Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works approval number	W6883/2024/1
Works approval holder	Northern Star Resources Limited
Registered business address	Level 4, 500 Hay Street, Subiaco WA 6008
DWER file number	DER2023/000787
Duration	08/05/2024 to 08/05/2027
Date of issue	08/05/2024
Premises details	Crossroads Gold Mine Legal description - Part of mining tenement M 24/462, M 24/640, M 27/175, M 27/191, M 27/198, M 27/202, M 27/493, M 27/494, M 27/497 and M 27/63 As defined by the premises map in Schedule 1 and the coordinates in Schedule 2

Prescribed premises category description (Schedule 1, *Environmental Protection Regulations 1987*)	**Assessed production / design capacity**
Category 6: Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore.	3,100,000 tonnes per year
Category 89: Putrescible landfill site: premises (other than clean fill premises) on which waste of a type permitted for disposal for this category of prescribed premises, in accordance with the Landfill Waste Classification and Waste Definitions 1996, is accepted for burial	5,000 tonnes per year

This works approval is granted to the works approval holder, subject to the attached conditions, on 8 May 2024, by:

Christine Pustkuchen
Digitally signed by Christine Pustkuchen
Date: 2024.05.08 10:17:18 +08'00'

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
08/05/2024	W6883/2024/1	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;

(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 requirements	Infrastructure location
1.	Two saline water dams (Turkeys nests)	a. Level sensors, telemetry and process control logic to be installed. b. Lined with HDPE to achieve a permeability of less than 1 x 10-9 m/s; and c. Dust suppression using water carts undertaken during construction.	Labelled as 'Saline water dams', as depicted in Schedule 1: Map, Figure 1.
2.	Dewatering pipelines	a. Dewatering pipelines must have: ○ telemetry systems and pressure sensors along pipelines to allow the detection of leaks and failures; or ○ automatic cut-outs in the event of a pipe failure; or ○ secondary containment sufficient to contain any spill for a period equal to the time between daily inspections b. Pipeline must be buried at road floodway points to reduce the risk of pipeline damage from floods and to allow surface water to flow unimpeded; and c. Dust suppression using water carts undertaken during construction / installation.	Labelled as 'Dewatering Line', as depicted in Schedule 1: Map, Figure 1.
3.	Landfill	a. Landfill to be located within the waste rock landform as shown within Figure 2, Schedule 1. b. The landfill compound should be semi-enclosed built from mine-waste with dimensions to be of approximate depth of 2 - 5 meters with 5 - 10 meter sides	Labelled as 'Landfill locations', as depicted in Schedule 1: Map, Figure 1.

	Infrastructure	Design and construction / installation requirements	Infrastructure location
		and a maximum 30 meter tipping face. c. Windrows/bunds to be constructed using mine waste to divert stormwater away from the landfill compound.	

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

Table 2: Infrastructure requirements – groundwater monitoring bores

Infrastructure	Design, construction, and installation requirements	Monitoring bore location(s)	Timeframe
One shallow and one deep groundwater monitoring bore downstream (north) of Six Mile Pit	<u>Bore design and construction:</u> Designed and constructed in accordance with *ASTM D5092/D5092M-16: Standard practice for design and installation of groundwater monitoring bores*.	N/A	Must be constructed, developed (purged), and determined to be operational prior to the commencement of discharge of mine dewatering effluent to Six Mile Pit
	<u>Logging of borehole:</u> Soil samples must be collected and logged during the installation of the monitoring bores. A record of the geology encountered during drilling must be described and classified in accordance with the Australian Standard Geotechnical Site Investigations AS1726. Any observations of staining / odours or other indications of contamination must be included in the bore log.		
	<u>Bore construction log:</u> Bore construction details must be documented within a bore 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 measurements, and the elevations of the ground surface protective installations.		
	<u>Bore development:</u> All installed monitoring bores must be developed after drilling to remove fine sand, silt, clay and any drilling mud residues from around the bore screen to ensure the hydraulic functioning of the bore. A detailed record should be kept of bore development activities and included in the bore construction log.		
	<u>Installation survey:</u> the vertical (top of casing) and horizontal position of each monitoring bore must be surveyed and subsequently		

	mapped by a suitably qualified surveyor.		
	Bore network map: a bore location map (using aerial image overlay) must be prepared and include the location of all monitoring bores in the monitoring network and their respective identification numbers.		

Compliance reporting

3. The works approval holder must within 30 calendar days of an item of 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 an Environmental Compliance Report on that compliance.

4. The Environmental Compliance Report required by condition 2, must include as a minimum the following:

(a) certification by a suitably qualified person that the item 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 or photographs 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. The works approval holder must, within 30 calendar days of the monitoring bores required by condition 2 being constructed, submit to the CEO a bore construction report evidencing compliance with the requirements of condition 2.

Time limited operations phase

Commencement and duration

6. The works approval holder may only commence time limited operations for an item of infrastructure identified in condition 1 where the Environmental Compliance Report as required by condition 2 has been submitted by the works approval holder for that item of infrastructure.

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

(a) for a period not exceeding 180 calendar days from the day the works approval holder meets the requirements of condition 2 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 7(a).

Time limited operations requirements and emission limits

8. During time limited operations, the works approval holder must ensure that the premises infrastructure listed in Table 3 and located at the corresponding infrastructure location is maintained and operated in accordance with the

corresponding operational requirement set out in Table 3.

Table 3: Infrastructure requirements during time limited operations

Item	Infrastructure	Design and construction / installation requirements	Infrastructure location
1.	Saline water dams (Turkeys nests)	a. Maintain minimum operational freeboard of 300 mm; and b. Maintain integrity of HDPE liner	Labelled as 'Saline water dams', as depicted in Schedule 1: Map, Figure 1.
2.	Dewatering pipelines	a. Pipelines containing dewatering effluent are required to be maintained with either: ○ telemetry systems and pressure sensors along pipelines to allow the detection of leaks and failures; or ○ automatic cut-outs in the event of a pipe failure; or ○ secondary containment sufficient to contain any spill for a period equal to the time between daily inspections.	Labelled as 'Dewatering Line', as depicted in Schedule 1: Map, Figure 1.
3.	Landfill	a. Volume of waste discharged into landfill to be recorded. b. Waste to be covered with dense, inert and incombustible material at least monthly. c. Wind-blown waste to be collected weekly and returned to the tipping area d. Windrows/ bunds to be maintained to divert stormwater away from the landfill compound. e. Watercarts to be available to apply water for dust suppression as required.	Labelled as 'Landfill location', as depicted in Schedule 1: Map, Figure 1.
4.	Six Mile pit	a. A minimum freeboard of 3 meters below crest level is to be maintained	Labelled as 'Six Mile pit', as depicted in Schedule 1: Map, Figure 1.

9. During time limited operations, the works approval holder must ensure that the discharges listed in Table 4 are discharged from the corresponding points and only at the corresponding point location in accordance with the requirements set out in Table 4.

Table 4: Authorised discharge points during time limited operation

Discharge point reference	Discharge source and description	Discharge point location
Six Mile Pit	Mine dewater from Crossroads mine (via saline water dams).	Labelled as 'Six Mile Pit, as depicted in Schedule 1: Map, Figure 1.

10. During time limited operations, the works approval holder must conduct visual inspections of the infrastructure specified in Table 5.

Table 5: Inspections of infrastructure

Infrastructure	Type of inspection	Frequency
Saline water dam (Turkeys nest)	To confirm required freeboard capacity is available. To confirm integrity.	Daily
Dewatering pipelines	To confirm integrity	Daily
Landfill	To confirm no windblown waste	Weekly
Six Mile Pit	To confirm required freeboard capacity	Monthly

Monitoring during time limited operations

11. During time limited operation, the works approval holder must ensure that:

(a) all water samples are collected and preserved in accordance with AS/NZS 5667.1; and

(b) all laboratory samples are submitted to a laboratory with current NATA accreditation for the parameters to be measured.

12. During time limited operation, the works approval holder must monitor discharges:

(a) at the corresponding discharge point;

(b) for the corresponding parameter;

(c) at the corresponding frequency;

(d) for the corresponding averaging period;

(e) in the corresponding unit, and

(f) at the corresponding location,

as set out in Table 6.

Table 6: Monitoring of discharges during time limited operation

Discharge point reference	Parameter	Unit	Averaging Period	Frequency	Location
Mine dewatering discharge into Six Mile pit	Volumetric Flow Rate	m^3/s or L/s	Spot sample	Quarterly[2,3]	Labelled as 'Dewatering emissions point', as depicted in Schedule 1: Maps, Figure 1.
	pH[1]	pH unit			
	Electrical conductivity[1]	µS/cm			
	Cyanides: • Weak Acid Dissociable • Free • Total	mg/L			
	Alkalinity	mg/L as $CaCO_3$			
	Ionic Balance	-			
	Total dissolved solids (TDS) [1]	mg/L			
	Dissolved metals and metalloids: • Aluminium (Al) • Cobalt (Co) • Manganese (Mn) • Selenium (Se) • Arsenic (As) • Cadmium (Cd) • Chromium (Cr) • Copper (Cu) • Nickel (Ni) • Lead (Pb) • Zinc (Zn) • Mercury (Hg) • Iron (Fe)	mg/L			
	Major ions: • Chloride (Cl) • Sulphate (SO_4) • Carbonate (CO_3^{2-}) • Bicarbonate (HCO_3^-) • Calcium (Ca) • Magnesium (Mg) • Sodium (Na) • Potassium (K) • Nitrogen - Nitrate as N (NO_3^-)	mg/L			

Note 1: In-field non-NATA-accredited analysis permitted.
Note 2: No monitoring is required if there is no discharge in that quarterly period.
Note 3: monitoring undertaken in each quarterly period such that there are at least 45 days in between the days on which samples are taken in successive quarters.

13. During time limited operation, the works approval holder must monitor the ambient water quality:

(a) at the corresponding monitoring points;

(b) for the corresponding parameters;

(c) at the corresponding frequency;

(d) for the corresponding averaging period;

(e) in the corresponding unit, and

(f) at the corresponding locations,

as set out in Table 7 and Table 8

Table 7: Monitoring of ambient surface water quality during time limited operation

Monitoring point reference	Parameter	Unit	Averaging Period	Frequency	Location
Six Mile pit – pit lake	pH[1]	pH unit	Spot sample	Quarterly[2,3]	Labelled as 'Six Mile Pit', as depicted in Schedule 1: Maps, Figure 1.
	Electrical conductivity[1]	µS/cm			
	Cyanides: a. Weak Acid Dissociable b. Free c. Total	mg/L			
	Alkalinity	mg/L as $CaCO_3$			
	Ionic Balance	-			
	Total dissolved solids (TDS)[1]	mg/L			
	Dissolved metals and metalloids: a. Aluminium (Al) b. Cobalt (Co) c. Manganese (Mn) d. Selenium (Se) e. Arsenic (As) f. Cadmium (Cd) g. Chromium (Cr) h. Copper (Cu) i. Nickel (Ni) j. Lead (Pb) k. Zinc (Zn) l. Mercury (Hg) m. Iron (Fe)	mg/L			
	Major ions: a. Chloride (Cl) b. Sulphate (SO_4) c. Carbonate (CO_3^{2-}) d. Bicarbonate (HCO_3^-) e. Calcium (Ca) f. Magnesium (Mg) g. Sodium (Na) h. Potassium (K) i. Nitrogen - Nitrate as N (NO_3^-)	mg/L			

Note 1: In-field non-NATA-accredited analysis permitted.
Note 2: Monitoring undertaken in each quarterly period such that there are at least 45 days in between the days on which samples are taken in successive quarters.
Note 3: When pit lake can be safely accessed.

Table 8: Monitoring of ambient groundwater during time limited operation

Monitoring point reference	Parameter	Unit	Averaging Period	Frequency	Location
Monitoring bore/s downstream of Six Mile Pit constructed as required by condition 2	Sanding water level	Meters below ground level	Spot sample	Quarterly[1]	Not depicted

Note 1: Monitoring undertaken in each quarterly period such that there are at least 45 days in between the days on which samples are taken in successive quarters.

Landfill

14. The Works Approval Holder must ensure that wastes generated on the Premises are only subjected to the processes set out in Table 9 and in accordance with any process requirements described in Table 9.

Table 9: Waste landfilling requirements

Waste type	Process(es)	Process requirements
Clean Fill Putrescible wastes Inert Waste Type 1	Handling and disposal of waste by landfilling	a. No more than 5000 tonnes of waste, of the waste types listed in column 1, is to be disposed of by landfilling per year. b. Disposal of waste by landfilling shall only take place within the waste rock landform as shown in Schedule 1: Map, Figure 1 c. Waste is to be disposed of in a defined area, or compound enclosed by earthen bunds; and d. The tipping area is restricted to less than 30 meters in length.
Inert Waste Type 2 (Tyres only)		a. Tyres may be disposed of by burial under a final soil cover of not less than 500 mm. b. Tyres to be buried in batches, with each batch separated from the next by at least 100 mm of soil. c. Each batch to consist of not more than 40 m^3 of tyres reduced to pieces, or not more than 1,000 whole tyres.

Compliance reporting

15. 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 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 15 includes the following:

(a) a summary of the time limited operations, including timeframes and amount of mine dewater emitted / discharged to the environment;

(b) data from the monitoring required by conditions 12 and 13;

(c) a review of operational performance and compliance against condition 8; and

(d) where the manufacturer's design specifications and/or 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

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 6;

(c) complaints received under condition 17.

19. The books specified under condition 18 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 9 have the meanings defined.

Table 9: Definitions

Term	Definition
books	has the same meaning given to that term under the EP Act.
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup DC WA 6919 info@dwer.wa.gov.au
Class II landfill	Means an unlined landfill designed to accept the waste type as defined under the Landfill Definitions for burial.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V Division 3 of the EP Act.
discharge	has the same meaning given to that term under the EP Act.
emission	has the same meaning given to that term under the EP Act.
Environmental Compliance Report	means a report to satisfy the CEO that the conditioned infrastructure and/or equipment has been constructed and/or installed in accordance with the works approval.
EP Act	*Environmental Protection Act 1986* (WA).
EP Regulations	*Environmental Protection Regulations 1987* (WA).
Landfill definitions	Means the document titled 'Landfill Waste Classification and Waste Definitions 1996" published by the CEO of the Department of Water and Environmental Regulation as amended.
NATA	means the National Association of Testing Authorities, Australia
premises	the premises to which this licence applies, as specified at the front of this licence and as shown on the premises map (Figures 1 and 2) 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.
waste	has the same meaning given to that term under the EP Act.

Term	Definition
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).

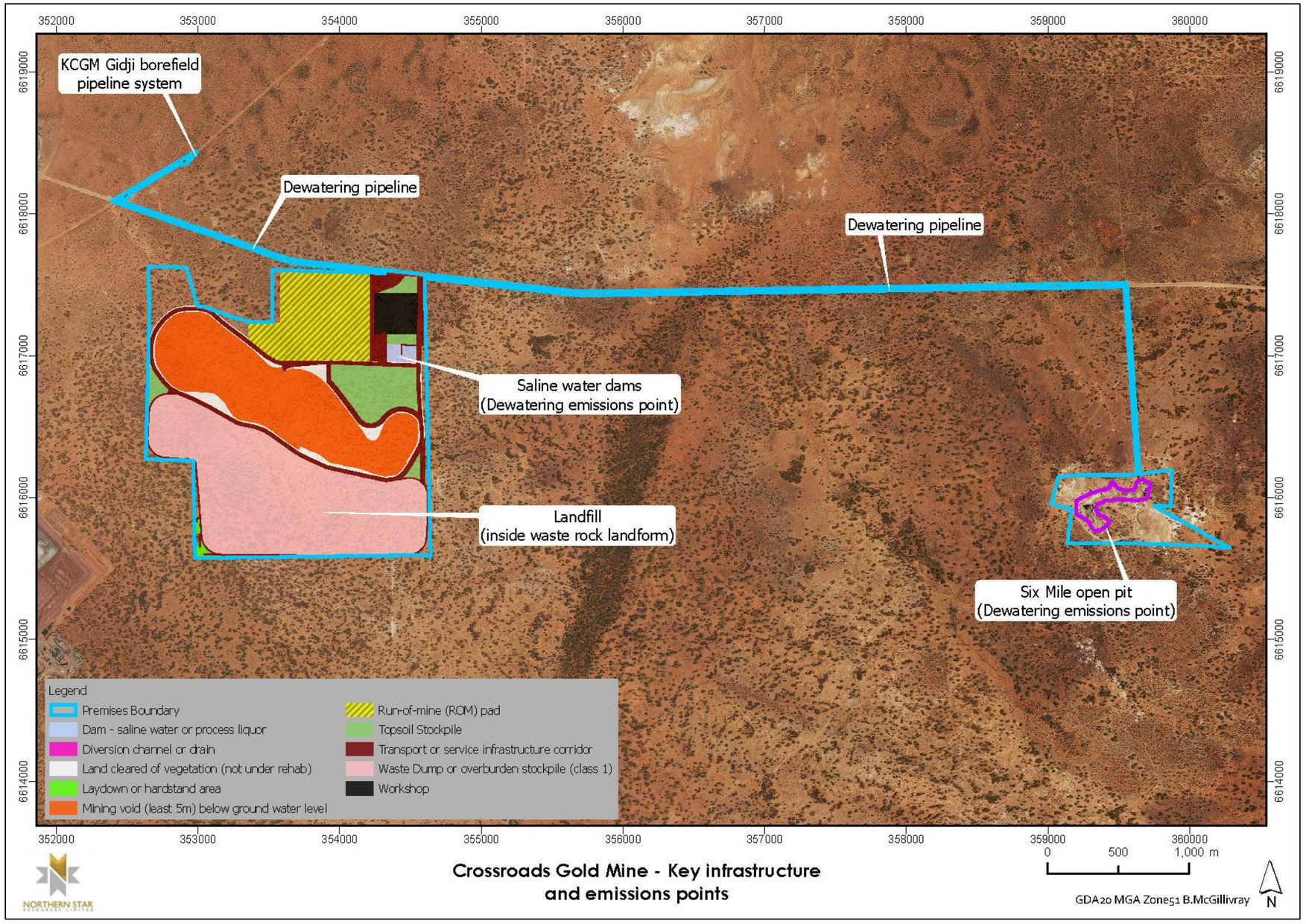

Figure 1: Map of the boundary of the prescribed premises, key infrastructure and emissions points.

Schedule 2: Premises boundary

Point	X	Y
Point 1	352,931.9	6,618,363.3
Point 2	352,441.3	6,618,091.9
Point 3	353,742.1	6,617,669.0
Point 4	355,675.8	6,617,455.0
Point 5	359,559.2	6,617,516.0
Point 6	359,649.7	6,616,168.5
Point 7	359,874.8	6,616,196.5
Point 8	359,868.6	6,615,938.9
Point 9	359,749.2	6,615,942.9
Point 10	360,286.6	6,615,646.2
Point 11	359,138.6	6,615,679.8
Point 12	359,167.4	6,615,919.6
Point 13	359,022.2	6,615,957.2
Point 14	359,078.7	6,616,149.6
Point 15	359,629.4	6,616,166.0
Point 16	359,540.1	6,617,487.0
Point 17	355,704.2	6,617,425.5
Point 18	354,601.1	6,617,546.5
Point 19	354,643.5	6,615,587.8
Point 20	352,978.5	6,615,574.1
Point 21	352,969.1	6,616,261.7
Point 22	352,632.5	6,616,272.7
Point 23	352,651.9	6,617,631.8
Point 24	352,921.2	6,617,623.8
Point 25	352,996.3	6,617,351.4
Point 26	353,360.0	6,617,241.2
Point 27	353,528.0	6,617,238.4
Point 28	353,527.7	6,617,605.8
Point 29	354,321.7	6,617,582.3
Point 30	353,650.8	6,617,658.1
Point 31	352,388.7	6,618,091.3
Point 32	352,982.1	6,618,444.6
Point 33	352,931.9	6,618,363.3