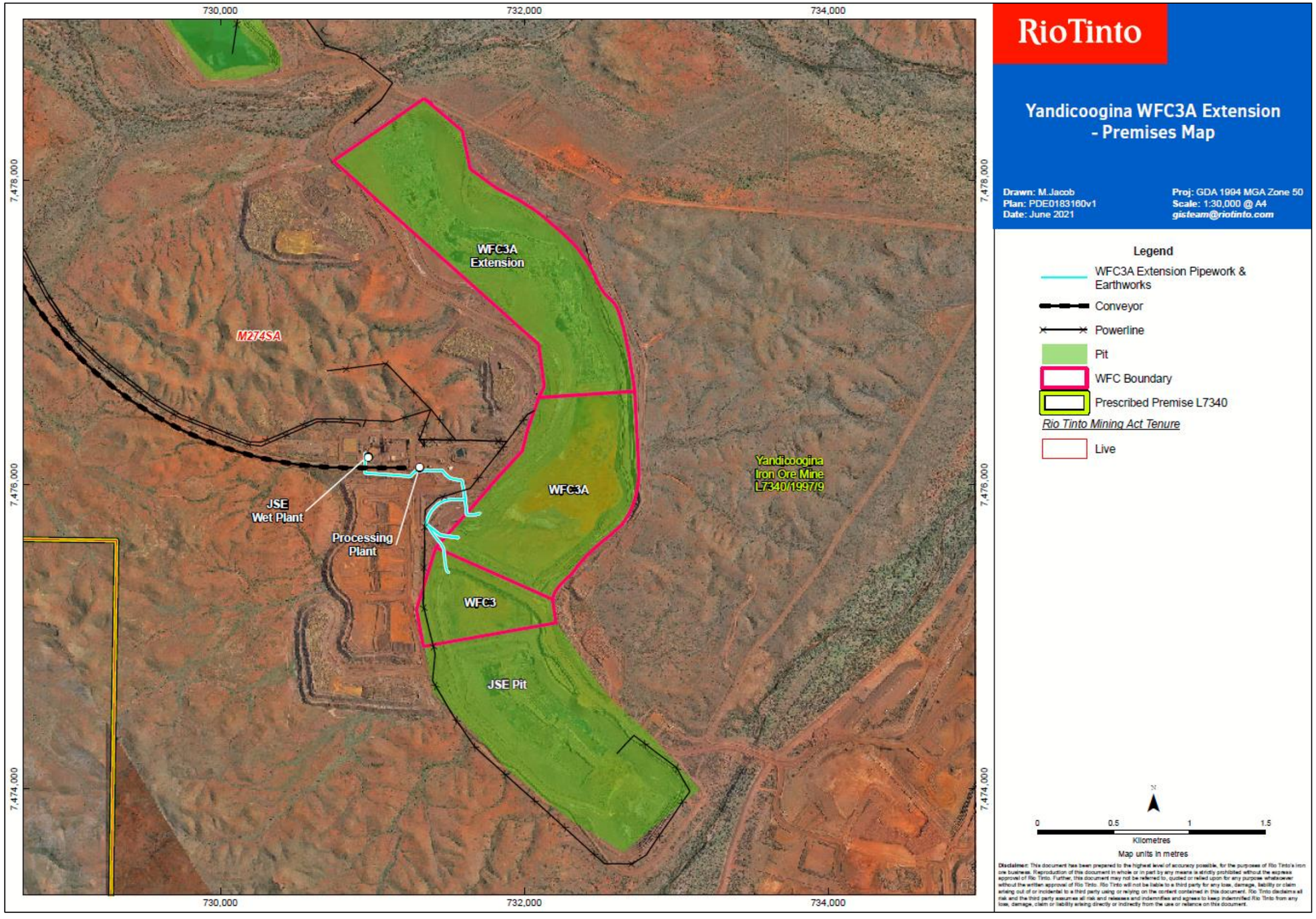


Figure 1: Map of the boundary of the prescribed premises

Schedule 1: Maps

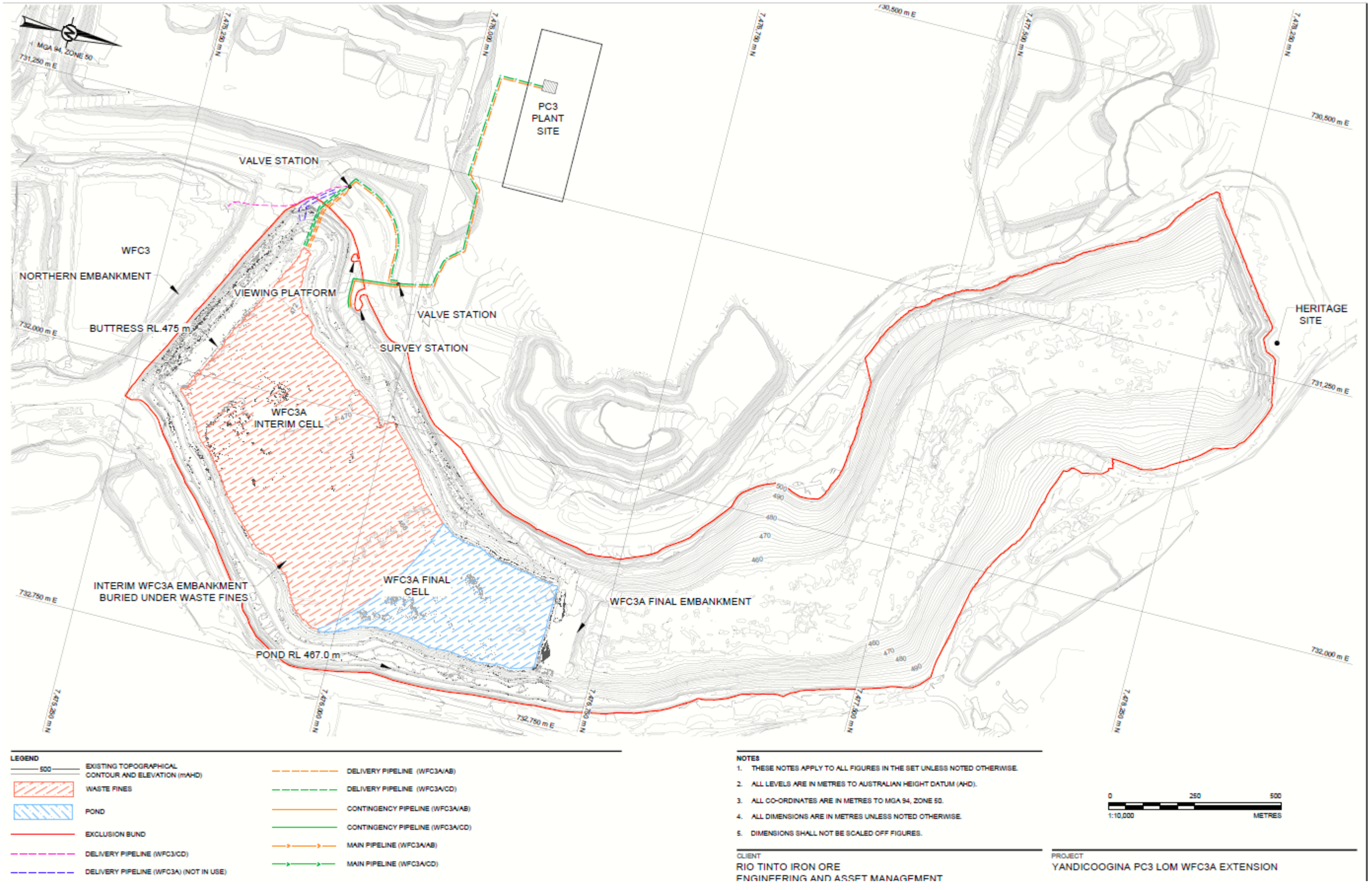
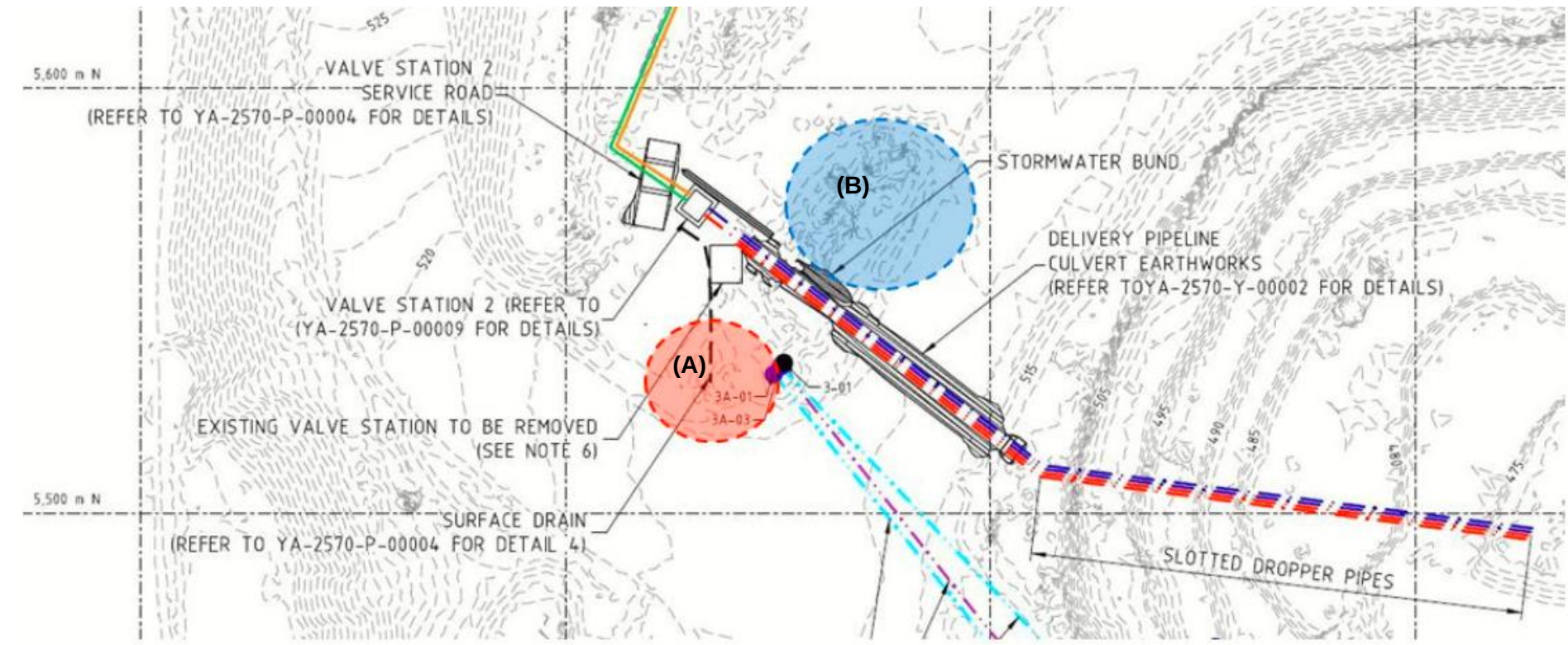
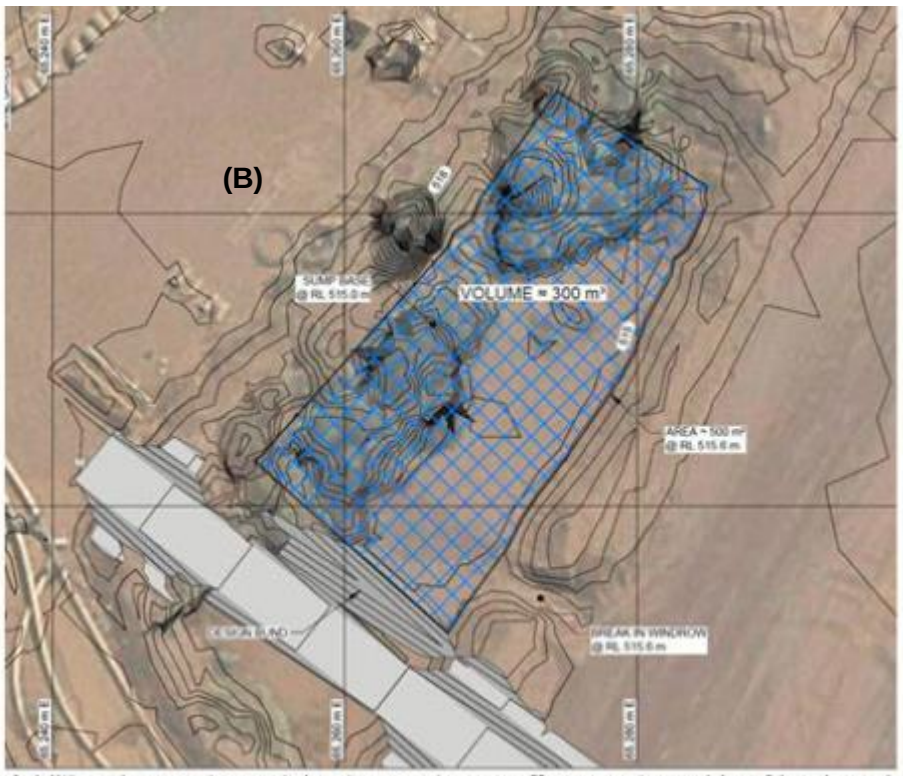


Figure 2: WFC3A Extension - Tailings discharge points, contingency pipeline and exclusion bund locations.

Schedule 1: Maps



Main sump to contain waste fines spills from pipeline leaks (on southern side)



Additional sump to contain stormwater runoff on western side of haul road, and any waste fines spills from pipeline leaks (on northern side)

Figure 3: WFC3A Extension -Tailings containment sumps.

Schedule 1: Maps

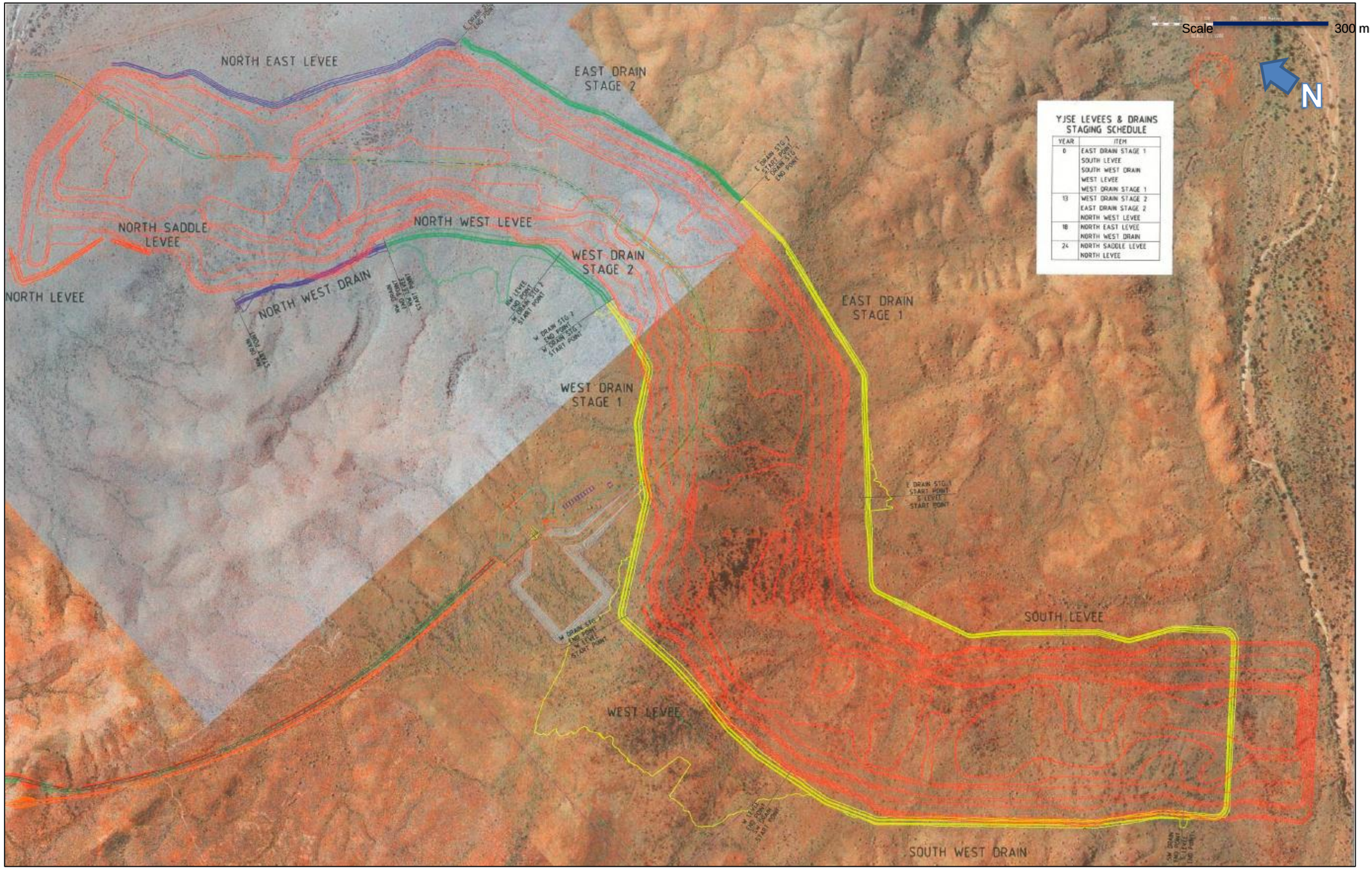


Figure 4: Stormwater infrastructure at WFC3A Extension

Schedule 1: Maps

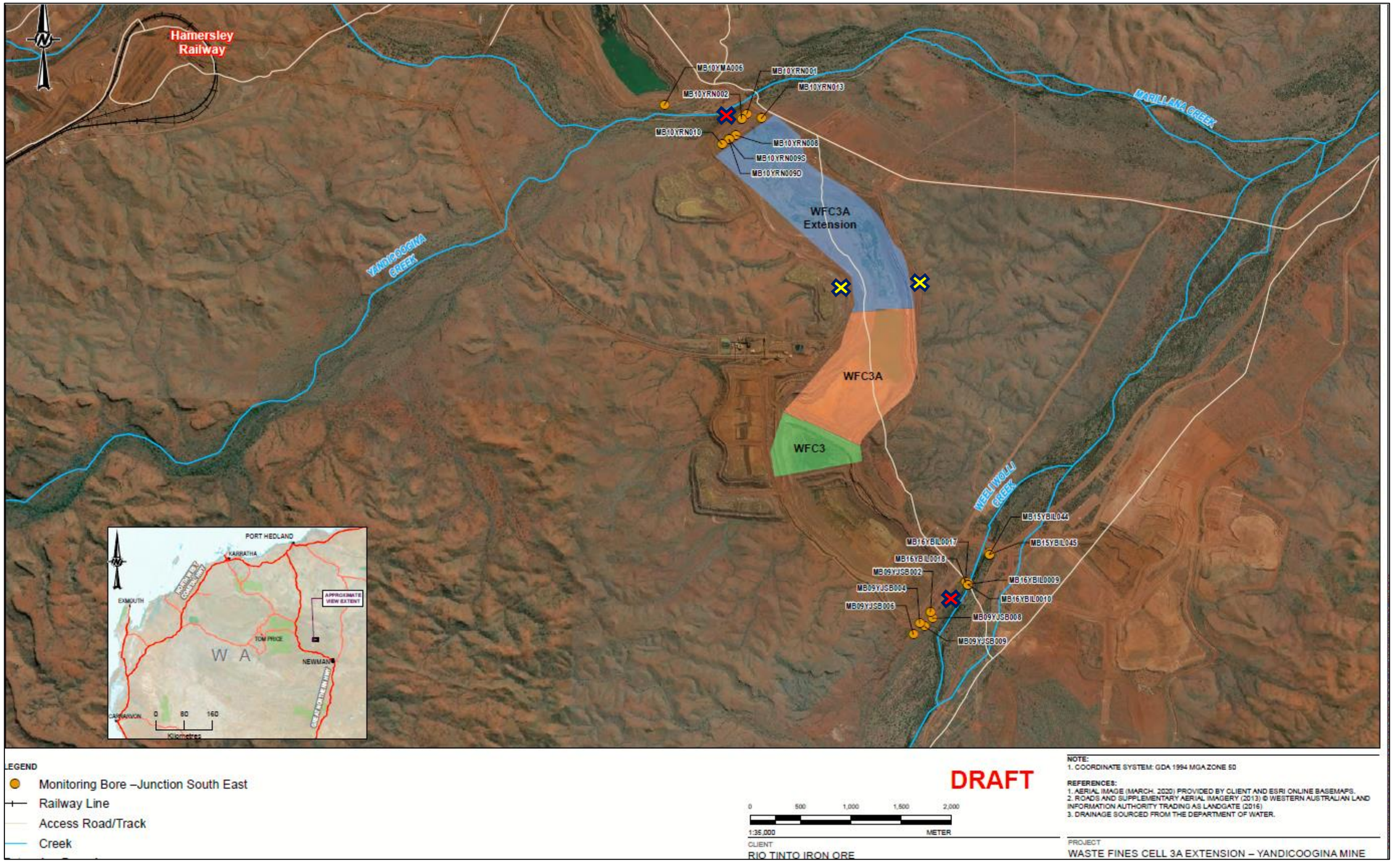


Figure 5: Groundwater monitoring bore location. Red and yellow crosses are indicative locations.

Schedule 2: Premises boundary

The premises boundary is defined by the coordinates in Table 2.

Table 2: Premises boundary coordinates - MGA 94 Zone 50

Easting	Northing
731,501.32	7,475,563.81
732,085.42	7,475,260.74
732,748.56	7,475,886.85
732,361.51	7,477,649.18
731,353.33	7,478,448.33
730,784.23	7,478,147.28
731,313.32	7,477,395.14
731,907.42	7,477,270.11
731,976.43	7,477,029.07
732,156.45	7,476,338.94