Decision Report

Application for Works Approval

Part V Division 3 of the *Environmental Protection Act 1986*

Works Approval Number	W3029/2025/1
Applicant	Northern Star Resources Ltd
ACN	092 832 892
File number	APP-0028668
Premises	Jundee Operations Wiluna, WA 6646 Legal description Part of mining tenements M53/191, M53/413, and M53/414 and general tenement G53/20 As defined by the premises maps attached to the issued works approval
Date of report	25 November 2025
Decision	Works approval granted

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1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of a proposed dry tailings paste plant at the Jundee Operations. As a result of this assessment, works approval W3029/2025/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

2.2 Application summary and overview of premises

On 18 April 2025, Northern Star Resources Ltd (the applicant) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The application is to undertake construction works relating to a dry tailings paste plant to generate paste fill for underground stope backfilling at the Jundee Operations, located approximately 41 km east of the town of Wiluna in the Shire of Wiluna (Figure 1).

The proposed dry tailings paste plant is a prefabricated modular design and will be used at two different locations within Jundee referred to as Cardassian and Westside. The tentative program is to construct and operate the paste plant at Cardassian for 12 months, before relocating to Westside for 36 months, however this is subject to underground mine scheduling requirements.

The original application was for 720,000 tonnes per annum (tpa), but during the assessment period the applicant notified the department that calculation of paste throughput was based upon preliminary modelling and assumptions. These have been optimised following further feasibility work over the past six months. The optimised throughput of the plant has increase from 720,000 tpa to 998,000 tpa.

The application also included Category 6: Dewatering but the department has determined that there will be no discharge to the environment of mine dewater and therefore only the Category 5 activity is relevant to the works approval assessment.

The premises relates to the categories and assessed production / design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W3029/2025/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020) are outlined in works approval W3029/2025/1.

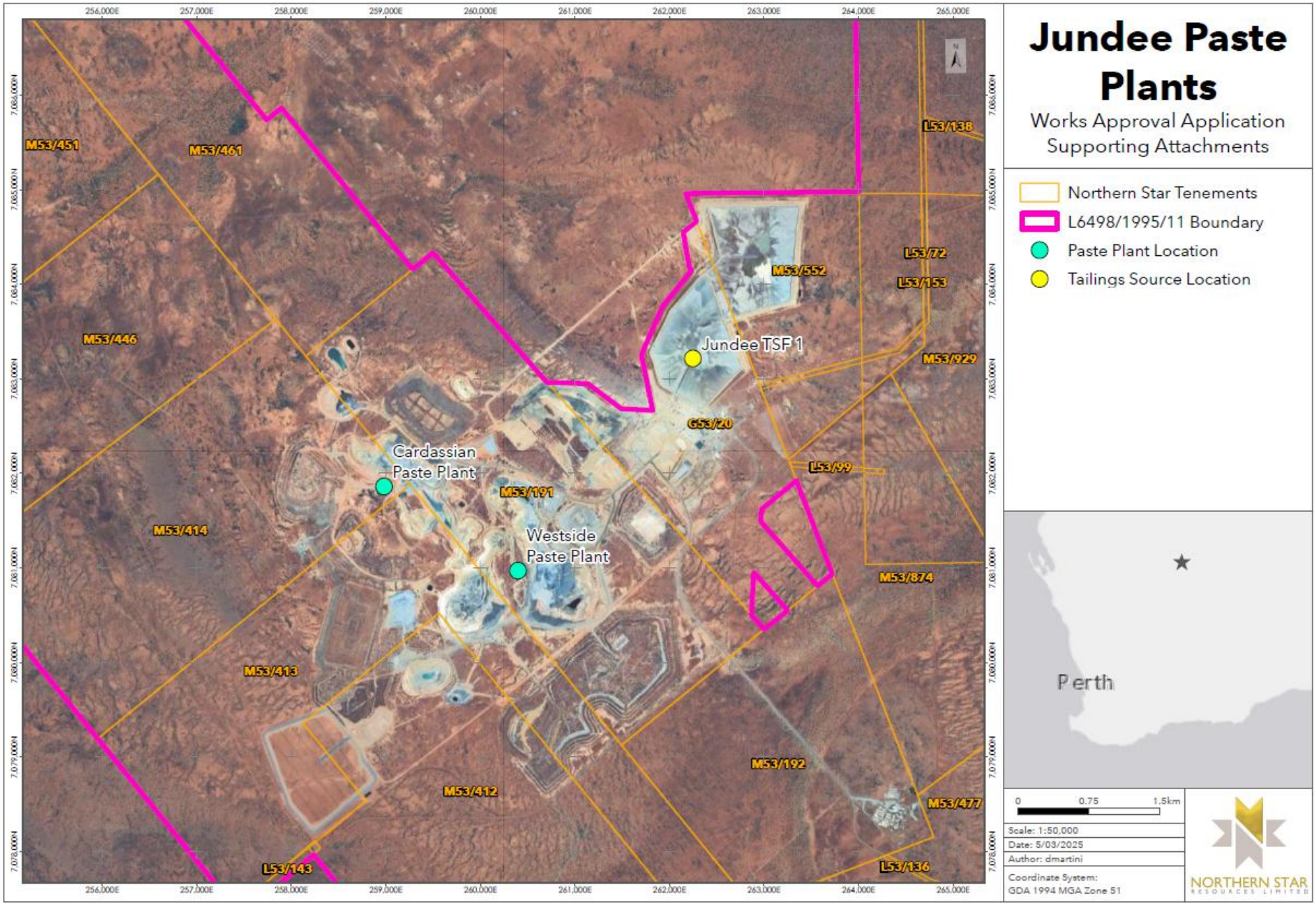

Figure 1: Jundee paste plant and TSF 1 location

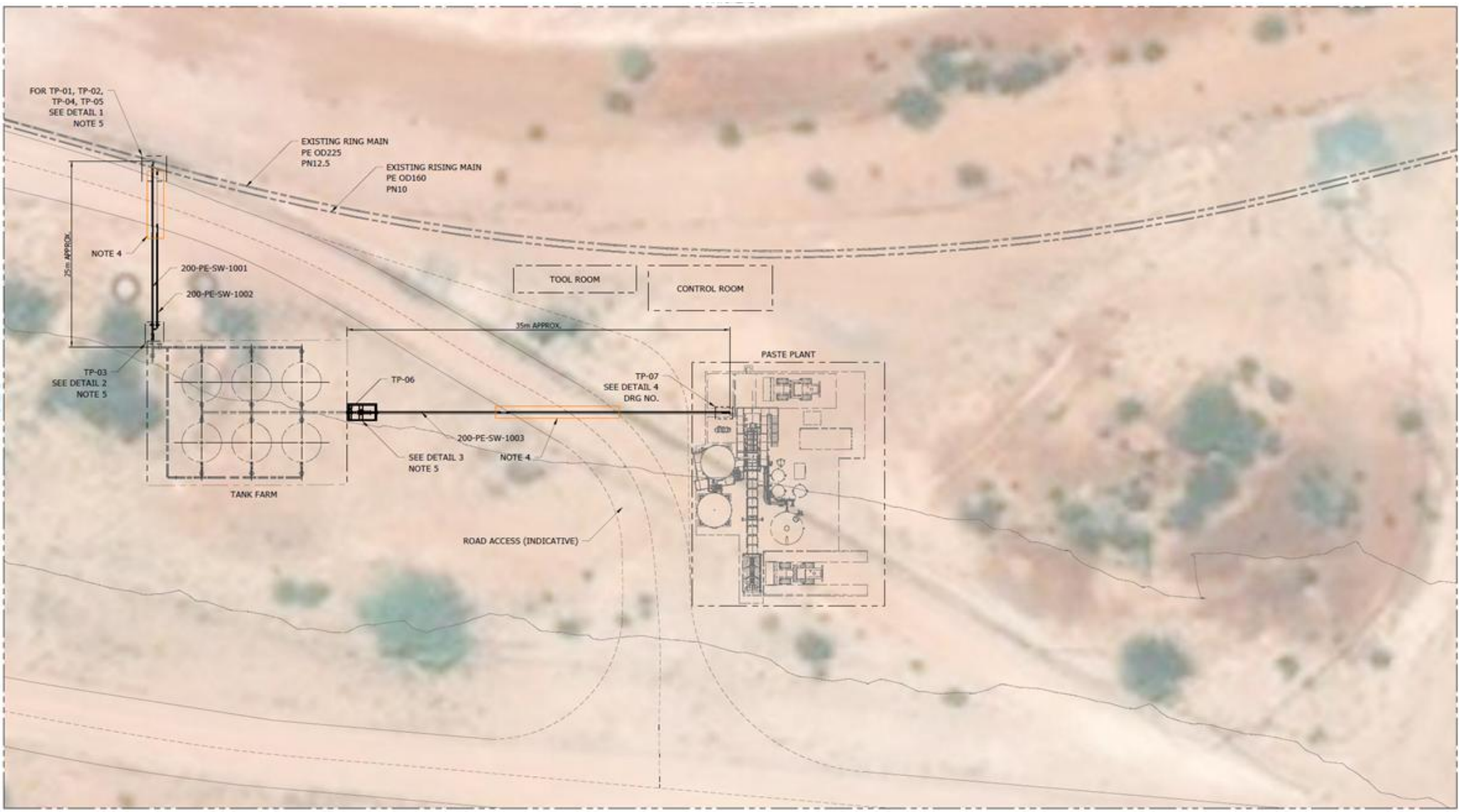

Figure 2: Paste plant layout and proposed water supply

2.2.1 Paste plant details

The applicant states that paste will be generated from blending of reclaimed tailings, cement and water within a mixing tank, and will be fed directly underground via bore hole to open stopes. According to the supporting information provided by the applicant, paste fill enables for higher recovery of ore than open stope mining as pillars are not required for ground support and can be extracted, also enabling tailings to be reused for a beneficial purpose.

The proposed dry tailings paste plant is of a prefabricated modular design, enabling quick installation and relatively minimal commissioning requirements. A concrete pad will firstly be constructed to allow for modular infrastructure to be bolted into place. The maximum throughput of the paste plant is 120 m^3/ hour, but the estimated productivity is likely to average between 960 –1,200 m^3/day as it will not be operated continuously.

The paste plant has a simple configuration broadly comprised of the following items of infrastructure:

- Hopper - front end loader fed with a capacity of 10 m^3 with constant feed rate onto conveyor.
- Conveyor – rubber lined incline conveyor with discharge chute directly into mixer.
- Cement silos – Two 240 tonne silos fed via compressed air driven pneumatic transfer and fitted with dust filter and overfill protection.
- Water tank – 25,000 L water storage tank to contain mine dewater from saline water pipelines.
- Mixer – single shaft continuous mixer which blends tailings, cement and water into paste.
- Bore hole – bore hole located over concrete sump driven by two centrifugal pumps which transfers paste directly underground to open stopes.
- Control system – central control system with operator interface with appropriate fault messages and automated shut down processes.

An indicative layout of the paste plant is shown in Figure 2 and Figure 3, which is a photo of an existing paste plant with the same configuration which will be utilised at Jundee.

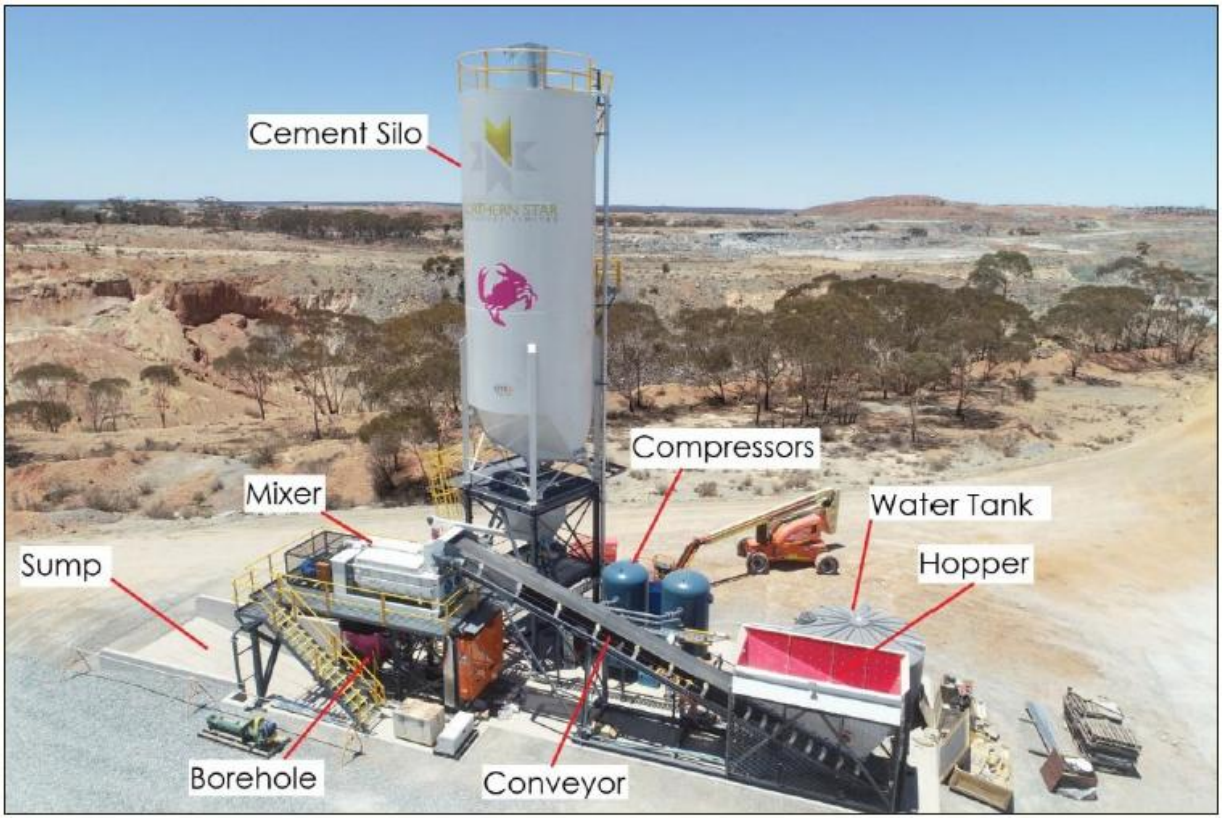

Figure 3: Paste plant indicative layout

2.2.2 Dry tailings handling

Dry tailings will be reclaimed (excavated) from Jundee tailings storage facility (TSF) 1 and transported by trucks approximately 6 km to paste plant locations (Figure 1).

Whilst tailings are considered dry, they contain sufficient residual moisture (approximately 15%) to prevent dusting during loading, unloading and transportation. Haulage will occur on existing access roads within Northern Star tenements, and tenement M 53/193 owned by external third party under existing access deed. No public roads will be accessed for any haulage of tailings.

Tailings will be unloaded in designated stockpile areas adjacent to paste plants which will be graded towards adjacent pits to capture any surface water runoff. The stockpile area will be constructed of a compacted clay or compacted tailings layer over crushed aggregate or surplus borrow material to ensure separation between stockpiled tailings and in-situ soils.

Tailings will be stockpiled to a maximum height of 5 m in windrows. Tailings may be rehandled in the stockpile area to allow for further drying to reduce moisture content required to create paste.

2.2.3 Tailings characterisation and chemistry

Tailings at the Jundee Operations have been well-characterised through recent licence amendments and supporting technical submissions. The data collectively show that tailings are geochemically stable, with a low potential for acid or metalliferous drainage.

Physical properties

The tailings material is derived from gold-processing residues from the Jundee Carbon-in-Leach (CIL) plant. Paste plant feed tailings will be blended with a cementitious binder to form paste fill for underground stopes.

The particle size distribution indicates a fine to silty sand texture, typical of CIL tailings with

specific gravity ~2.7 t/m³.

Geochemical characteristics

Testing of tailings from multiple licence amendment assessments (2019 – 2023) shows that they are non-acid forming (NAF).

- Acid Neutralising Capacity (ANC): typically exceeds 30 kg H_2SO_4/t.
- Net Acid Producing Potential (NAPP): negative to mildly positive values, confirming low acid generation risk.
- Sulphide minerals (mainly pyrrhotite) are finely disseminated, and cement addition in paste fill further inhibits oxidation and sulphate generation.

Static leach testing of tailings supernatant and decant water found that quality is, as below:

- pH: 7.1 – 8.2
- Electrical Conductivity (EC): 2.0 – 10 mS/cm
- Chloride: 300 – 2,200 mg/L
- Sulphate: 400 – 3,800 mg/L
- Dissolved metals: generally low; Cu, Zn, Ni, Mn < 0.1 mg/L; As and Se below detection limits.
- Total Dissolved Solids (TDS): 330 – 11,000 mg/L across site monitoring, consistent with groundwater salinity.

Environmental behaviour

The applicant considers the tailings to be chemically compatible with site groundwater, which is already brackish to hypersaline, and the department notes that there is no beneficial use of groundwater within the project area.

Paste curing is expected to reduce the hydraulic conductivity and immobilises trace metals by cement encapsulation. In addition, no cyanide residues are expected in paste tailings since cyanide destruction occurs before tailings are discharged to the paste plant circuit.

Monitoring from the existing TSF and seepage recovery network indicates no acidification trends in underlying groundwater bores.

2.3 Paste plant water supply

About 200,750 tonnes (per annum) of water for blending paste will likely be sourced from Cook Pit, an existing mine dewater point at Jundee. The applicant has notified the department that there is an existing Category 6 dewater pipeline (Jundee ring main) running adjacent to the proposed location of the paste plants. The applicant has determined there is enough capacity in the line to not have to duplicate it, so, water supply to the paste plant will be a simple tee off / transfer from the Jundee ring main (see general arrangement in Figure 2).

A water tank, 25,000 L in capacity will contain mine dewater for paste plant operations.

The department advises the applicant that if pipelines are to be constructed as part of the paste plant operations, then an amendment of works approval W3029/2025/1 may be required for this infrastructure.

2.4 Hydrogeology

The Jundee Operations are located within the Yandal Greenstone Belt of the Northern Goldfields region. The local hydrogeology is dominated by fractured rock aquifers associated with greenstone lithologies. Groundwater occurs in weathered and fractured rock zones, with

variable yields depending on fracture density and connectivity.

Monitoring bores across the Jundee premises indicate groundwater levels typically between 15 – 30 m below ground level, depending on topography and local geological conditions.

2.4.1 Groundwater quality and chemistry

Water quality across the premises is highly variable, ranging from fresh to hypersaline. Monitoring since 2017 shows salinity levels from 330 mg/L to 11,000 mg/L total dissolved solids (TDS). This variability reflects the heterogeneous nature of the fractured rock aquifer system and evaporative concentration in low-lying areas.

Tailings and dewatering studies indicate that groundwater is typically sodic saline, with elevated chloride and sulfate in hypersaline zones. Cement addition during paste production is expected to reduce the mobility of sulphide minerals (e.g. pyrrhotite), thereby lowering the risk of acid or metalliferous drainage.

The groundwater resource is non-potable and primarily used for mine dewatering and operational supply. No public drinking water source areas occur within proximity of the paste plant; the nearest drinking water reserve is 40 km southwest at Wiluna.

Monitoring of groundwater levels and chemistry is ongoing under the site's operating licence conditions, with annual and triennial groundwater review reports submitted to DWER.

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk Assessments* (DWER 2020).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this decision report are detailed in Table 1 below. Table 1 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 1: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Construction / installation of infrastructure: vehicle movements, earthworks	Air / windborne pathway	Watercarts will be used for dust suppression. Construction will be limited during periods of excessive winds.
Noise	Construction / installation of infrastructure:	Air / windborne pathway	No controls are proposed. *Environmental Protection (Noise)*

Emission	Sources	Potential pathways	Proposed controls
	vehicle movements, earthworks		*Regulation 1997* apply.
Operation			
Dust	Stockpiling and unloading dry tailings at paste plant. Handling dry tailings. Movement of machinery /vehicles	Air / windborne pathway	Tailings contain residual moisture of approximately 15% which should reduce dust during unloading / stockpiling. Trucks will be covered. Tailings will be stockpiled to a maximum of 5 m height in windrows (from side tipper unloading). Visual monitoring of dust liftoff from tailings stockpiles and wetting down if required.
Hydrocarbon spill	Spills and leaks of hydrocarbons from mobile machinery, pumps and plant equipment.	Direct discharge to land	Spill kits are available. No dangerous goods will be stored at the paste plant or mobile crushing and screening plant.
Tailings / paste	Tailings spill during unloading and transfer to paste plant. Paste spills	Direct discharge to land	Paste boreholes are located within a concrete sump. The stockpile area will be constructed of a compacted clay or compacted tailings layer over crushed aggregate to ensure separation between tailings and in-situ soils.
Dewatering effluent	Pipeline / tank leaks or spills.	Direct discharge to land and seepage	Water tanks are fully enclosed. Shutdown valves will be installed to allow for isolation for maintenance and in response to leaks or spills. Existing pipelines are conditioned as per L6498/1995/11.
Contaminated stormwater runoff	Stormwater coming into contact with tailings stockpiles	Overland runoff	Paste plant and tailings stockpile area surrounded by earthen bunds on external perimeter (excluding road train egress points) and graded internally to contain surface water runoff. The stockpile area will be constructed of a compacted clay or compacted tailings layer over crushed aggregate or surplus

Emission	Sources	Potential pathways	Proposed controls
			borrow material.

3.1.2 Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020), the Delegated Officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies and is provided for under other state legislation.

Table 2 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises *(Guideline: Environmental Siting* (DWER 2020)).

Table 2: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Jundee Homestead	2.6 km northeast from main active mining area.
Environmental receptors	**Distance from prescribed activity**
Surface water	Ephemeral creek line, 7 km northwest. **Receptor screened out due to distance.**
Underlying groundwater (non-potable purposes)	Water quality across the premises ranges from fresh to hypersaline. Monitoring bores since 2017 have produced results ranging from 330 – 11,000 mg/L TDS.
Cultural receptors	**Distance from prescribed activity**
Aboriginal heritage site	There are approximately 20 sites of archaeological and ethnographic significance in the Jundee Operations area. These tend to be artefact "scatters", with each site containing between 100 and 30,000 artefacts. "Plover Bore" is the closest site, located 2.1 km northwest of the proposed activity. **Receptors screened out due to distance.**

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the delegated officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 3.

Works approval W3029/2025/1 that accompanies this decision report authorises construction and time-limited operations. The conditions in the issued works approval, as outlined in Table 3 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence amendment is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the premises i.e. Category 5: Processing or beneficiation of metallic or non-metallic ore activities. A risk assessment for the operational phase has been included in this decision report; however licence conditions will not be finalised until the department assesses the licence application.

Table 3: Risk assessment of potential emissions and discharges from the premises during construction, and operation

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Construction								
Construction of new Jundee paste plant.	Dust	**Pathway:** Air/windborne pathway **Impact:** Health and amenity	No receptors.	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 1: Design and construction / installation requirements	The Delegated Officer notes that the construction period will be short, and the paste plant location is central to the operations and separate from vegetation. The Delegated Officer considers noise and dust impacts will remain low due to distance from receptors and short construction timeframes.
	Noise			Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	
Operation (including time-limited-operations operations)								
Operation of new Jundee paste plant at Cardassian and Westside.	Dust generated during paste plant operations.	**Pathway:** Air/windborne pathway **Impact:** Health and amenity	Aboriginal heritage site, "Plover Bore" located 2.1 km northwest	Refer to Section 3.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 6: Infrastructure and equipment requirements during time limited operations	Conditions related to the management of dust from paste plant operation are included in the works approval
	Hydrocarbon spill.	**Pathway:** Direct discharge to land **Impact:** Contamination of soils	Soils	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	N/A *Environmental Protection (Unauthorised Discharges) Regulations 2004* apply
	Paste deposition underground.	**Pathway:** Leaching of contaminants from paste **Impact:** Contamination of groundwater	Groundwater	Refer to Section 3.1	C = Minor L = Unlikely **Medium Risk**	Y	N/A	NSR conduct field water quality samples monthly as conditioned in existing licence L6498/1995/11.
	Dewater used in paste production.	**Pathway:** Leaks from, or failure of process water tank.	Soils	Refer to Section 3.1	C = Minor L = Unlikely	Y	Condition 6: Infrastructure and equipment requirements during	Pipes and tanks to be inspected daily. Pipelines fitted with flow

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
		Impact: Ecosystem disturbance or impact to surface water quality.			**Medium Risk**		time limited operations	meters and inspected daily as per licence L6498/1995/11.
	Contaminated stormwater.	**Pathway:** Overland runoff **Impact: E**cosystem disturbance or impacting surface water quality	Native vegetation	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	Condition 6: Infrastructure and equipment requirements during time limited operations	Applicants' proposed controls are acceptable to manage this risk event and have been conditioned in the works approval in accordance with Guideline: Risk Assessments (DWER 2020).

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk Assessments* (DWER 2020).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

4. Consultation

Table 4 provides a summary of the consultation undertaken by the department.

Table 4: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 4 August 2025	None received	N/A
Applicant was provided with draft documents on 20 November 2025	The applicant provided a response to the draft documents on 21 November 2025. The applicant requested that the remainder of the comment period be waived. Refer to Appendix 1	Refer to Appendix 1

5. Conclusion

Based on the assessment in this decision report, the delegated officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, Guideline: Risk Assessments, Perth, Western Australia.
4. Northern Star Resources (NSR) 2025, 'Jundee Paste Plant Works Approval Application Supporting Attachments', Subiaco, Western Australia.

Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Department's response
Condition 1, Table 1: Design and construction / installation requirements	An additional silo has been added to the design to provide additional cement storage capacity and operational contingency. The applicant does not believe this will have an impact on the paste plant throughput or environmental risk and the second silo will be of the same 240 tonne capacity fitted with dust filter and overfill protection.	The Delegated Officer does not believe that the environmental risk is significantly increased with the inclusion of a second cement silo and has made this proposed change to the final version of W3029/2025/1.
Condition 1, Table 1: Design and construction / installation requirements	Whilst the existing surface water management condition is appropriate for the majority of rainfall events, any significant rainfall events (i.e. 1% AEP event) may require overflow into the adjacent pit so there is no avenue for discharge into the surrounding environment. The applicant requests that the condition be clarified to state that any overflow is to be directed to the adjacent open pit.	Given the small size of the paste plant and stockpile area, the Delegated Officer considers the potential discharge into the pit to be minimal in the context of the pit catchment. The Delegated Officer considers containment of overflow water in the pit to be preferable to allowing water to be released into nearby vegetation.