Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works approval number	W6265/2019/1
Works approval holder	Atlantic Vanadium Pty Ltd
ACN	610 583 090
Registered business address	Level 6 40 The Esplanade PERTH WA 6000
DWER file number	DER2019/000145
Duration	25/03/2020 to 24/03/2027
Date of amendment	10/03/2023
Premises details	Windimurra Vanadium Project Mining Tenements: M58/178, M58/279 and M58/280 MOUNT MAGNET WA 6638

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	4,500,000 tpa
Category 7: Vat or in situ leaching of metal	1,200,000 tpa
Category 44: Metal smelting or refining	10,515 tpa
Category 63: Class I inert landfill site	5,000 m^3
Category 85: Sewage facility	45 m^3/day

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

Alana Kidd
Digitally signed by Alana Kidd
Date: 2023.03.10 11:24:54 +08'00'

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

Works approval history

Reference number	Date	Summary of changes
W6265/2019/1	24/03/2020	Works approval – categories 5, 7, 44, 54 and 63
W6265/2019/1	06/04/2020	Amendment Notice 1 – to correct administrative error
W6265/2019/1	10/03/2023	Amendment to: • extend the expiry date • extend the duration of environmental commissioning • change the capacity of the temporary WWTP • allow time limited operations for the temporary WWTP under this works approval • modify previous conditions 15 and 21 • remove previous condition 20 • incorporate Amendment Notice 1

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 construct and/or install the infrastructure listed in Table 1, in accordance to the requirements set out in Table 1.

Table 1: Design and construction / installation requirements.

Infrastructure	Design and construction requirement / installation requirement	Infrastructure location
New works		
Crushing, milling, beneficiation circuit	• SAG Mill	As shown in Figure 2 of Schedule 1
	• Regrind Ball Mill	As shown in Figure 3 of Schedule 1
	• Magnetite Concentrate Thickener	As shown in Figure 4 of Schedule 1
	• For all new components that are to be sited within new concrete bunded compounds, the bunding shall be constructed with capacity to contain 110% of the largest vessel within the bund or 25% of the total volume of all vessels in the bund, whichever is larger plus a 1 in 20 year, 24 hour rainfall event	Not shown
Process Water Tank	• Volume of approximately 1,000 m^3 • Equipped with a duty/standby pump arrangement interlocked to tank level control; level control and pump operation alarms installed	Not shown
Refinery: • Deammoniation kiln • Fusion furnace • Flaking wheel • Packaging plant	• All new components sited within concrete bunded compounds with the capacity to contain 110% of the largest vessel within the bund or 25% of the total volume of all vessels in the bund, whichever is larger plus a 1 in 20 year, 24 hour rainfall event • Refinery stormwater channel relined with new HDPE liner	Refer to Figure 8 of Schedule 1 for the indicative location
Refinery: • Two stage offgas scrubbing system (baghouse followed by	• Capture all emission from the deammoniation kiln except burner combustion gases • Baghouse to be designed for 99.9%	Refer to Figure 8 of Schedule 1 for the indicative location

Infrastructure	Design and construction requirement / installation requirement	Infrastructure location
New works		
dilute acid scrubber)	efficiency • pH measurement and control on scrubber • Sampling port to be installed on the exit stack compliant to AS4323.1	
Refinery: • Baghouse filter system to collect particulate from fusion furnace, flaking wheel and packaging plant	• Capture all particulate emissions from the fusion furnace, flaking wheel and packaging plant • Baghouse to be designed for 99.9% efficiency	Refer to Figure 8 of Schedule 1 for the indicative locations
Temporary WWTP	• WWTP of 45 m^3/day capacity • WWTP comprising of: o a buffer tank; o two aeration tanks; and o two effluent tanks • Located 100 m from the ephemeral floodway • Situated above ground on skids or a trailer or similar, which will prevent inflow of clean stormwater • Include an alarm system, which includes audible alarms and flashing lights for high tank levels and pump faults • Tanks will be sized so that recirculating anoxic buffer tank is only 40% full in typical operating conditions	As shown in Figure 10 of Schedule 1 labelled Proposed Temporary WWTP
Additional irrigation spray field	• Sized at 0.9 ha • Located at least 40 m away from the watercourse	As shown in Figure 10 of Schedule 1 labelled Proposed Sprayfield
Inert landfill	• Constructed at base of waste rock stockpile 2 (WRS 2) in an area 50 m x 50 m and height of 2 m • Total capacity of 5,000 m^3	As shown in Figure 9 of Schedule 1

2. The works approval holder must construct and/or install the Critical Containment Infrastructure listed in Table 2, in accordance with the requirements set out in Table 2

Table 2: Critical Containment Infrastructure design and construction requirements / installation requirements.

Critical Containment Infrastructure	Design and construction requirement / installation requirement	Infrastructure location
Calcine Tailings Storage Facility (CTSF) extension area (1.7 ha)	• Liner to achieve a hydraulic conductivity of 10^{-9} m/s - installation of a dual liner comprising a geosynthetic clay liner (GCL) overlain by a 1.5 mm HDPE liner	Extension area as shown in Figure 5 of Schedule 1
Non – magnetic Tailings Storage Facility (NMTSF) Cell 1	• Total freeboard of 0.5 m • Internal embankment between southern end of NMTSF (Cell 1)	NMTSF Cell 1 area shown in Figure 7 of Schedule 1

Compliance reporting

3. The works approval holder must within 60 calendar days of an item of infrastructure 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 by a suitably qualified and experienced Engineer (eligible for membership of the Institute of Engineers, Australia) that the items of infrastructure or component(s) thereof, as specified in condition 1 have been constructed in accordance with the relevant requirements specified in condition 1;

(b) as constructed plans 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. 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.

6. The Critical Containment Infrastructure Report required by condition 5 must include as a minimum the following:

(a) certification by a suitably qualified Tailings Design Engineer 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.

Environmental commissioning phase

Environmental commissioning requirements

7. The works approval holder may only commence environmental commissioning of an item of infrastructure listed in Table 3 once the Environmental Compliance Report has been submitted in accordance with condition 3 of this works approval.

8. The works approval holder may only commence environmental commissioning of the critical containment infrastructure listed in Table 4:

(a) once the Critical Containment Infrastructure Report has been submitted for that item of infrastructure in accordance with condition 5 of this works approval; and

(b) the CEO has notified the works approval holder that the Critical Containment Infrastructure Report required by condition 5 meets the requirements of the works approval.

9. Any environmental commissioning activities undertaken for an item of infrastructure specified in Tables 3 and 4 may only be carried out:

(a) in accordance with the corresponding commissioning requirements; and

(b) for the corresponding authorised commissioning duration.

Table 3. Environmental commissioning requirements

Infrastructure	Commissioning requirements	Authorised commissioning duration
Crushing, milling and beneficiation circuit including new SAG Mill, Ball Mill, Magnetic Thickener and Process Water Tank	None specified	For a period not exceeding 180 calendar days
Deammoniation Kiln and offgas scrubbing system		For a period not exceeding 180 calendar days
Fusion furnace, flaking wheel and packaging plant including offgas baghouse filter system		For a period not exceeding 180 calendar days
Temporary WWTP	• Treated sewage to the following output emission standards: ○ Biochemical Oxygen Demand - <20 mg/L; ○ Total Suspended Solids - <30 mg/L; ○ Total Nitrogen - <20 mg/L; and	For a period not exceeding 180 calendar days

Infrastructure	Commissioning requirements	Authorised commissioning duration
	○ Total Phosphorus - <8 mg/L. Any discharge must be directed to the Proposed Sprayfield (as shown in Figure 10 in Schedule 1)	

Table 4. Environmental commissioning requirements for Critical Containment Infrastructure

Infrastructure	Commissioning requirements	Authorised commissioning duration
CTSF Expansion Area	During commissioning, the pumping system for transferring CTSF leachate to the processing plant via the calcine storage reticulation sump shall be tested and provision made for automatic pump operation activated by level controls for both the CTSF leachate pond and CTSF calcine storage reticulation sump.	For a period not exceeding 180 calendar days
NMTSF Cell 1	During commissioning, the pumping system for transferring tailings to Cell 1 and returning decant to the processing plant shall be hydro-tested. Any leaks shall be repaired.	For a period not exceeding 180 calendar days

10. The works approval holder must monitor emissions during environmental commissioning in accordance with Table 5.

Table 5: Emissions monitoring during environmental commissioning

Emissions point	Monitoring location	Parameter	Frequency	Averaging Period	Unit[1]	Method
Two stage offgas scrubber system from Deammoniation Kiln	Exit stack post scrubbing	Volumetric flowrate	Three individual tests during the commissioning period	N/A	m^3/s	USEPA Method 2
		Particulate		1 hour	mg/m^3 g/min	USEPA Method 5
		Total Vanadium		1 hour		USEPA Method 29
		Ammonia		3 minutes and 1 hour		USEPA Method 17
		Nitrogen oxides		1 hour		USEPA Method 7E or 7D
		Hydrogen chloride		1 hour		None specified
Baghouse collecting air	Exit stack post	Exit velocity		N/A	m^3/s	USEPA Method 2

Emissions point	Monitoring location	Parameter	Frequency	Averaging Period	Unit[1]	Method
emissions from fusion furnace, flaking wheel and packaging plant	baghouse	Particulate		1 hour	mg/m^3 g/min	USEPA Method 5D
		Total Vanadium		1 hour		USEPA Method 29

Note 1: All units are referenced to STP dry

11. The works approval holder must record the results of all monitoring activity required by condition 10 during environmental commissioning.

12. The works approval holder must submit to the CEO an Environmental Commissioning Report within 60 calendar days of the completion date of environmental commissioning for each item of infrastructure specified in Tables 3 and 4.

13. The works approval holder must ensure the Environmental Commissioning Report required by condition 12 of this works approval includes at minimum the following:

(a) a summary of the commissioning activities undertaken, including timeframes and amount of wastewater processed (for temporary WWTP); ore processed or waste deposited (for tailings facilities);

(b) a summary of point source emission to air results obtained during commissioning under condition 10;

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

1. hydro-testing of infrastructure including NMTSF Cell 1 decant system and pipelines;
2. commissioning of the crushing, milling, beneficiation circuit, deammoniation kiln, fusion furnace, flaking wheel and packaging plant;
3. testing the off gas systems;
4. commissioning of the process control system; and
5. treated sewage results against the output emission standards as specified in Table 3.

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

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

Time limited operations phase

Commencement and duration

14. The works approval holder may only commence time limited operations for an item of infrastructure identified in conditions 1 and 2:

(a) where the item of infrastructure is not authorised to undertake environmental commissioning, the Environmental Compliance Report as required by

condition 3 has been submitted by the works approval holder for that item of infrastructure; and

(b) where the item of infrastructure is authorised to undertake environmental commissioning under condition 9, the Environmental Commissioning Report for that item of infrastructure as required by condition 12 has been submitted by the works approval holder.

15. The works approval holder may conduct time limited operations:

(a) for a period not exceeding 180 calendar days from the day the works approval holder meets the requirements of condition 14 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 15(a).

16. During time limited operations, the works approval holder must ensure the temporary WWTP is maintained and operated in accordance with the requirements as specified in condition 9.

17. The works approval holder must submit to the CEO a report on the time limited operations within 60 days of the completion date of time limited operations.

18. The works approval holder must ensure the report required by condition 17 of this works approval includes at minimum the following:

(a) a summary of the time limited operations, including timeframes and amount of wastewater processed (temporary WWTP); ore processed and waste disposed of (to tailings facilities); and

(b) a review of performance against the works approval.

Specified actions

19. Prior to commissioning the CTSF, the integrity of the existing HDPE liner in the CTSF leachate pond and CTSF calcine storage reticulation sump are to be tested. Any holes or tears are to be repaired and a report assessing the integrity of the liner submitted to the CEO.

20. Prior to recommissioning of the tailings thickener the integrity of bunding for the thickener shall be tested by a qualified Civil Engineer, eligible for membership to the Institute of Engineers. Any repairs identified shall be completed prior to recommissioning.

21. The capacity of the CTSF leachate pond and CTSF calcine storage reticulation sump shall be calculated and a maximum operating pond level determined to ensure that both ponds can contain the expanded CTSF catchment and are operated with capacity to contain a 1% AEP rainfall event over 72 hours (187 mm).

22. Monitoring bore PSMB2 shall be reinstated.

Records and reporting (general)

23. 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.

24. 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;

(b) any maintenance of infrastructure that is performed in the course of complying with conditions 1 and 2;

(c) monitoring programmes undertaken in accordance with condition 10; and

(d) complaints received under condition 23.

25. The books specified under condition 24 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 6 have the meanings defined.

Table 6: Definitions

Term	Definition
AEP	Annual Exceedance Probability.
AS4323.1	Australian Standard AS4323.1 *Stationary Source Emissions Method 1: Selection of sampling positions.*
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.
CTSF	Calcine Tailings Storage Facility.
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	means the *Environmental Protection Act 1986* (WA).
EP Regulations	means the *Environmental Protection Regulations 1987* (WA).

Term	Definition
HDPE	High density polyethylene.
NMTSF	Non-magnetic Tailings Storage Facility.
premises	the premises to which this works approval applies, as specified at the front of this works approval 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.
USEPA Method 2	United States (of America) Environmental Protection Agency *Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube).*
USEPA Method 5	United States (of America) Environmental Protection Agency *Determination of particulate matter emissions from stationary sources.*
USEPA Method 5D	United States (of America) Environmental Protection Agency *Determination of particulate matter emissions from positive pressure fabric filters.*
USEPA Method 7D	United States (of America) Environmental Protection Agency *Determination of nitrogen oxides emissions from stationary sources (Alkaline-permanganate/ion chromatographic method).*
USEPA Method 7E	United States (of America) Environmental Protection Agency *Determination of nitrogen oxides emissions from stationary sources (Instrumental Analyser Procedure).*
USEPA Method 17	United States (of America) Environmental Protection Agency *Determination of particulate matter emissions from stationary sources.*
USEPA Method 29	United States (of America) Environmental Protection Agency *Determination of metals emissions from stationary sources.*
waste	has the same meaning given to that term under the EP Act.
WWTP	wastewater treatment plant.
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 dark blue) in the map below (Figure 1).

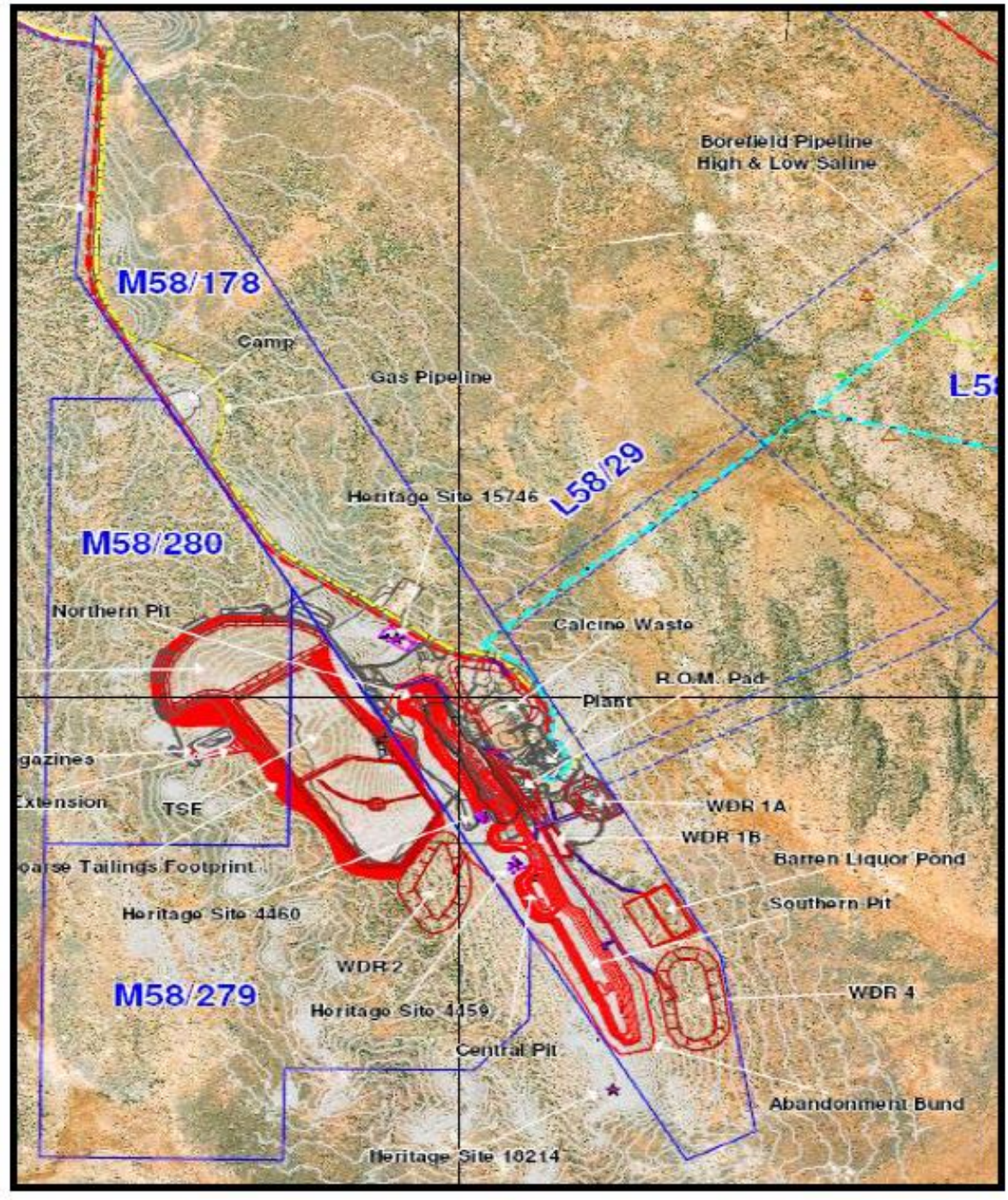

Figure 1: Windimurra Vanadium Project Prescribed Premises Boundary

Infrastructure

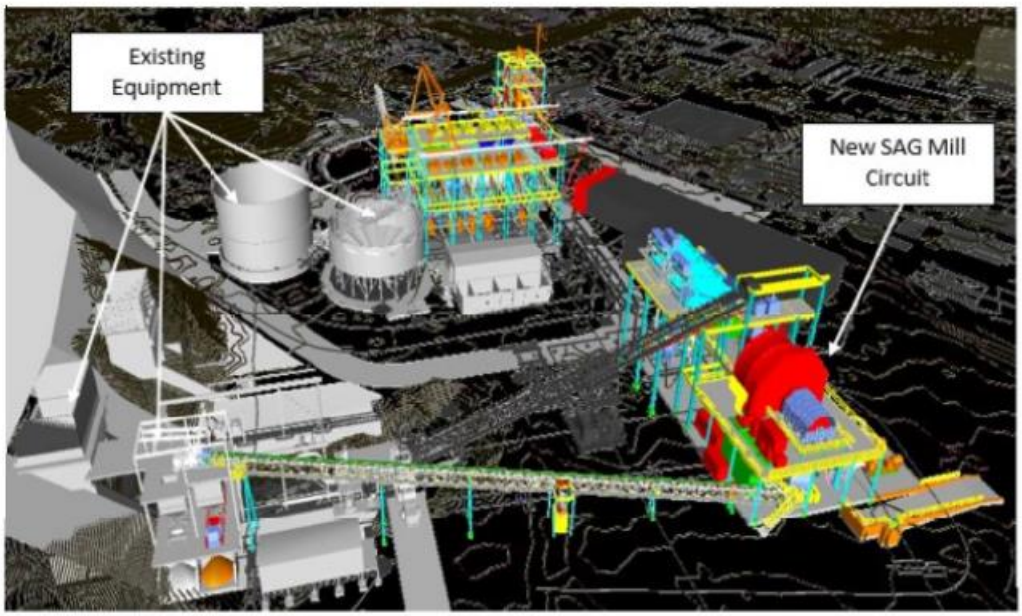

Figure 2: Proposed SAG Mill location

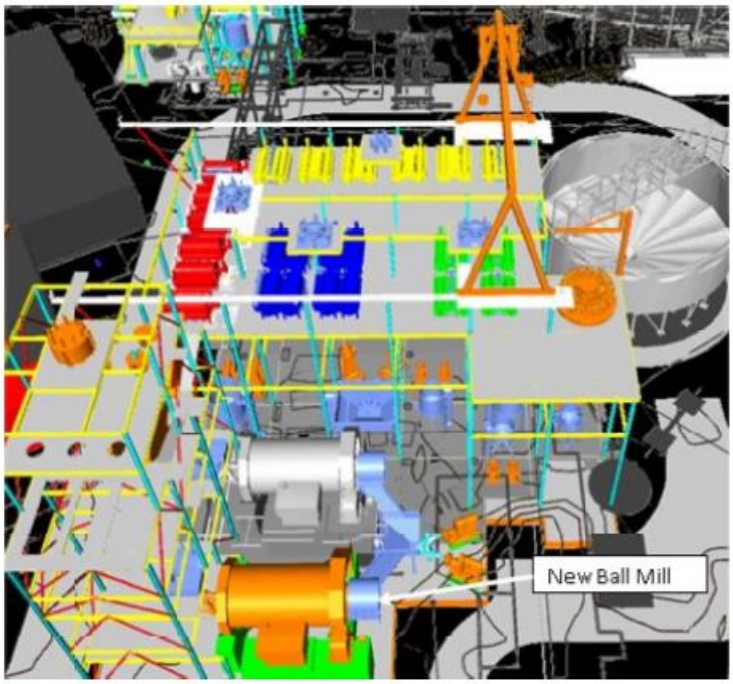

Figure 3: Proposed new regrind ball mill location

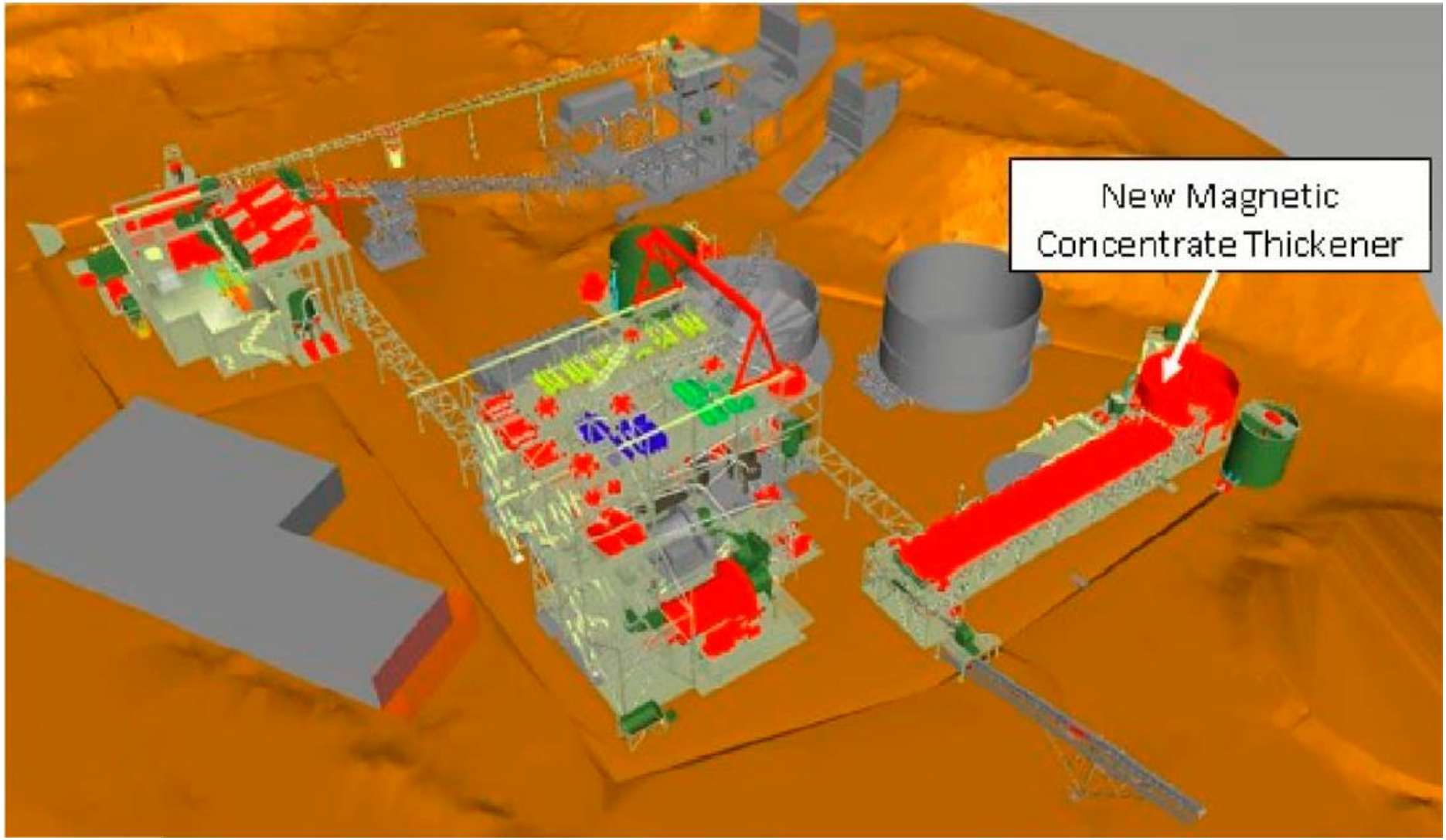

Figure 4: Proposed new magnetic concentrate thickener location

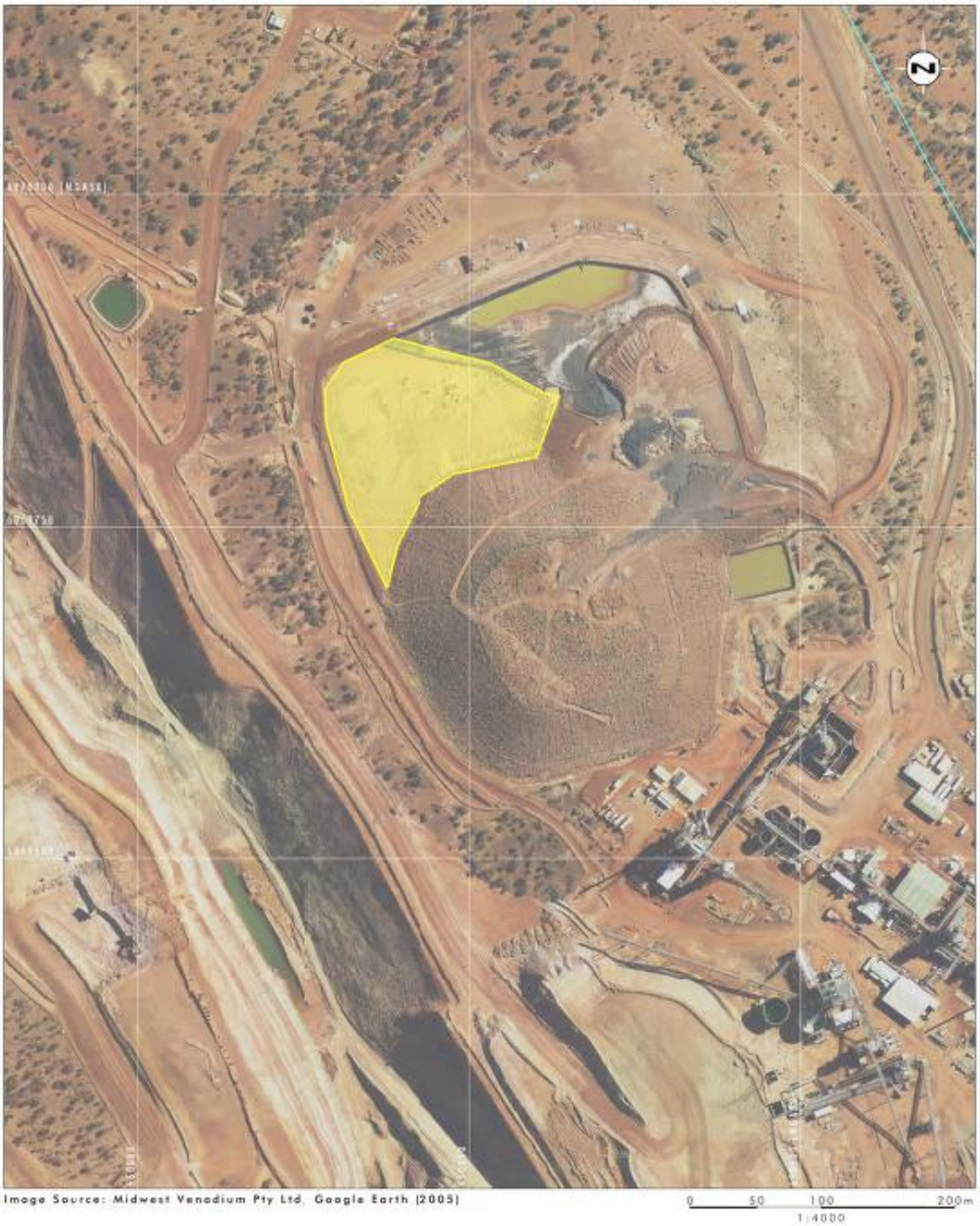

Figure 5: Extension area of the CTSF subject to dual liner installation (in yellow)

Figure 6: Location of the CTSF leachate pond (in cross hatch) and the CTSF calcine reticulation sump (outlined in black)

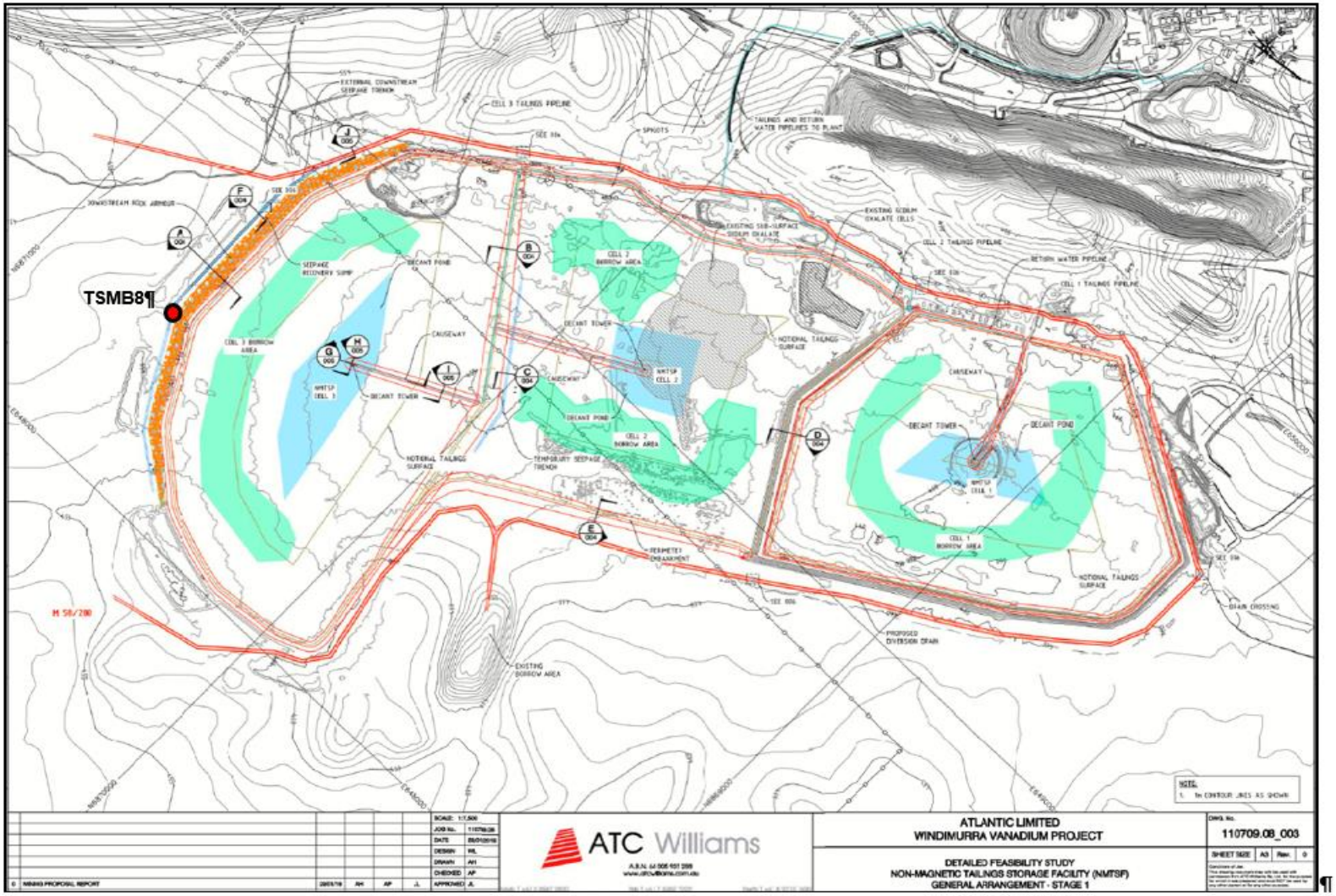

Figure 7: Non-magnetic Tailings Storage Facility (NMTSF) Cells 1 - 3 (Cell 3 on the left, Cell 2 in the middle and Cell 1 on the right). The location of groundwater bore TSMB8 is also shown

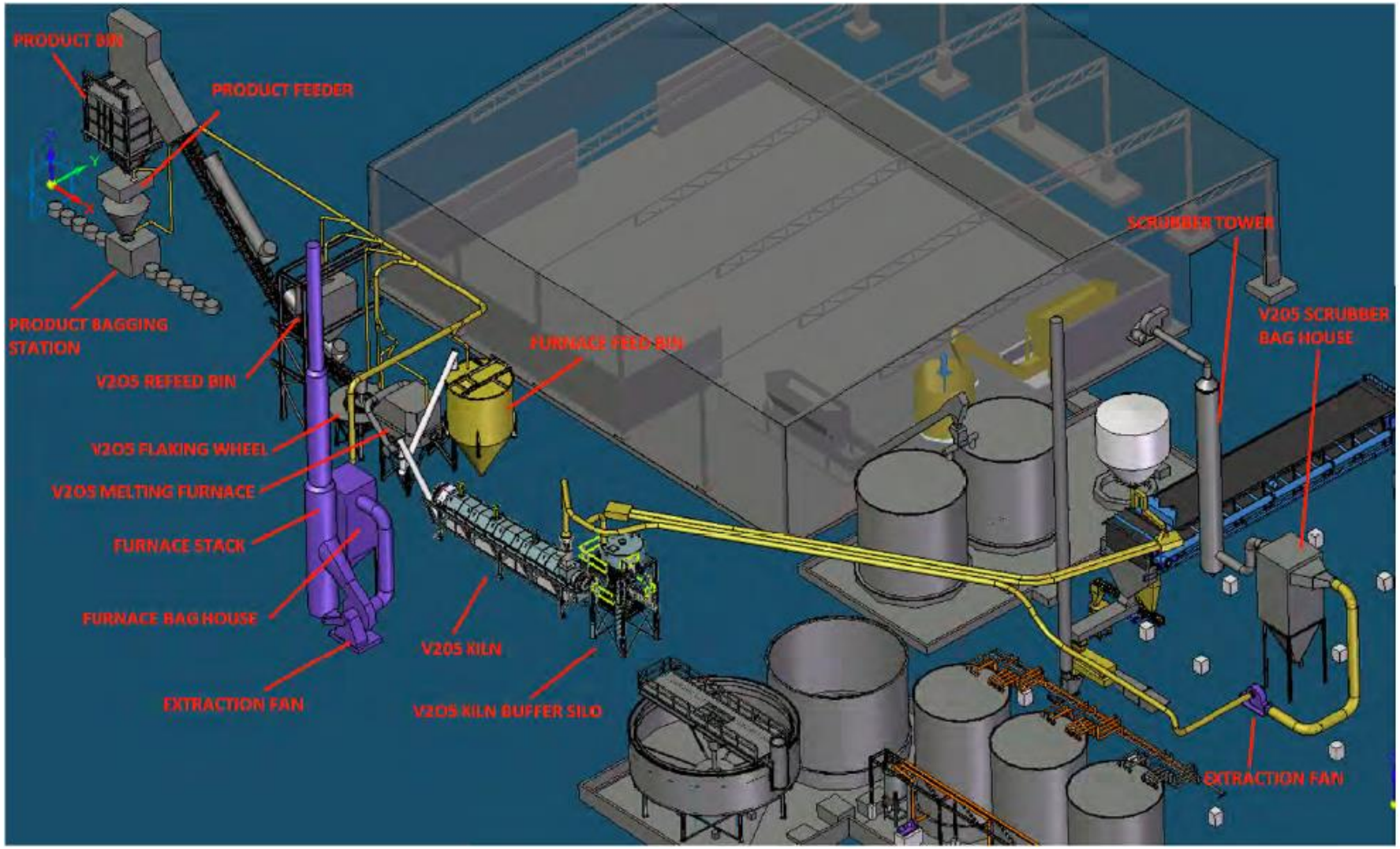

Figure 8: Refinery layout and dust control at Windimurra Vanadium Project

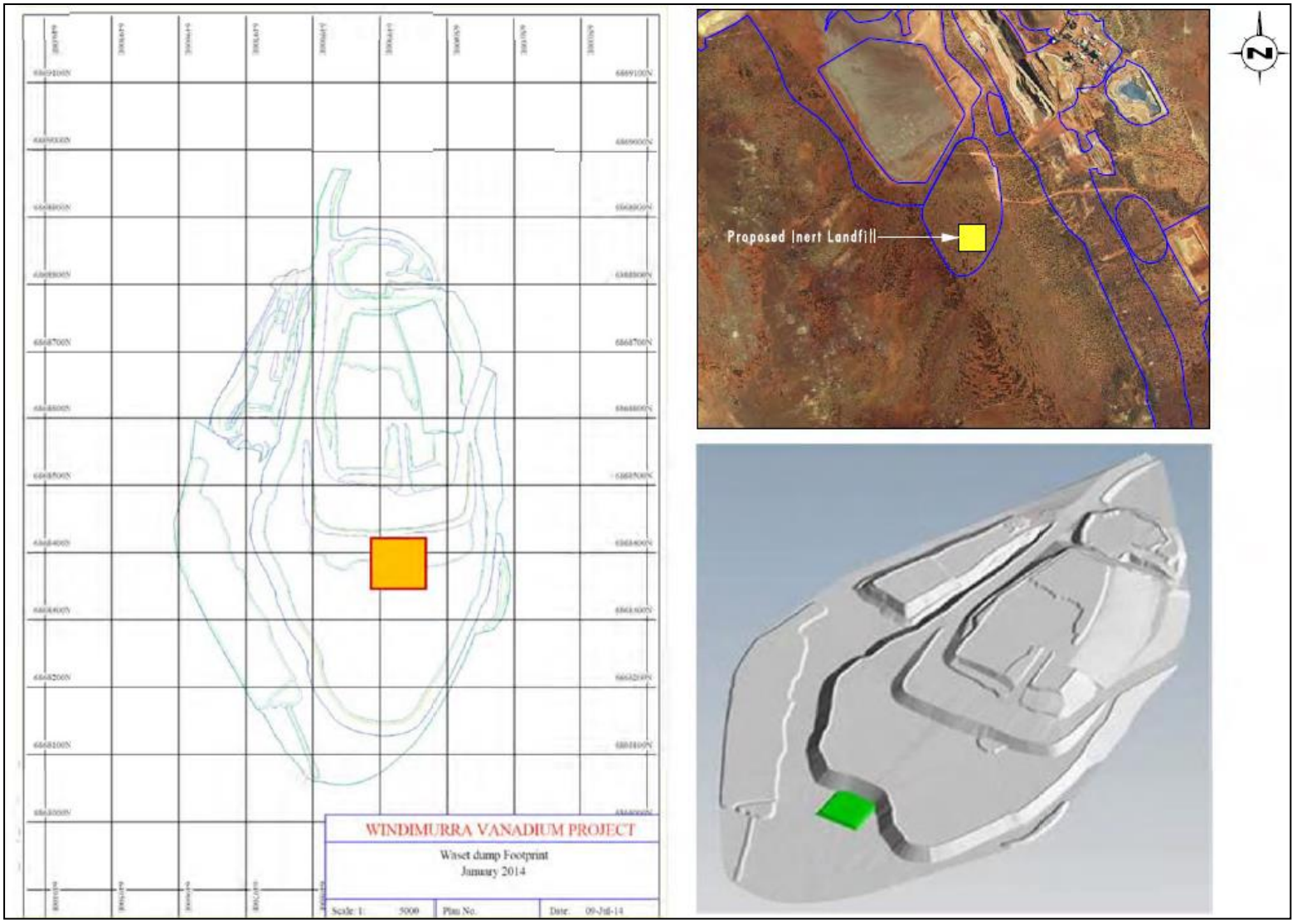

Figure 9: Proposed inert landfill location (in yellow) in Waste Rock Stockpile 2

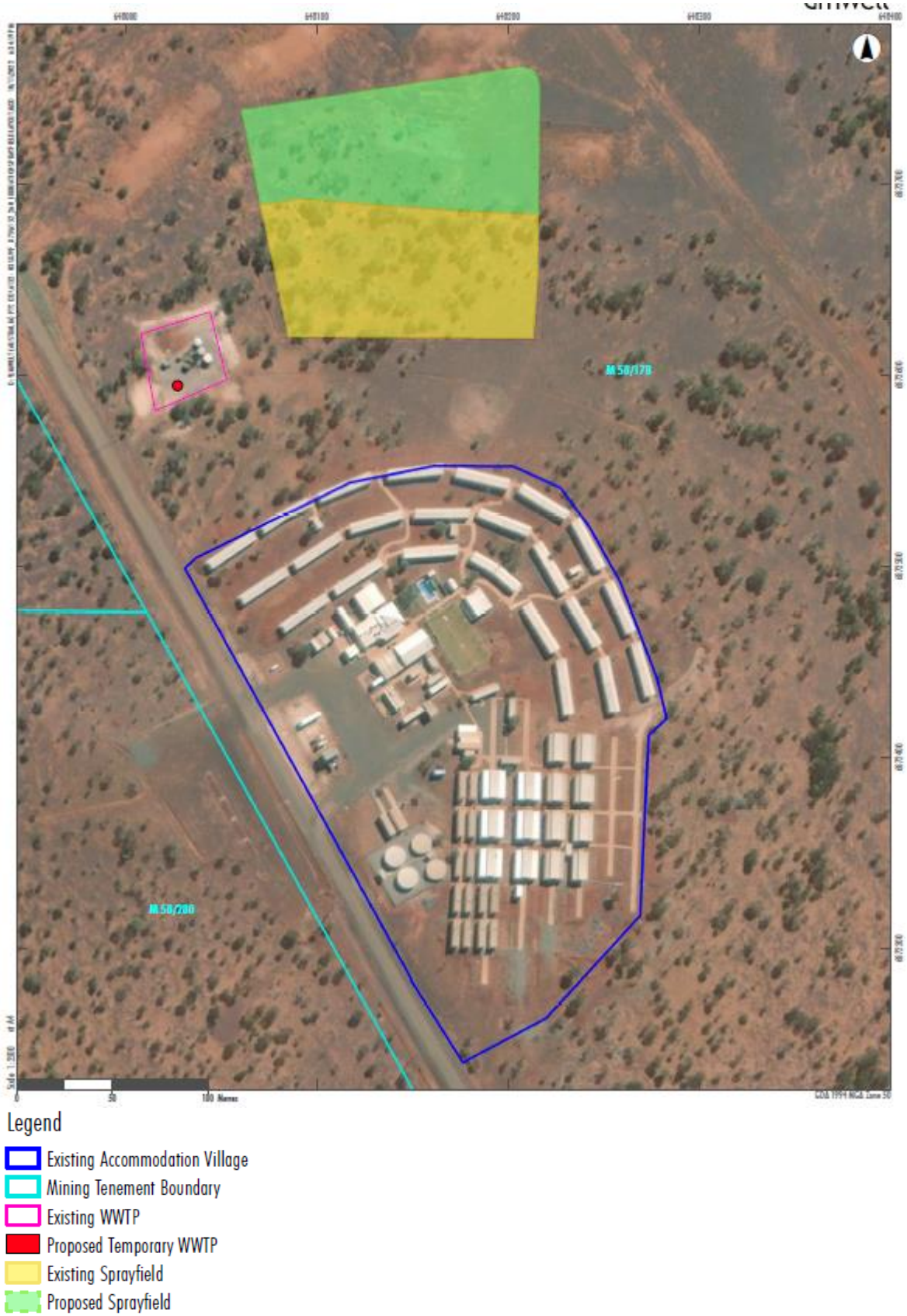

Figure 10: Location of temporary WWTP and sprayfield